

IDEAS FOR UQ ST LUCIA

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Ideas for UQ St Lucia

This Ideas for UQ St Lucia document contains water and energy initiatives identified by stakeholders as part of the UQ St Lucia research synthesis workshop hosted by the Cooperative Research Centre for Water Sensitive Cities (CRCWSC) and Bligh Tanner at the University of Queensland (UQ) Global Change Institute on 28 and 29 July 2016. The ideas were generated by CRCWSC participants and UQ stakeholders to inform the UQ St Lucia Campus Master Plan being prepared by UQ Properties and Facilities Division and their master plan consultants: Urbis, Bligh Tanner and MRCagney.

The research synthesis workshop explored opportunities for the UQ St Lucia Campus master plan to:

- deliver generative infrastructure (water, energy, community, environment)
- facilitate adaptive infrastructure (flexible, scalable, secure) to meet future conditions and needs
- leverage green and blue infrastructure to enhance living and learning
- integrate urban design and water management considerations.

The following Ideas for UQ St Lucia developed and explored by workshop participants are presented and described in this document as a record of the workshop outcomes and to stimulate potential further development by UQ and its consultants through the master planning process.

Idea 1: Make existing sustainability initiatives more legible, accessible and connected (for learning)

Idea 2: Develop an integrated water and energy strategy

Idea 3: Create a welcoming and engaging environment along the river edge for the University community and local community

Idea 4: Connect with other water innovation precincts in Brisbane to enhance global reach and recognition for Brisbane as a new world city

Effective stakeholder engagement is critical to the successful development and implementation of the UQ St Lucia campus master plan. Adopting contemporary and innovative stakeholder engagement will help UQ work with the diverse range of individuals and groups with an interest in the master plan, and demonstrate its standing as a global leader.

The collective value of these ideas are represented in the concept of blurring the lines to create a living-learning-working environment. This initiative would identify and build on natural synergies between the different physical environments and associated activities across the University to enhance the UQ St Lucia experience for staff, students, visitors and other stakeholders.

These ideas for UQ St Lucia contribute to a:

connected campus: leveraging the University's attractive campus and sub-tropical climate, and creating and enhancing outdoor living and learning opportunities across the campus and along the riverfront through increased visibility and learning-access.

community campus: developing infrastructure and facilities that recognise and support links between the University and the local community with an initial focus on increased activation of the 3.2km campus riverfront.

knowledge city campus: leveraging the international reputation and research expertise of the University, connected to other centres of knowledge and innovation across the city, to support Brisbane's new world city aspirations.

The ideas were informed by an appreciation of Aboriginal connection to place and relationship with water, and the value of indigenous teaching and learning practices. The development and implementation of the UQ St Lucia Campus Master Plan represents an important opportunity for UQ to support Aboriginal reconciliation.



Context

The following considerations informed the scope and focus of the research synthesis workshop.

1. Quality of living and quality of learning opportunities are critical in attracting and retaining students in an increasingly competitive tertiary education environment.
2. Increased digital delivery of information needs to be complemented with opportunities for high-value face to face learning and interactions. A reduced demand for lecture-theatre based teaching creates opportunities for alternate teaching and learning environments.
3. UQ St Lucia has already implemented a number of sustainability initiatives, particularly in the water and energy space. New ideas should leverage and build on existing initiatives.
4. Hard infrastructure has a 30 to 50+ year life; decisions made now impact future directions and opportunities.

The research synthesis workshop explored opportunities for leveraging existing infrastructure and teaching initiatives, and for creating new opportunities for living and learning.

A Directions Paper outlining key considerations to be addressed in the master plan was being developed at the time of the research synthesis workshop (published in October 2016). Key themes outlined in the directions paper are:

- connectivity to the city
- a distinct St Lucia campus
- culture and community
- innovation and authenticity.

A UQ Student Strategy (white paper) was published shortly before the research synthesis workshop. The white paper outlines four goals which seek to change the way higher education is imagined and experienced at UQ. These goals are:

- game-changing graduates
- student-centred flexibility
- dynamic people and partnerships
- an integrated learning environment.

The purpose and role of the St Lucia campus in relation to these themes and goals were explored in the research synthesis workshop. They were considered from the perspectives of water and energy, teaching and learning, and people and place.

Ideas

Idea 1: **Make existing sustainability initiatives more legible, accessible and connected (for learning)**

UQ has implemented a number of sustainability initiatives - particularly in relation to water and energy. The opportunity to leverage these existing initiatives more broadly within an integrated teaching and learning environment is the basis of Idea 1. These are also opportunities to more actively showcase UQ's leading role in water and energy sustainability to existing and potential future University staff, students and visitors.

Existing water initiatives include alternate water sources for open space irrigation: rainwater from the roof of the Sir Llew Edwards building, stormwater collected in the campus lakes, and recycled wastewater from Fairfield Wastewater Treatment Plant. Energy initiatives include the 1.22 megawatt array installed across four campus buildings (two multi-level car parks, Sir Llew Edwards building, and the UQ Centre).

There is potential to provide visual and digital connection between existing water and energy (and other) sustainability measures, and to incorporate new initiatives as part of a learning trail. Knowledge nodes connected by this learning trail can provide active and passive teaching and learning opportunities, while utilising and promoting informal learning opportunities provided by UQ St Lucia's attractive campus and Brisbane's subtropical climate.

Use of georeferenced augmented reality via smart phones and tablets (à la Pokémon Go) will enable hidden infrastructure (e.g. underground water pipes and water storage tanks, and rooftop solar panels) to become 'visible', with associated data (e.g. daily use against seasonal average or aspirational target; proportion of alternate water or renewable energy used) available for teaching and learning. This technology can also be paired with physical objects (e.g. sculpture) to enhance learning opportunities.

Collection and real-time provision of open-access data relating to sustainability initiatives could enable greater awareness, understanding and connection with the water and energy (and other) systems that support the University. Utilising this data to facilitate adaptive learning could also assist UQ to refine and adapt sustainability initiatives over time.

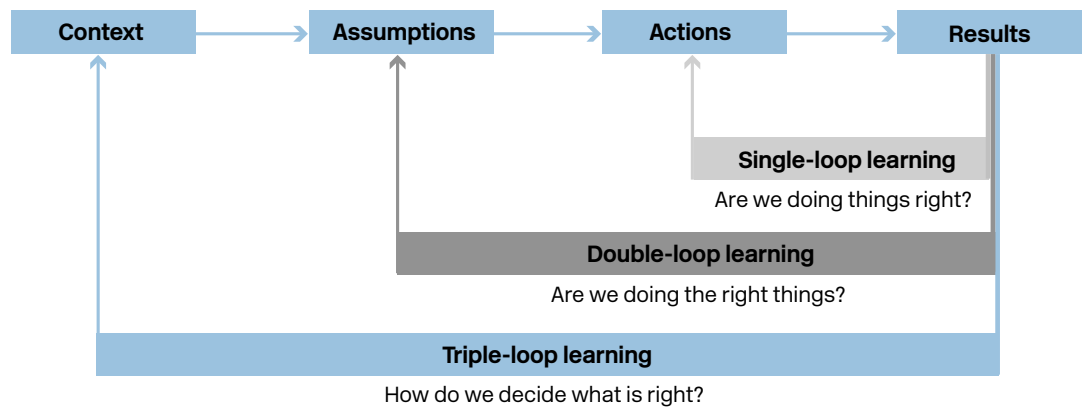


Implementation of this idea could:

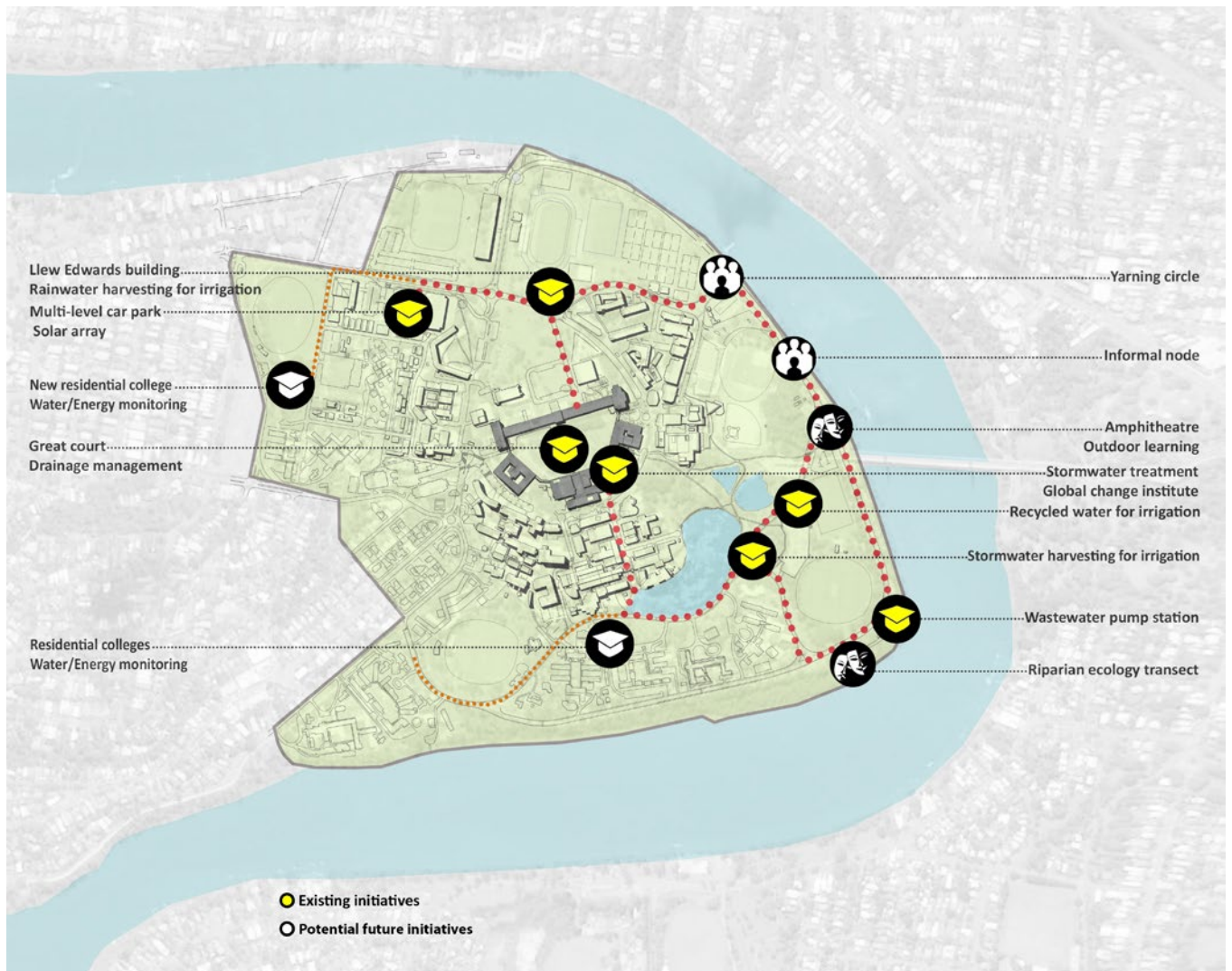
- increase the (physical and virtual) visibility of existing sustainability initiatives (knowledge nodes), and increase opportunities for teaching and learning across the campus
- link knowledge nodes via a learning trail to demonstrate precinct-scale connectivity and complexity (bio-physical, disciplinary, organisational)
- catalyse triple-loop learning (i.e. are we asking the right questions?) by utilising performance data from research and demonstration projects (e.g. Global Change Institute's green wall)
- enhance active and passive learning opportunities for students and community
- increase awareness (visibility) of UQ's national and global leadership, particularly in relation to urban water management.

Outcome: Enhanced outdoor living and learning opportunities

Knowledge nodes (sustainability initiatives) connected by a learning trail will enhance outdoor / informal teaching and learning opportunities across the campus and along the river. The knowledge nodes should include technological / infrastructure initiatives, and also provide catalysts for informal knowledge sharing, for inter-generational and cultural exchange, and for enhanced community connection and engagement.



Triple-loop learning (after Argyris, 2004)



Knowledge nodes connected by a learning trail

Idea 2: Make existing sustainability initiatives more legible, accessible and connected (for learning)

A clear and complete understanding of current water and energy systems at UQ St Lucia is critical to making informed decisions about enhancing security and sustainability through future infrastructure investments and management decisions. It enables a system-level understanding of water and energy needs, and the inter-relationship between these and other systems to be communicated to a wide range of stakeholders, allowing broader understanding and informed input to planning processes, including the development of the St Lucia Campus master plan.

An important early step in developing an integrated water and energy strategy is to understand the mass balance of individual systems (inputs, use, outputs, and change in storage). Mass balance methods are more holistic than traditional supply-demand methods as they represent the performance of the urban system rather than the performance of the water infrastructure. Mass balance also provides a good foundation for urban metabolism evaluation methods being developed by UQ researchers (Renouf et al., 2016), which quantify the process of resources flowing through, being transformed and consumed within an urban entity to sustain all the technical and socio-economic activities that occur within in it. The urban metabolism approach also includes the analysis of direct resource exchanges between an urban area and its supporting region (Renouf and Kenway, in press).

Preparation of water and energy mass balance representations for UQ St Lucia to inform the development of an integrated water and energy strategy will:

- enable a holistic high-level understanding of UQ St Lucia's water and energy systems, facilitating more effective communication with a wide range of stakeholders as part of strategic planning processes
- identify key opportunities and challenges associated with managing supply (e.g. increasing local alternate / renewable supplies) and demand to meet current and future system security and sustainability needs.
- facilitate communication of UQ's global leadership in water management to University and local communities and to visitors.

Implementing a digital open-source water-energy brain, connected to extensive real-time system monitoring, to store and share water and energy information represents a continuation of this idea. As well as providing important management and control information, this information could also be utilised as part of the learning trail described in Idea 1. For example, real-time information on water (and energy) storage levels, and/or cumulative inflow / supply, use and outflow could be incorporated in teaching and learning. This initiative can draw on the University's broad knowledge and expertise in urban water and energy management, including (but not limited to) the School of Chemical Engineering, Advanced Water Management Centre, Global Change Institute, Institute for Social Sciences and Dow Centre for Sustainable Engineering.

An integrated water and energy strategy and water-energy brain for the St Lucia Campus will complement the living laboratory for water sensitive cities initiatives identified in the Key Directions Paper. A living laboratory integrates research and innovation within a user-centred, open-innovation ecosystem. It involves collaboration between researchers, industry, government and end-users, implementing, testing and refining initiatives in real-world settings.

A living laboratory for water sensitive cities will:

- embed unique learning opportunities for students from across urban / built environment disciplines in the management of water, one of the earth's most precious resources.
- build competence of future graduates and post-graduates in relation to water sensitive city principles and aspirations
- create interpretive, experimental and collaborative learning opportunities, and providing opportunities for industry-wide demonstration and collaboration
- leverage UQ's reputation for excellence in urban water and energy management, and its involvement in the Cooperative Research Centre for Water Sensitive Cities.

Outcome: A clear understanding of UQ St Lucia's current water and energy context to identify financial savings and innovation opportunities

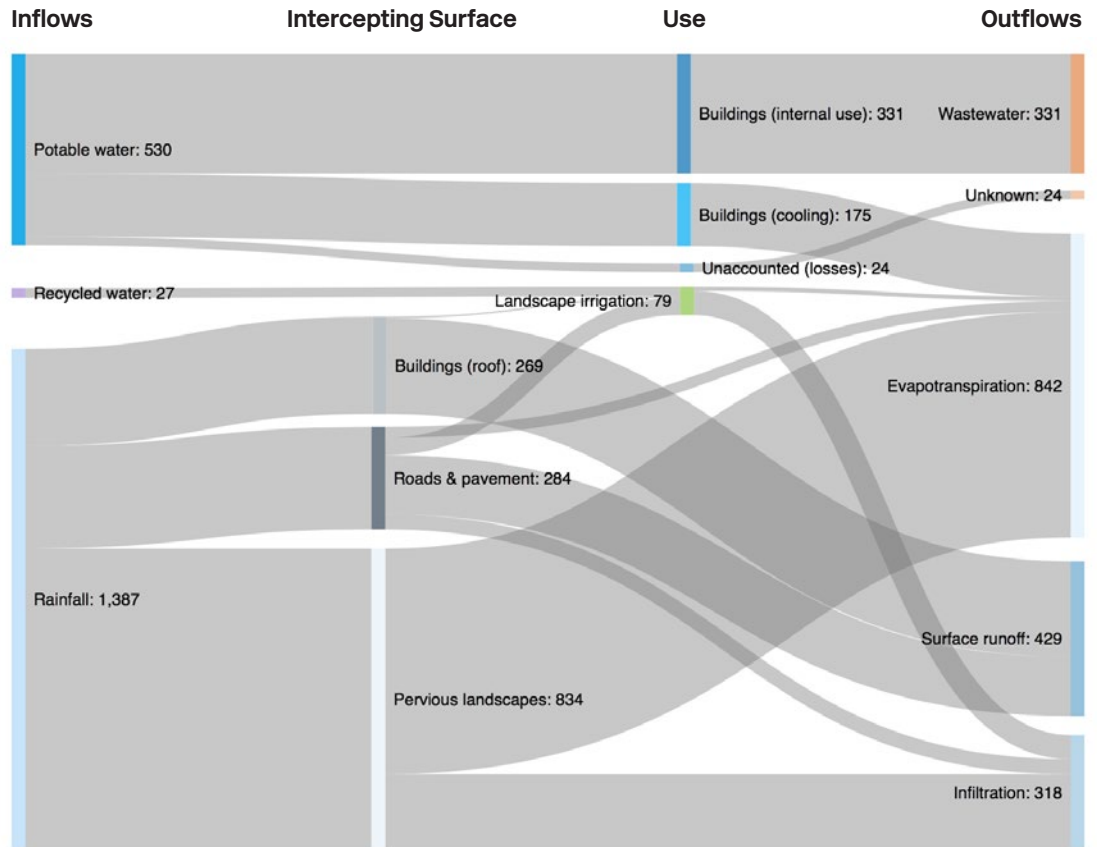
Given UQ outlays in the order of \$50M per year on energy and \$20M per year on water for the St Lucia campus (excluding residential halls), the rationale for better understanding the water and energy systems is clear.

Preparation of water and energy mass balance representations for UQ St Lucia, as part of the development of an integrated water and energy strategy, provides a strong foundation for exploring - and communicating - key opportunities and challenges associated with meeting current and future water and energy needs of the campus.

This activity will inform any subsequent water and energy assessments across the city - from semi-contained precincts or small urban communities, to wider city systems. Exploring this nexus between water and energy can identify major efficiencies or savings. For example, research by Kenway et al. (2008) showed residential hot water systems account for 87% of the total energy used by urban water systems in Australian and New Zealand.

An indicative annual water mass balance for UQ St Lucia has been prepared based on information available at the research synthesis workshop. Refinement of this indicative water mass balance could be undertaken using an urban water system model representing the different water consuming units within the campus (i.e. individual facilities and different building types) run at a sub-daily timestep. Assessing (and communicating) UQ St Lucia's water system in this way would enable information including system efficiency, spatial and temporal opportunities for enhancing security and sustainability to be more comprehensively understood.

Water and energy mass balance information (and any subsequent urban metabolism evaluations) can also be used to demonstrate and communicate UQ's sub-tropical research and teaching excellence in relation to water and energy.



Indicative UQ St Lucia water mass balance (all data in megalitres/year)
 Diagram created using SankeyMATIC based on information available at the workshop



Idea 3: Create a welcoming and engaging environment along the river edge for the University community and local community

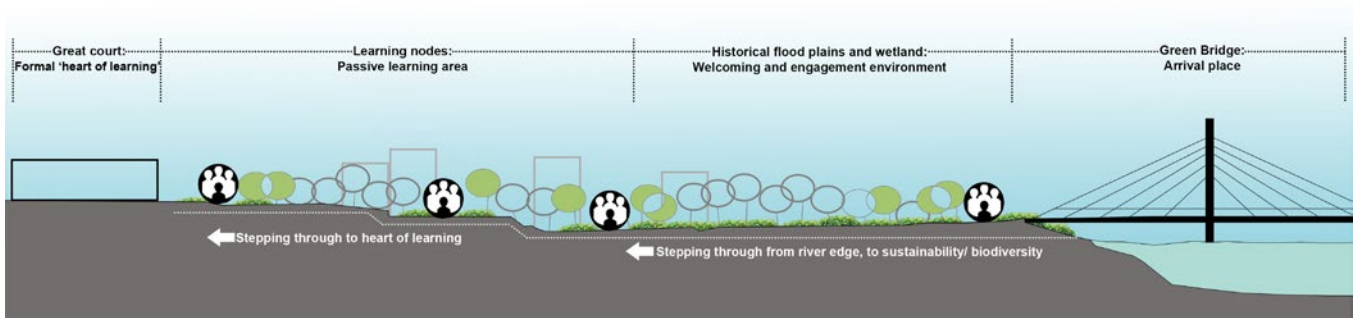
St Lucia campus' nearly 3 kilometres of accessible river edge is a valuable asset to UQ and the local community that could be enhanced through sensitive activation of this edge for the benefit of University staff, students and visitors. Existing roads, cycling paths and walking tracks provide means for people to pass along the river edge however, there is currently limited infrastructure and initiatives aimed at making the river edge a destination.

The accessibility and activation of the river edge could be enhanced while maintaining the natural beauty and value of the area by creating:

- places to meet, places to play (e.g. yarning circle, riverside amphitheatres)
- places of wonder, places to linger (e.g. informal spaces, permanent and temporary art installations)
- places to engage with nature, with the river
- places for water-based physical activity (e.g. rowing, kayaking)

Given the Aboriginal cultural significance of rivers and their banks, planning and implementation of initiatives along the river edge provide valuable opportunities for UQ to support and facilitate reconciliation of Indigenous and non-Indigenous Australians.

Activation of the river edge through a range of initiatives would enhance informal or outdoor learning opportunities and complement the traditional heart of learning on the hill and encourage movement between these two realms.

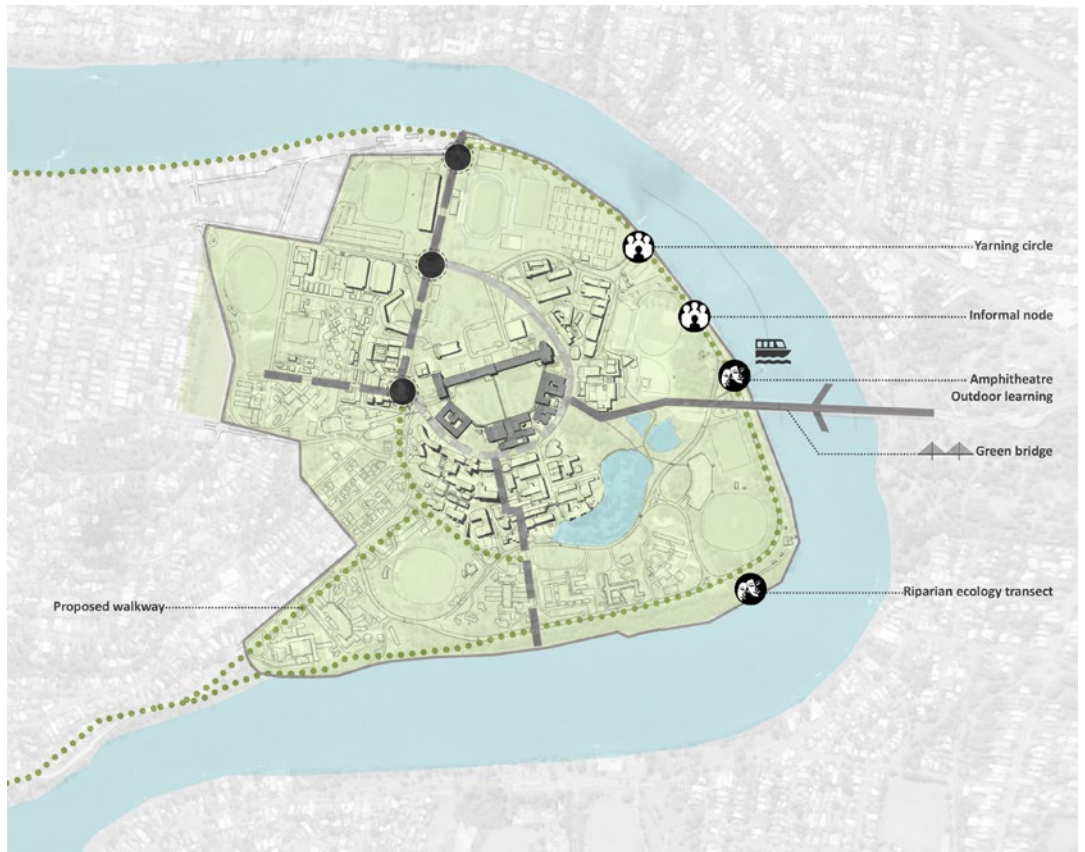


River edge to heart of learning (section)

It could also contribute knowledge nodes as part of the learning trail suggested in Idea 1. Creation of river-facing riverside amphitheatres could facilitate greater visual, physical and spiritual connection with the river. In addition to providing places for formal outdoor learning and informal gathering, these places could also incorporate permanent and temporary art work referencing connection to place and community and encouraging inquiry, wonder, and reflection.

Outcome: Enhance living and learning by leveraging the University's attractive campus, sub-tropical climate and community connection

Sensitive activation of the river edge to create a welcoming and engaging environment will increase the value of this University and community asset, and enhance UQ St Lucia as a Brisbane destination.



A welcoming and engaging river edge

Idea 4: Connect with other water innovation precincts in Brisbane to enhance global reach and recognition for Brisbane as a new world city

Brisbane aspires to be a new world city - a city with economic specialisation in newly globalising sectors, a focus on higher education and knowledge intensive industries, and a high quality of life. Both Brisbane City Council and the Queensland Government are leading initiatives to realise this aspiration. UQ is one of many internationally-leading urban water knowledge and practice organisations in Brisbane. Other organisations include the Cooperative Research Centre for Water Sensitive Cities, International Water Centre and Healthy Waterways and Catchments. Large-scale projects including the Southbank Rain Bank scheme and Brisbane district cooling and thermal energy storage initiatives represent innovative on-ground practices.

There are opportunities for UQ to strengthen strategic collaborations with leading knowledge and practice organisations to deliver mutually beneficial outcomes, and to partner with Brisbane City Council and the Queensland Government on new world city initiatives aligned with UQ's strategic direction.

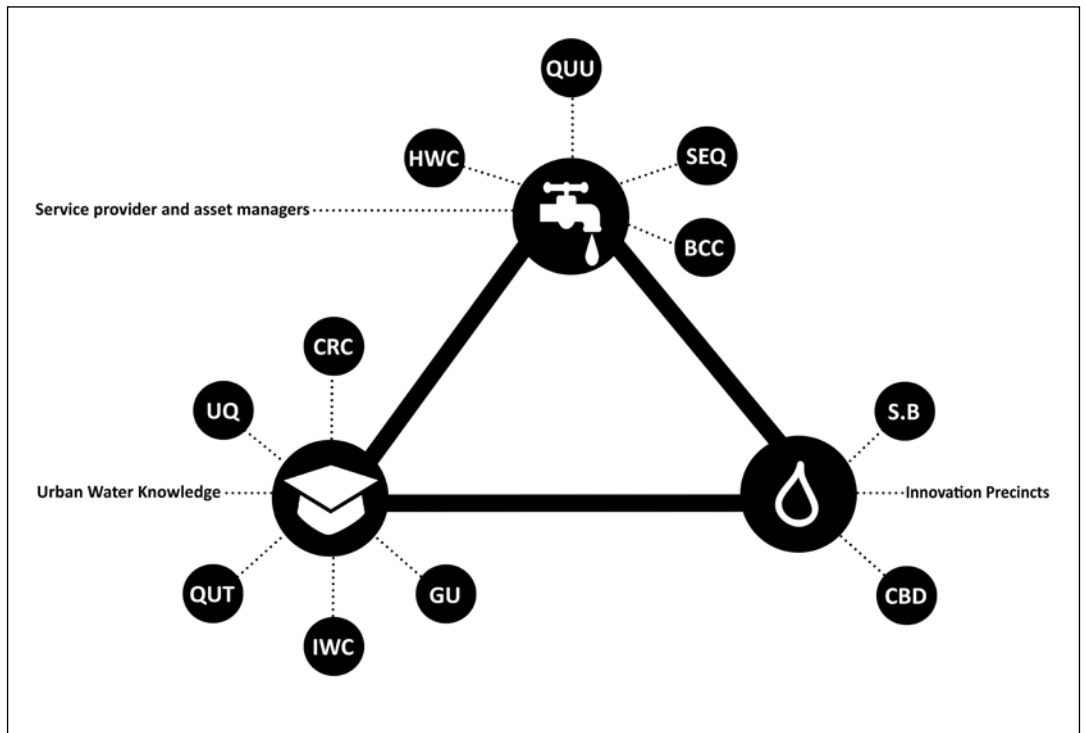
Collaborative opportunities could involve:

- **centres of urban water knowledge:** IWC (integrated water management), Healthy Waterways and Catchments (waterway health), Queensland University of Technology (e.g. flood management), Griffith University (e.g. joined-up regional planning) and the CRCWSC (e.g. resource recovery from waste water).
- **service providers and asset managers:** Queensland Urban Utilities, SEQ Water, Brisbane City Council
- **innovative water and energy precincts:** Southbank Rain Bank scheme, Brisbane district cooling and thermal energy storage initiatives.

UQ St Lucia's solar array demonstrates UQ leadership in energy, while the living laboratory for water sensitive cities proposed in the Key Directions Paper could showcase UQ's urban water knowledge leadership and provide a basis for strong University - government - industry collaboration. This initiative could also be a catalyst for fostering stronger partnerships with both the Queensland Government (via Trade and Investment Queensland, and Economic Development Queensland) and Brisbane City Council (via new world city initiatives).

Outcome: Increased global reach and recognition for UQ's urban water and energy expertise

Enhanced collaborations and partnerships with other leading knowledge and practice organisations in Brisbane could facilitate greater international exposure and positioning for UQ, while also supporting Brisbane's new world city aspirations.



Enhancing new world city connections

Stakeholder engagement

Effective stakeholder engagement is critical to the successful development and implementation of the UQ St Lucia Campus master plan. Contemporary and innovative approaches to stakeholder engagement approaches will assist the University to work with the diverse range of individuals and groups with an interest in the master plan.

The University should:

- **access and utilise contemporary knowledge and expertise:** engage with University academics and associated industry professionals to identify and apply stakeholder engagement strategies that support the development and implementation of the master plan and reflect the University's standing as a global leader.
- **undertake genuine and transparent engagement:** be clear on the purpose and desired outcomes of individual and collective engagement activities; don't over-promise; demonstrate willingness to explore creative / alternate approaches to achieve required outcomes while also addressing key concerns in relation to liveability and amenity.
- **identify alignment between University priorities and community needs:** identify where there is (or could be) alignment between University priorities and community needs, and leverage these synergies for mutual and collective benefit.
- **explore participatory processes with engaged communities:** demonstrate a willingness to inclusiveness; facilitate 'trade-off' conversations with stakeholders.

Effective stakeholder engagement requires key stakeholder groups to be identified. For each group, build an understanding of their needs and degree of engagement with the project/ organisation. This allows genuine and targeted engagement strategies to be developed. Dean et al. (2016) investigated the demographic and psychosocial profiles of different stakeholder groups in relation to engagement with water, providing a rationale and basis for building engaged communities. This work could inform UQ's stakeholder engagement strategies for the St Lucia Campus master plan.

Outcome: Stakeholders have a greater opportunity to connect with and inform the master plan, leading to stronger and more constructive relationships

Genuine and transparent stakeholder engagement will assist UQ to better understand and respond to stakeholder views, and reduce risks of negative sentiment adversely impacting the development and implementation of the master plan. Developing targeted engagement strategies that acknowledge the needs of specific stakeholder groups will increase the likelihood of constructive engagement.

Adopting contemporary and innovative stakeholder engagement approaches

Planning

Identify initiatives that:

- build trust with stakeholders
- enhance reputation for innovation
- engage with diverse communities
- improve liveability

Engagement

Implement initiatives that:

- are genuine
- are visible
- maintain fairness
- address community needs

The opportunity: using contemporary and innovative approaches to stakeholder engagement



Blurring the lines: creating a living–learning–working environment

Ideas 1 to 4 reflect specific initiatives that could be explored as part of, or in association with, the development and implementation of the UQ St Lucia Campus master plan. The concept of blurring the lines to create a living-learning working environment leverages the collective value of these ideas for both UQ and Brisbane. This initiative would identify and build on natural synergies between the different physical environments and associated activities across the University to enhance the UQ St Lucia experience for staff, students, visitors and other stakeholders. Effective stakeholder engagement will inform and support this initiative and facilitate stronger and more constructive relationships between UQ, local communities and the city.

Greater association and synergies between living, working and learning environments could be facilitated by:

- establishing (or creating access to) monitoring and evaluation of existing and future sustainability initiatives on campus to enhance teaching, learning and research opportunities for the University community and beyond
- partnering with industry to build greater University-industry understanding, provide a stronger practice basis for research activities, and facilitate more effective application of research.
- partnering with local communities (e.g. promoting and supporting residential / business sustainability initiatives: identification and implementation through to monitoring, evaluation and adaptive management, linked to learning).

Outcome: Blurring the lines enhances the University experience and contribution to the city.

Blurring the lines between living, learning and working environments would leverage UQ's attractive campus and subtropical climate, and contribute to the University's global appeal, while also contributing to a globally connected, prosperous Brisbane with a high quality of life - a new world city. Blurring the lines will enhance the University experience for all.

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CRC for Water Sensitive Cities

The Cooperative Research Centre for Water Sensitive Cities (CRCWSC) was established in July 2012 to help change the way we design, build and manage our cities and towns by valuing the contribution water makes to economic development and growth, our quality of life, and the ecosystems of which cities are a part.

The CRCWSC is an Australian research centre that brings together many disciplines, world-renowned subject matter experts, and industry thought leaders who want to revolutionise urban water management in Australia and overseas.

Research Synthesis

Research synthesis is key to successful research application and adoption.

A facilitated design process, Research Synthesis brings together the CRCWSC's many research areas and disciplines with government and private industry partners to develop practical "ideas" for addressing specific industry-based challenges.

Research synthesis is a highly effective tool for exploring collaboration and innovation. The open-minded environment of a research synthesis design workshop is founded on science, and no individual organisation leads or owns the conversation. This supports an un-biased dialogue that enables the discovery of new and creative ideas.

Workshop Participants

Participation of the following individuals in the research synthesis workshop is gratefully acknowledged.

- Ross Allen, CRC for Water Sensitive Cities / Monash University
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CRCWSC Research Synthesis

Discussion Paper | CRC for Water Sensitive Cities

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