CRCWSC Research Synthesis

Discussion Paper | CRC for Water Sensitive Cities

IDEAS FOR BENTLEY

CRC for Water Sensitive Cities

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Ideas for Bentley

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Disclaimer

CRC for Water Sensitive Cities

The Cooperative Research Centre for Water Sensitive Cities (CRCWSC) is a national research program that brings together inter-disciplinary research and practice expertise to revolutionise water management in Australia and overseas.

Established in 2012, the CRCWSC facilitates research and industry partnerships to respond to three critical drivers affecting Australian cities:

- population growth,
- climate change and variability, and
- changing economic conditions.

In collaboration with over 80 research, industry and government partners, the CRCWSC delivers the socio-technical urban water management solutions, education and training programs, and industry engagement required to make towns and cities water sensitive.

Research Synthesis

Research Synthesis brings together CRCWSC researchers and local practitioners including participants and project stakeholders to identify, prioritise and apply emerging research relevant to a major urban planning and development project.

Research Synthesis focuses on the rapid adaptation and implementation of emerging research in a way that responds to local context to addresses project-specific needs. The creation of a neutral space for collaborative and constructive engagement enables complex challenges (often involving multiple agency and stakeholder interests) to be addressed.

Ideas for Bentley

A two-day research synthesis workshop for the Bentley Regeneration Project was held in June 2015. This document represents the compilation and refinement of the ideas generated through the workshop.

The research synthesis workshop was hosted by the Department of Housing (now Housing Authority) and facilitated by the CRCWSC. Individuals from the following organisations also participated in the workshop: City of Canning, CRC for Low Carbon Living, Department of Water, Water Corporation, LandCorp, Swan River Trust, CBRE, Creating Communities, Donald Veal Consultants, Essential Environmental, Place Laboratory, Pritchard Francis, Ralph Beattie Bosworth, Roberts Day and Sunshine Light. Participants drew on the collective knowledge and experience of their organisations, without implying their organisation's support or endorsement of the ideas generated.

The workshop leveraged emerging research and current built environment and water management plans for the Bentley Regeneration Project, with a focus on identifying best-practice water sensitive initiatives for a major infill development project within the Perth metropolitan region.

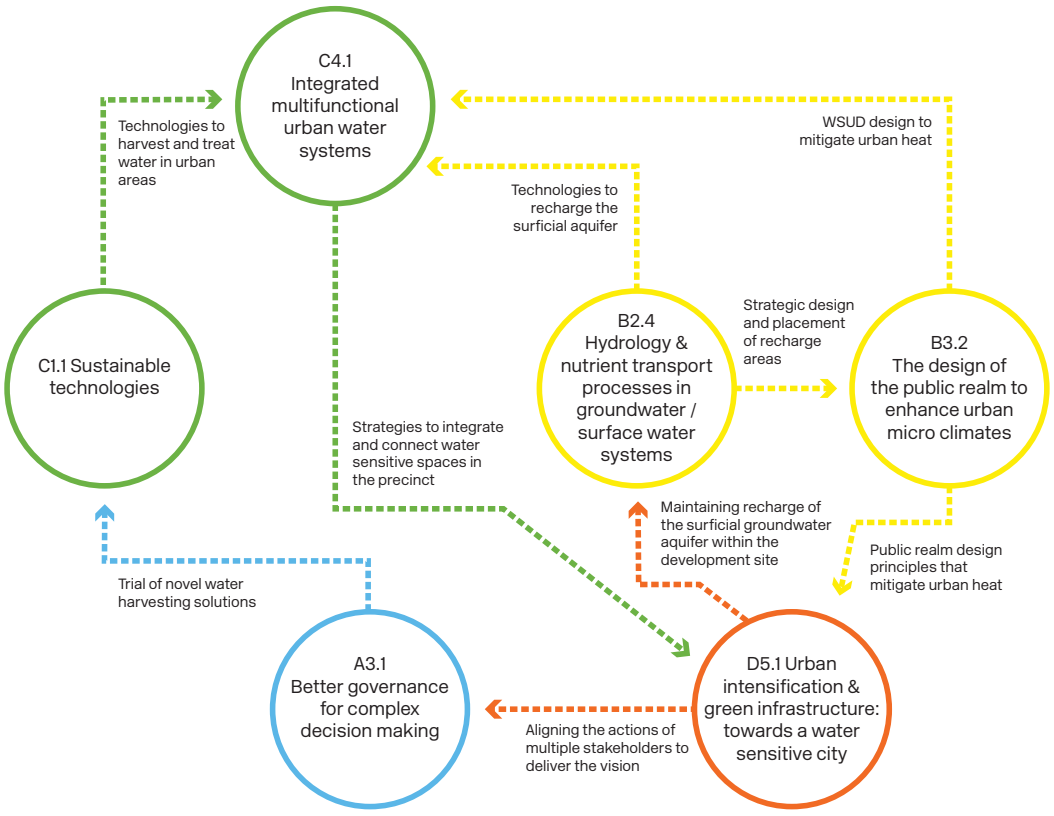

Figure 1.
Research projects that influenced Ideas for Bentley

About the Bentley Regeneration Project

The Bentley Regeneration Project is a 25-hectare precinct in the Perth suburb of Bentley, Western Australia. The site is located approximately 8 km south-east of Perth CBD and 1.5 km north of the Canning River.

The development will aim to provide at least 1,500 new residential dwellings, as well as revitalised civic and community facilities, a range of open spaces, and commercial and retail buildings. Three building types are envisaged across the medium-density development: one to three storey buildings around the outside of the precinct; two to five story buildings away from existing houses and overlooking parks and boulevards; and five to ten storey buildings in the middle of the site around shops, activities and the central village square.

With ambitious development and sustainability targets, the Bentley Regeneration Project is a key infill project for the Western Australian Government and is being delivered through a strategic partnership between the Western Australian Housing Authority and the City of Canning.

Figure 2. Bentley Regeneration Project location
(Source: Bentley Regeneration Project Local Structure Plan)

A vision for Bentley

The vision for the Bentley Regeneration Project established by the City of Canning and the West Australian Housing Authority is to regenerate the precinct as a highly valued neighbourhood. By learning from the past, Bentley can be transformed into a vibrant, diverse and sustainable place that creates community pride. It will be a first-in-Perth exemplar precinct that has the potential to redefine the delivery of infill development in Western Australia and nationally.

The vision for Bentley will be achieved through transformations across three elements: a 'people first' public domain; high quality built form providing a spectrum of housing choices; and collaborative and effective governance arrangements providing a template for the delivery of future infill developments.

Stakeholders have described this transformation as including:

- a vibrant and walkable urban village
- possible retrofitting of green walls on Brownlie Towers
- reducing heat island effects
- capturing and harvesting stormwater flows on site
- reducing pollutants entering downstream ecosystems
- green, high quality parklands.

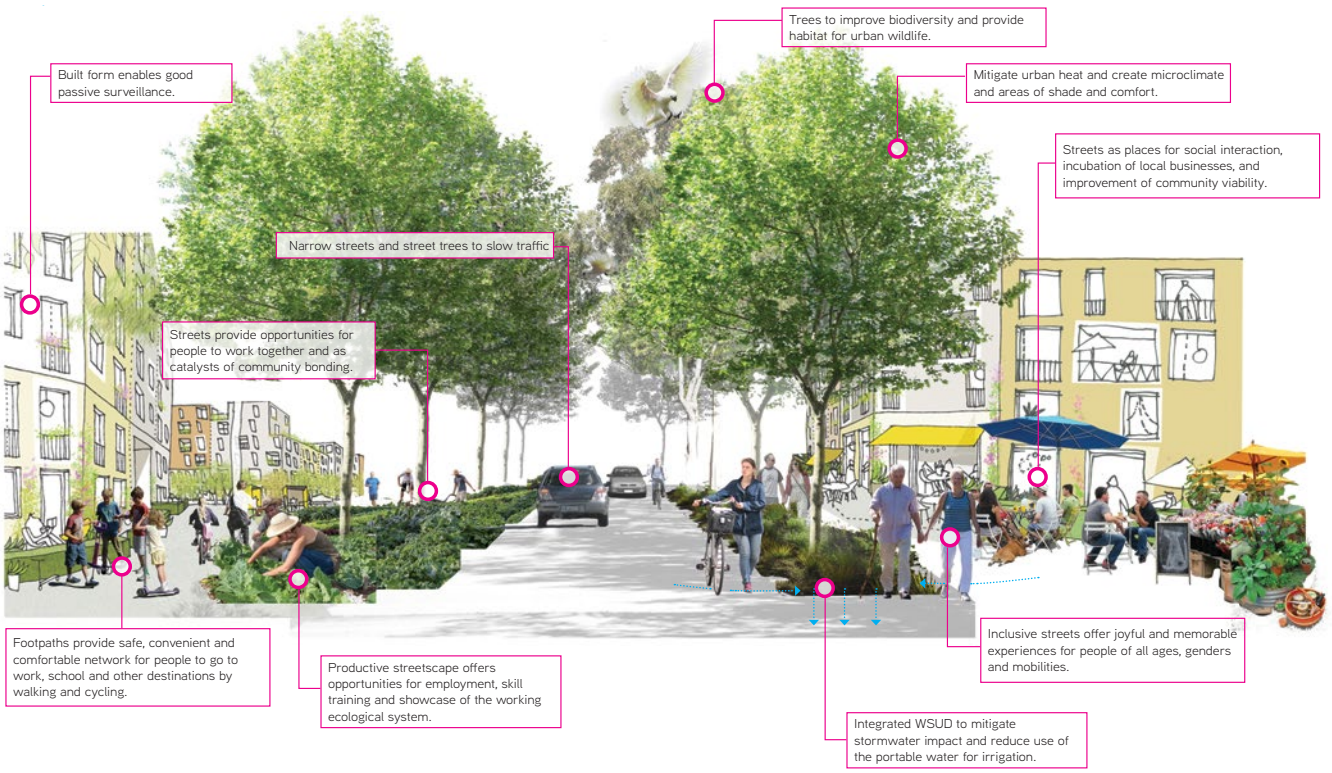

Figure 3. Bentley liveable streetscape concept
(Source: Landscape Masterplan, Place Laboratory, 2013)

Water related context and opportunities

Water supply and sewerage infrastructure

The regeneration of the Bentley precinct has a number of water management implications. Approximately 1,500 new dwellings for an additional 4,000 residents will be created.

- Scheme water supply infrastructure currently has a 67 ML/yr capacity; the projected full-development demand is 270 ML/yr.
- The current sewerage system has a pump station capacity 101 ML/yr; the projected full-development sewage load is 224 ML/yr.

Augmentation of both water supply and sewer infrastructure would be required under current management practices to meet the future demands.

Opportunity: Can augmentation of the water supply and/or sewer infrastructure be deferred by reducing reliance on these centralised systems?

Drainage

Increased impervious surface areas (corresponding to a higher urban density) will increase stormwater runoff.

- Site drainage must be managed to maintain surface and ground water quality at pre-development levels (winter concentrations) and, if possible, improve the quality of water leaving the development area (WAPC, 2008).
- Maintaining net pre-development infiltration volumes (and quality) within the site will assist in managing post-development annual discharge volume and peak flows.
- The drainage system was developed in 1969-70 and adopted the conventional practise of infiltrating stormwater via soak wells. Individual lots drain to soak wells within site, with larger areas draining to one of four infiltration pits located within or adjacent to the site. The soak wells and infiltration pits are fenced, single-function assets.

Opportunity: Can stormwater and drainage assets be re-imagined to add value to the development and manage impacts on receiving waters?

Green infrastructure

Equitable access to high quality urban environments is an important consideration for the Bentley Regeneration Project. A high quality public realm, in addition to private space, is required.

- Existing open space areas are irrigated using groundwater extracted from four bores located on the site. There is scope to increase groundwater extraction as well as diversify the sources of water used on site.
- The site provides opportunities to employ green walls on the Brownlie Towers and other buildings to reduce heat island effects and create a vibrant environment.

Creating a vibrant, high quality public realm will increase irrigation water demand.

Opportunity: Can alternate local water sources supplement or substitute Scheme water or groundwater for irrigation of open spaces?

Water related context and opportunities

Heat vulnerability

Heat vulnerability mapping (Loughnan et al. 2013) indicates that the Bentley community is highly vulnerable to heat stress (Figure 4). Vulnerability to heat is determined by factors that include age, socio-economic status, ethnicity and disability as well as physical environment, and manifests as above average incidences of heat related morbidity and mortality.

Opportunity: Can urban design enhance the microclimate of the precinct using green infrastructure?

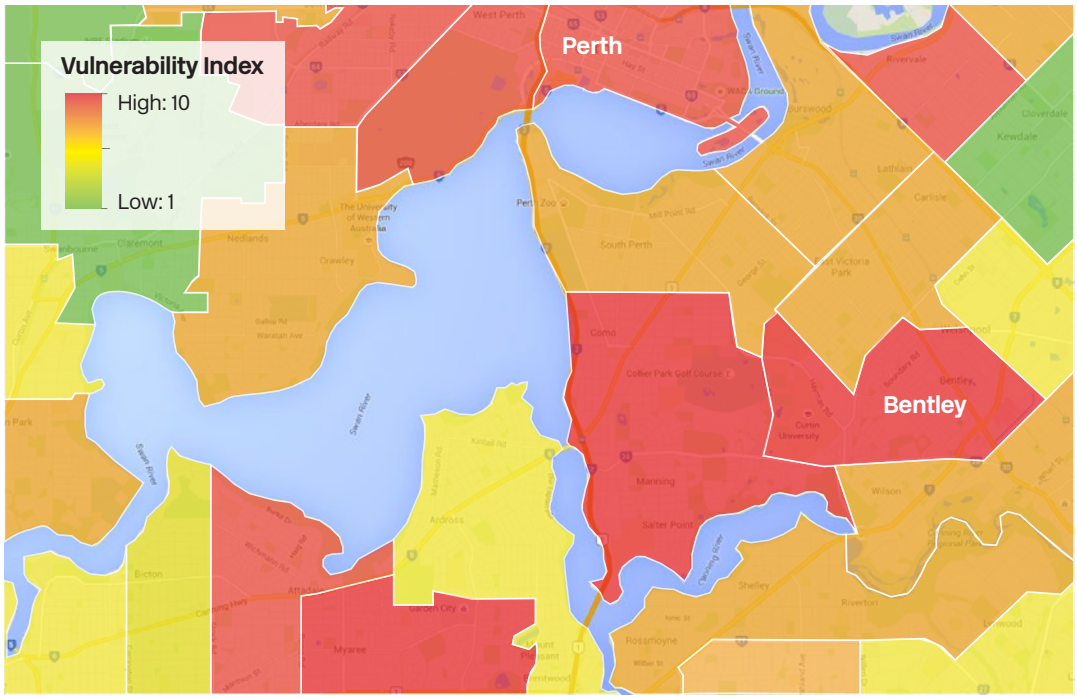

Figure 4. Heat Vulnerability mapping showing Bentley as a high risk area (Adapted from http://www.mappingvulnerabilityindex.com/home/perthvi)

Ideas for a water sensitive Bentley

A water sensitive planning and development approach can help deliver outcomes that support the Bentley Regeneration Project vision by:

- Creating a green, cool local environment that supports place making.
- Utilising local water supplies and green infrastructure to reduce the water footprint of Bentley and defer water infrastructure augmentation costs.
- Establishing secure local water supplies to sustain the local landscape without increasing demand on Scheme water or groundwater.
- Offering water sensitive buildings as a choice for consumers.

The following ideas will enable these water sensitive outcomes to be realised.

Idea 1. Enhance the central green spine

Build on the spine described in the Bentley Master Plan to create a high quality central public realm that delivers:

(i) green infrastructure for urban cooling and surface water management and extends this into the development
(ii) a sense of place and connection for the community.

Idea 2. Implement a precinct-scale water grid

Develop a modular approach to local water infrastructure delivery built on a 'no-regret' strategy for future expansion.

Idea 3. Establish additional local water sources

Deliver sustainable and resilient water services to reduce Bentley's water footprint and defer upgrades of regional water supply and wastewater infrastructure.

Idea 4. Incorporate water sensitive buildings

Implement allotment-scale water sensitive initiatives to complement precinct-scale initiatives.

Development and implementation of these water sensitive ideas requires collaborative and effective arrangements for project execution and governance.

Project execution and governance

Establish and implement project execution and governance arrangements that ensure the public realm and first construction project establish a high-quality standard for the precinct.

Idea 1. Enhance the central green spine

The Bentley Master Plan includes a central spine as a feature. This is a main avenue and key place-making feature distinguished by a nine meter verge on one side for green infrastructure.

This spine can be enhanced and activated as a central connection between a series of distinct places and functions along its length: the popular parks, the town square and other green assets can be connected to provide a range of ecosystem services and corridors through the development.

Incorporating an ephemeral drainage line within the spine allows stormwater to be conveyed through the development in a way that creates opportunities for celebrating water through public art and water features as it traverses the site before being infiltrated within an urban forest in the south close to the existing library. This approach connects people to water and vegetation and could act as an identifiable hallmark of the Bentley Precinct.

Figure 5. Master Plan concept showing the green spine
(Source: Illustrative Masterplan, City of Canning, 2013)

Key elements of Bentley's green spine may include:

1. **Green nodes:** open spaces, including adjacent parklands and wetland constellations, linked to the spine. This green infrastructure can be used to collect, treat and store stormwater and extend the micro-climate benefits of the green spine into the finer-grain fabric of the precinct. Water to maintain the green spaces could come from greywater from adjoining buildings that is pre-treated by green walls.

2. **Activation:** transforming the central spine from a car-dominated space to a multi-functional, green spine incorporating an ephemeral 'hardscape' waterway. The ephemeral nature of the waterway represents its dynamic response to rainfall events. The waterway could also convey occasional pumped groundwater discharge to create a water feature for local cooling and celebration of water, with the groundwater subsequently infiltrating into the surficial aquifer at the downstream urban forest.

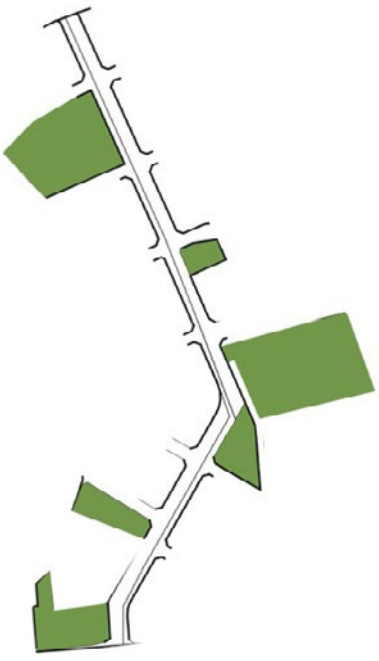

Figure 6. Green nodes linked to the central spine

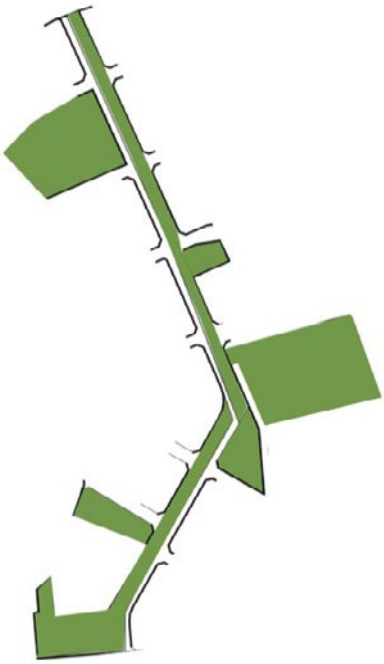

Figure 7. Activation of the central green spine

3. **'Water moments':** There is a significant change in elevation across the precinct (from 19m AHD to 9m AHD), enabling stormwater to be retained on the surface as an alternative to below ground drainage. An ephemeral 'hardscape' waterway along the northern section of the spine will keep water at surface, allowing it to be celebrated and prolong the cooling benefits when rainfall provides respite from heatwaves.

   Stormwater collected from local catchments will flow along the spine to an urban forest located adjacent to the town square where infiltration can occur.

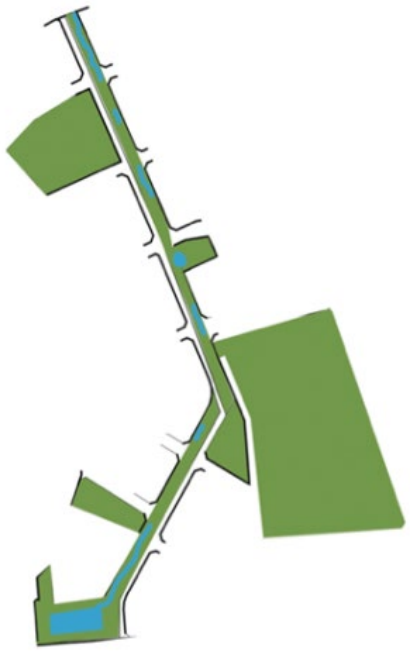

Figure 8. 'Water moments' along the green spine

Various 'water moments', such as wetland constellations along and adjacent to the hardscape waterway will treat the stormwater and provide micro-climate benefits (Figure 8).

A 'green oasis' within the Village Square can become a local attractor, complimenting civic and retail functions and encouraging people to visit, to engage with the space and to linger.

An urban forest (Figure 9 & 10) provides for the detention and infiltration of stormwater conveyed along the ephemeral hardscape waterway into the Bassendean Sands to maintain the natural hydrological characteristics at the precinct-scale. The potential for stormwater harvesting could also be explored.

The Bentley community gardens can provide local food production and an opportunity to develop career skills for local residents. Practical training in maintaining green infrastructure can be extended to help maintain other elements of Bentley's landscape.

Figure 9. Urban forest example

Figure 10. Urban forest example

4. **Green canyon:** Enveloping the spine with green elements will create the experience of a 'green canyon'. This could include green walls on key, high-density developments along with other plantings at street level.

   In a location such as Bentley, green walls will be important in insulating buildings from the summer heat. Green walls will also improve thermal comfort for pedestrians on the adjacent streets by reducing the radiant temperature from buildings.

   While green walls of any description will achieve these effects, research shows that the amount of vegetation and canyon geometry are more important than canyon orientation in determining the degree of cooling (Alexandri and Jones 2008). The amount of irrigation is another important factor that enhances cooling via evapotranspiration.

   Greywater generated from the buildings can provide a reliable daily supply of water for irrigation of these green walls, with excess water filtered and recovered for non-potable uses.

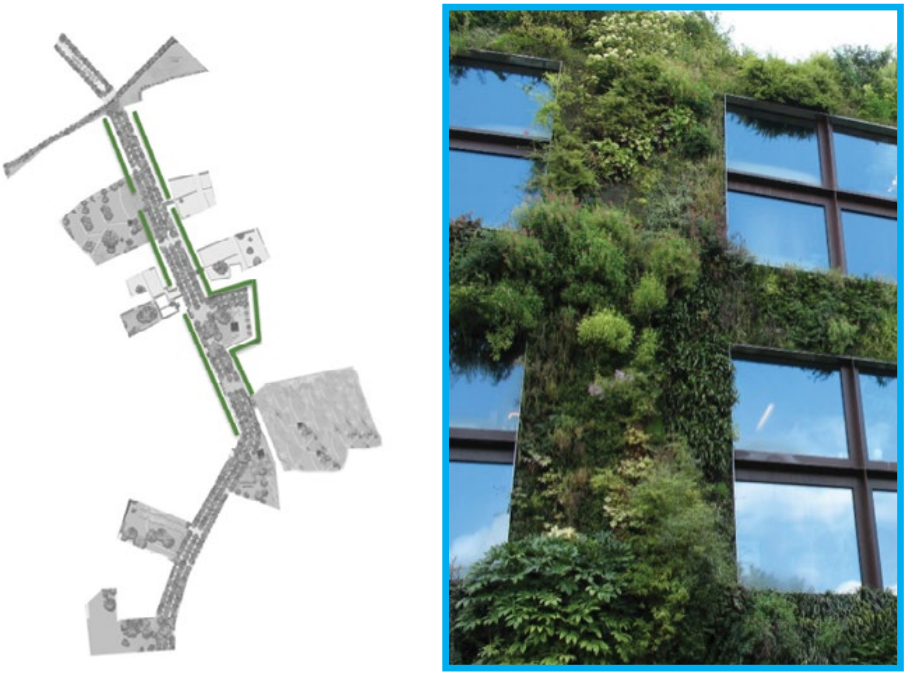

Figure 11. Green walls are a possible feature of the 'canyon' (highlighted in green)

5. **Water art features:** Water art along the spine could include cascading water features along the steeper terrain to create sound and movement during and immediately after rainfall events, animating an urban design that provides passive and active recreation opportunities throughout the year.

Figure 12. A cascading water art feature (highlighted in blue)

Figure 13. Alternate landscape concept for steeper terrain

Idea 2. Implement a precinct-scale water grid

Implementing a water grid for the precinct provides a foundation for water security within (and potentially beyond) the site.

Water security requires a portfolio of water supplies. By implementing a precinct-scale water grid, this portfolio can be optimised by connecting appropriate (fit-for-purpose) sources to water demands. The water grid, once established, provides flexibility in terms of what is attached, and when, to meet the evolving needs of the development and community.

This idea represents a 'no regrets' approach by making key decisions now that preserve the opportunity to explore other options in the future.

The grid would improve water security for open space irrigation in the short term by connecting to existing groundwater bores within the site. Other local water sources and demands can be investigated if and when there is a need, but do not need to be confirmed or funded in the initial stages of development.

This approach enhances the reliability of irrigation water, potentially reducing scheme water consumption to less than the Perth average and deferring augmentation of water and sewage infrastructure.

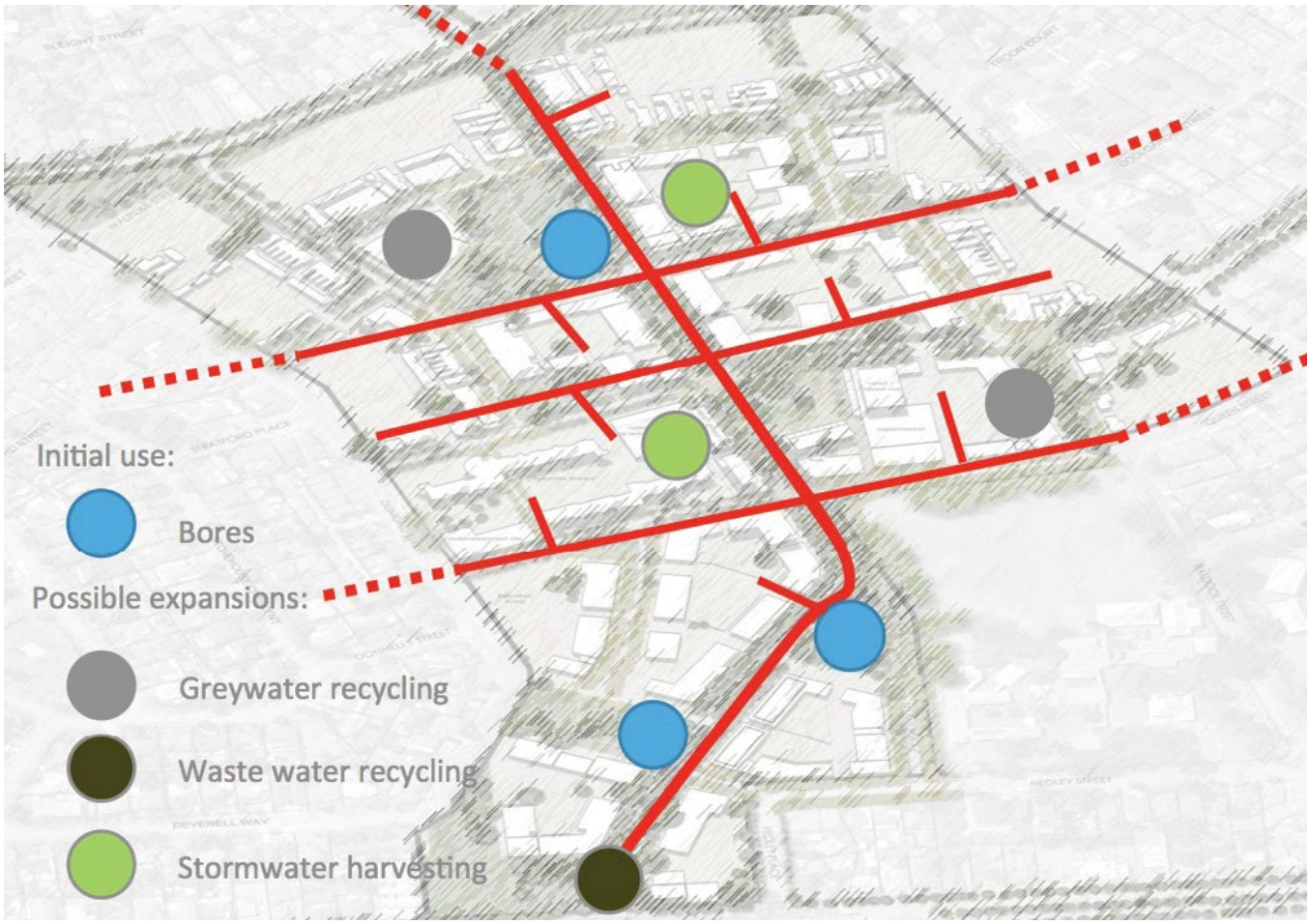

Figure 14. A conceptual precinct scale water grid for Bentley

Steps for implementing a precinct-scale water grid could include the following:

1. Establish a pipe network (water grid)

The main connection (along the central green spine) and other main branches could be constructed with a common services trench to allow strategic upgrades of water, energy, telecommunications and other infrastructure. Economies-of-scope may allow the costs of the common services trench to be shared across multiple services.

2. Connect individual groundwater bores to the water grid

Link the existing bores[1] to the water grid to provide a precinct-wide irrigation supply. Additional bores could potentially be added along the grid as needed (the superficial aquifer is currently 71% allocated and can provide additional water if required (RPS, 2013)).

Connecting the bores enhances water security within the precinct by reducing the impact of disruption to individual bores. It also enables rapid expansion by connecting new bores or new open space demands.

At this point, the water grid could be used for irrigation of public and private open space (including public assets such as street trees).

3. Establish and connect other water sources to create a non-potable supply network

Refer to Idea 3. The groundwater supply could potentially be augmented with other water sources such as roof water, stormwater, greywater and wastewater treated to an appropriate standard for the end-uses. Expansion of the supply portfolio will improve the supply reliability. This modular approach allows new sources to be introduced as required, thus deferring costs into the future and smoothing investment cash flows.

[1] Five groundwater bores have been identified at the Bentley site including four bores used under two irrigation licences.

4. Identify and connect additional non-potable demands

As the supply volume increases through an expanded portfolio of sources, demands other than open space irrigation may be able to be serviced. Two potential options include identifying other non-potable uses within the site, and exporting water beyond the site by extending the grid (for example to regional open space). Public open space surrounding the Bentley site has been identified in the Bentley Regeneration Project Local Structure Plan.

Connecting non-potable indoor demands (laundry and toilets) would reduce reliance and demand on Scheme water.

5. Investigate the creation of a local potable supply

Once a secure non-potable network has been created, there may be scope to use one or more of the water sources to create a local potable water supply. By identifying the highest quality water source and disconnecting it from the grid, this source could be treated on-site to potable standard and distributed via the reticulated Scheme water network. This effectively substitutes for Scheme water, a growing percentage of which is being derived from energy intensive sources.

Bore or roof water may be the easiest sources to use for this purpose, particularly from a community and policy perspective.

Idea 3. Establish additional local water sources

Once a grid has been created, local water sources could be developed to expand the supply portfolio. This could reduce reliance on centralised water and wastewater systems, as well as reducing the impact of the site on the Canning River. Given future constraints to both water supply and wastewater infrastructure, an expansion of local sources including groundwater, stormwater, greywater, treated wastewater in line with increasing demand could delay or avoid augmentation of centralised water and/or wastewater infrastructure, creating considerable savings in planned capital expenditure. These savings may be the basis of a business case to justify the investment in additional local water sources (and other ideas in this report).

Stormwater and roof water

Harvesting and use of roof water and stormwater from roads and other impervious surfaces may provide a cost effective means of meeting increased irrigation demands within the site and at the same time reduce stormwater impacts on the Canning River.

Stormwater is typically infiltrated at, or near, the source in Perth. By retaining stormwater on the surface within this development, it can provide amenity and cooling functions or be captured and treated for use within the site via the water grid (refer to Idea 2).

Greywater

Greywater can be kept separated from sewage within buildings and treated to a standard suitable for irrigation of green or living walls, toilet flushing or irrigation of open space areas.

Passing greywater through a green or living wall provides water to support vegetation growth, with excess water collected in a tank below the building and reused for irrigation or internal uses. This has the potential reduce wastewater volumes delivered to the local pump station by 60%, avoiding the need for capacity upgrades.

Technologies for greywater treatment to potable standard are well developed but not widely used. A decision to potentially use greywater-to-potable water technology at Bentley would not need to be made until a third of the development was completed (notionally when the population reaches 1,300). This lead-time enables the implementation of a pilot of the technology to demonstrate its local applicability and to better understand benefits, costs and risks.

Treated wastewater

A local wastewater treatment plant producing high quality recycled water is a potential water supply option, provided that a suitable land area is retained for this purpose. With a sewage load of 224 ML/year at full development, a local wastewater treatment plant would enable Bentley to produce significant volumes of non-potable water that may have use beyond the boundaries of the development.

Idea 4. Incorporate water sensitive buildings

Buildings producing water

Stormwater and roof water harvesting is a well-recognised contribution of buildings. Maximising this within Bentley requires a change from the traditional practice of on-site infiltration. This can be achieved by considering buildings as an extension of the precinct water grid. Rainwater tanks and raingardens will play a role in on-site water harvesting and treatment.

Green and living walls can be designed to treat greywater, enabling water not taken up by the vegetation to be used for non-potable demands. It is estimated that a green wall on one face of a building will consume approximately 40% of the greywater generated from a typical 6-8 story residential building. Reuse of treated greywater for toilet flushing could utilise a further 30%, with the remaining 30% potentially available for other precinct-wide non-potable demands.

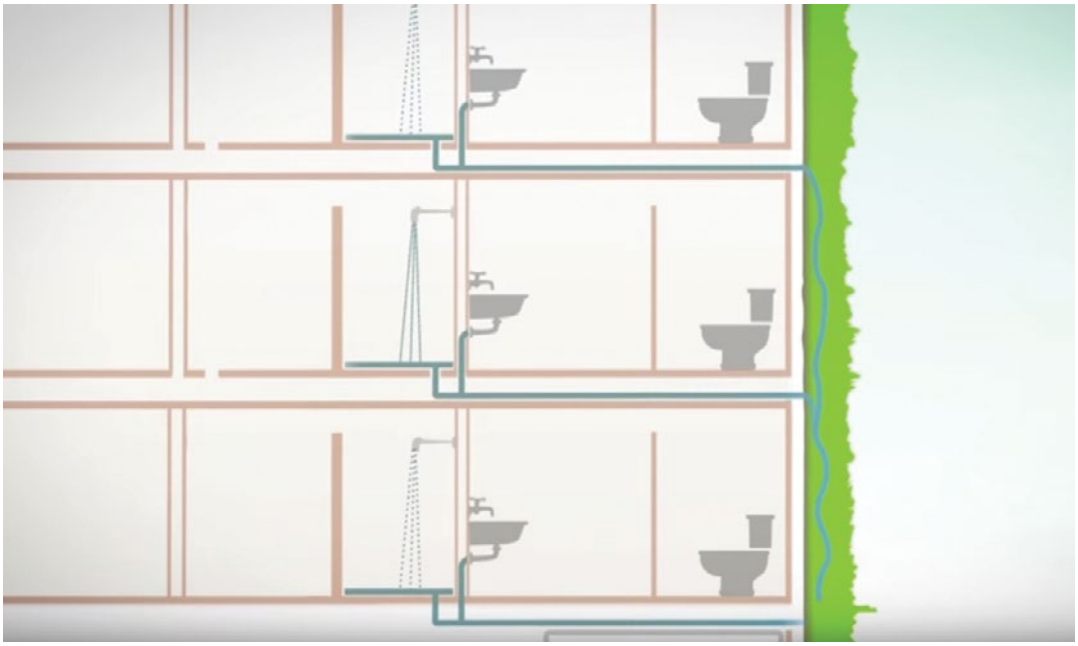

Figure 15. Greywater reuse using green walls. The green wall is maintained by the regular flows of greywater while also acting as a biofilter to remove chemicals and pathogens, allowing excess greywater to be used as a resource.

Buildings providing cooling

Green infrastructure can mitigate urban heat by shading the ground surface and cooling the air through evapotranspiration. This is particularly important in areas that experience high temperatures, have vulnerable populations and high activity (e.g. transport hubs).

Buildings with green walls can be particularly effective at reducing urban heat. Modelling and observation shows that irrigated green walls provide a cooling effect of up to 6 °C of the air temperature in an "urban canopy" in Perth's climate.

Figure 16. A green canyon – comprising green walls and trees – can be up to 6 °C cooler than surrounding areas during extreme heat conditions

Cooling benefits can be maximised through:

- Street design. An east-west orientation captures and funnels cooling winds, while wide canyons enable the use of street trees to provide ground level shading.
- The strategic use of green walls on buildings to create green canyons.
- The mix of trees and green walls. The positioning of trees should consider building shade lines which also provide cooling. Trees should be prioritised in wide streets and areas with low building heights.

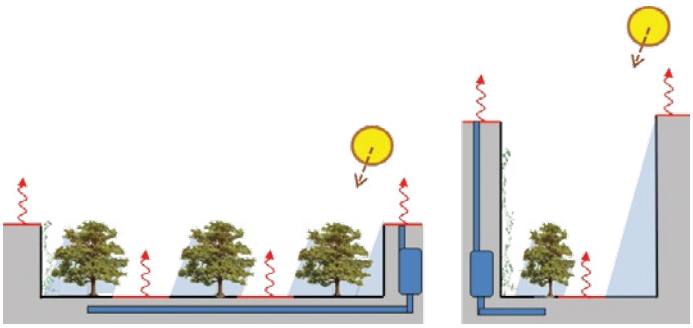

Figure 17. The strategic combination of canyon design, green walls and street trees can maximize cooling benefits (Coutts et al, 2014)

Buildings generating energy

Green roofs can provide water cycle benefits. However, roofs of multi-storey buildings are likely to be used primarily for solar photovoltaics. Given that green walls are more effective than green roofs at providing ground level cooling, prioritising roofs for renewable energy generation and building façades for green walls is ideal.

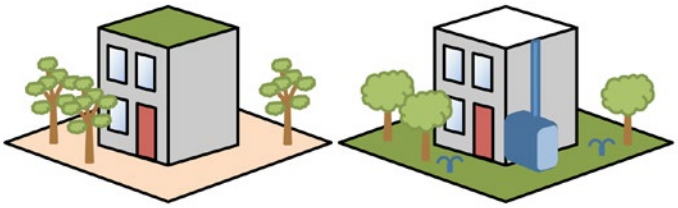

Figure 18. Green roofs can provide social benefits (such as amenity); however, greening measures located closer to ground level are more effective at reducing human exposure to heat (Coutts et al, 2014).

Green wall trial

A green wall pilot study at Bentley could trial a range of different configurations, orientation and vegetation types suited to Perth climatic conditions. The incorporation of biofiltration technology would enable excess greywater to be treated (filtered) for reuse, primarily for toilet flushing.

Project execution and governance

A high quality and successful first development project is critical (and sets the tone) for the overall success of the Bentley Regeneration Project, providing clarity and confidence to developers involved in subsequent projects. Establishing a high quality town square also supports this aim, as well as sending positive signals to the community about the aspirations of the Bentley project. Conversely, if the first private and public realm development projects do not reflect the long-term aims, it will be difficult to achieve the overall aims of the project.

Integrated and collaborative governance arrangements are required to maintain and communicate a clear vision over the 17-year delivery period of the Bentley Regeneration Project. Given the collective aspirations and responsibilities of all government stakeholders involved, the re-establishment and expansion of an inter-agency working group is critical. Clarity on the role and functions of this group can be achieved through (for example) a Memorandum of Understanding between relevant parties.

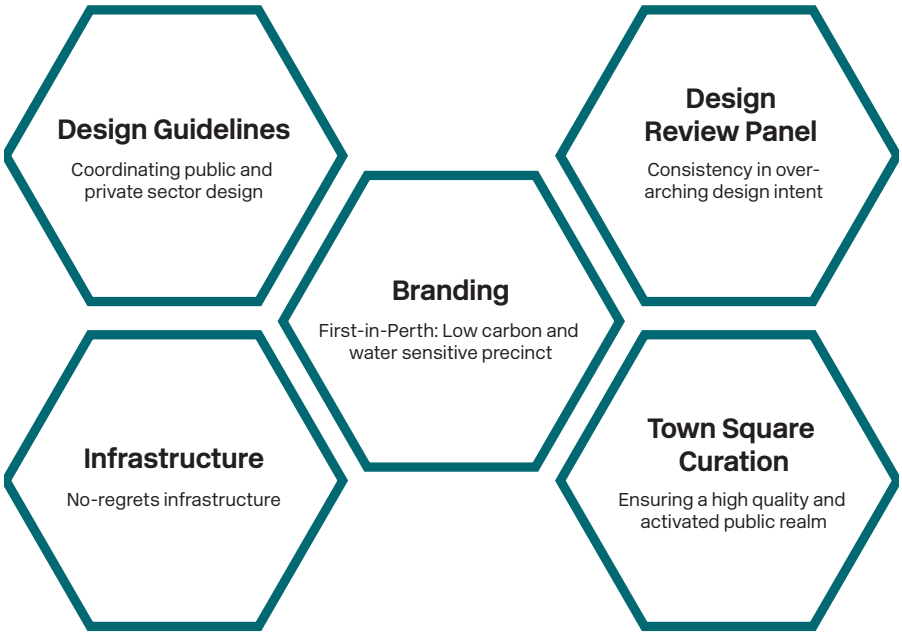

Figure 19. Key outcomes of an integrated governance arrangement or the Bentley Regeneration Project

Potential functions of the inter-agency working group may include:

- Establishing an Independent Design Review process. Key activities can include coordinating the design masterplan and co-developing Design Guidelines to ensure appropriate activation of the precinct.
- Coordinating the first project, planned to be delivered on the City of Canning land, to ensure it sets a high benchmark for future stages. This will provide confidence to subsequent developers and gives a positive signal to the community about the aspirations for Bentley.
- Aligning activities to ensure the early delivery of key public realm, 'no-regrets' infrastructure, staging of developments by different parties, prioritisation of investment to activate development and create community and place.

An additional agreement between the Housing Authority and City of Canning on a collaborative and mutually beneficial process for delivering the main square is also required. A forward (future) focussed joint-venture agreement may be an effective mechanism for delivery of this critical project.

Benchmarking can support monitoring and evaluation of the Bentley Regeneration Project throughout its delivery. This may include:

- Identifying similar projects (local, national, international) and learning from their successes and failures.
- Utilising the establishment of a high-quality public realm as an indicator of success.
- Evaluating the success of the town square based on its ability to attract the local community and others from beyond the precinct.
- Monitoring the level of collaboration, commitment and satisfaction of all stakeholders.

Summary

The Bentley research synthesis workshop leveraged emerging research and current built environment and water management plans for the Bentley Regeneration Project, with a focus on identifying best-practice water sensitive initiatives for a major infill development project within the Perth metropolitan region.

This document identifies four ideas for water sensitive planning and development that support the Bentley Regeneration Project vision by:

- Creating a green, cool local environment that supports place making.
- Utilising local water supplies and green infrastructure to reduce the water footprint of Bentley and defer water infrastructure augmentation costs.
- Establishing secure local water supplies to sustain the local landscape without increasing demand on Scheme water or groundwater.
- Offering water sensitive buildings as a choice for consumers.

If fully implemented, these investments in local water sources and green infrastructure will reduce the potential demand of the Bentley site on regional water supply, wastewater and drainage schemes. If investments in augmenting these assets can be avoided or deferred into the future, there may be considerable financial savings.

Idea 1. Enhance the central green spine

Build on the spine described in the Bentley Master Plan to create a high quality central public realm that delivers green infrastructure for urban cooling and surface water management, and a sense of place and connection for the community.

Idea 2. Implement a precinct-scale water grid

Develop a modular approach to local water infrastructure delivery built on a ‘no-regret’ strategy for future expansion

Idea 3. Establish additional local water sources

Deliver sustainable and resilient water services to reduce Bentley’s water footprint and defer upgrades of regional water supply and wastewater infrastructure

Idea 4. Incorporate water sensitive buildings

Implement allotment-scale water sensitive initiatives to complement precinct-scale initiatives

Project execution and governance

Collaborative and effective arrangements for project execution and governance are required to support these ideas.

Establish and implement project execution and governance arrangements that ensure the public realm and first construction project establish a high-quality standard for the precinct.

These ideas are based on several innovations that can be readily translated to other large urban redevelopments. This enables Bentley to establish new benchmarks for these types of developments.

'No-regrets' approach

Adopting a 'no regrets' approach to infrastructure provides a pathway to implement innovative ideas.

Developments such as Bentley occur over many years, and much can change over this time. As policy makers and community become more comfortable with new technology over time, so the desire to implement new options will increase.

A 'no-regrets' strategy separates the decisions that need to be made today from those that can be made tomorrow, while being mindful not to disregard options that could become viable in the future. This creates certainty to act, and space for further deliberation where needed. Where uncertainties exist, it also provides time to trial and evaluate before decisions are made.

Key 'no-regrets' decisions for Bentley include the establishment of a green spine and water grid and the initiating local trials of novel technology such as green walls.

Connecting people with water

In cities, space is becoming ever more contested. In response we can utilise multi-functional green infrastructure to deliver place making as well as delivering core water services. Assets such as parks, open space, road verges and even the walls of buildings can be designed as living systems that capture, cleanse, store and transport water through the precinct. This can cool local environments, transform the aesthetic and create new water resources.

The Bentley community garden provides a specific opportunity to showcase this relationship between people, place and water. Maintained by a reliable water source, this site can produce food for local consumption, activate community connections and become a training hub to mobilise a local volunteer workforce in the maintenance of precent-wide green infrastructure.

Borrowing water from the natural water cycle

The Perth water cycle is unique. Water management approaches, in particular drainage practices, have been adapted to suit local conditions.

Bentley can be sympathetic to these natural flow pathways whilst simultaneously harnessing the value of water that is generated within the Bentley catchment. A conscious strategy of borrowing water from the natural water cycle – by delaying infiltration and directing water to strategic locations - will provide a range of benefits without affecting the natural hydrology.

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Discussion Paper | CRC for Water Sensitive Cities

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