

CENTRAL PARK, SYDNEY

Project description

This case study provides a good example of the different context in the NSW water industry as a result of the Water Industry Competition Act 2006 (WIC Act). The WIC Act has enabled decentralised IWM systems being operated by a private water utilities – in this case the multi-utility business Flow Systems, and its subsidiary Central Park Water.

The \$2 billion urban village of Central Park sits on a 5.8 hectare former brewery site in inner Sydney with one third of the area dedicated to open space. The site has 11 buildings, 2,271 apartments, shops, cafes, restaurants, laneways, terraces and offices.

Wastewater is collected from the precinct's residential, commercial and retail buildings and an adjacent Sydney Water wastewater pipeline with top-up from stormwater runoff and rainwater. These various locally-captured water sources are treated at the Central Park local water centre located within the basement of one of the buildings. Wastewater is treated to two different recycled water types for different end uses. Both recycled water types meet the required dual reticulation standards using a membrane bioreactor (MBR), ultraviolet and chlorine disinfection plus one stream is also treated through reverse osmosis (RO).

The two separate fit-for-purpose recycled water types are distributed within the precinct to supply water for irrigation, including the substantial greenwalls, toilet flushing, clothes washing, car washing and ornamental water features plus for cooling towers. The recycled water systems mean that the precinct uses saves 40 to 50 per cent less drinking water, without restricting its use of water during drought.

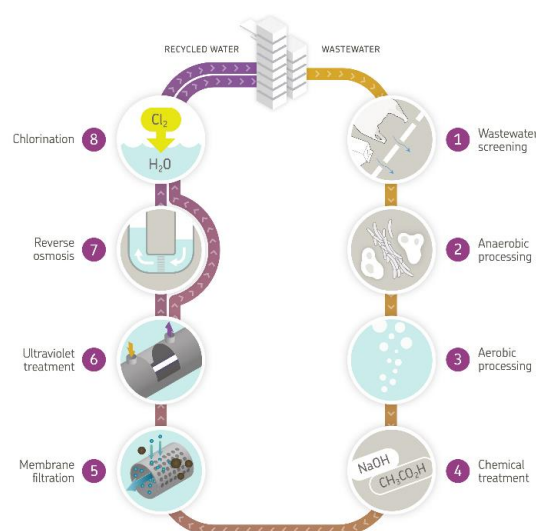


Figure: Recycled water production flowchart for Central Park. Source: Flow Systems.

Project drivers

VISION

The vision for Central Park is to “raise the bar for sustainable living using green technologies” in a high density urban development, achieving a minimum 5-star Green Star rating for each building to push the boundaries on what is possible for self-sufficient mixed use urban development precincts.

Stakeholder and community engagement

The main collaborators for the planning and delivering of this project are:

- Flow Systems, its subsidiary Central Park Water (licensed owner, and operator and customer-facing billing utility) and its consultants and contractors including Permeate Partners
- City of Sydney (local government authority)
- Frasers Property (developer)
- Sekisui House (developer)
- Institute for Sustainable Futures at the University of Technology Sydney (research and sustainability advice)
- Education partners – Flow Systems also works closely with the University of Technology Sydney, located across the road from the Central Park precinct. UTS students participate in studies at the Central Park local water centre. The Central Park recycled water network has also been expanded to export available recycled water to the UTS precinct and has the potential for further expansion
- Sydney Water – an inter-utility services agreement between Flow Systems and Sydney Water sets the parameters for the bulk provision of drinking water to the precinct and for accepting waste streams from the scheme.
- NSW Government (including IPART, Department of Planning, Industry and Environment, NSW Health)

The WIC Act allows private water utilities to obtain a licence to operate infrastructure and supply water and wastewater services to customers. As with other water utilities, Central Park Water (the private water licence holder at Central Park) is subject to strict health and water quality guidelines.

The Independent Pricing and Regulatory Tribunal (IPART) and the NSW Minister for Water, Property and Housing administers the WIC Act and regulates Flow Systems and Central Park Water as a licensee making them critical stakeholders in the project. As with any recycled water project, considerable engagement is also held with the local health authorities, in this case, the local Public Health Unit and Water Unit of NSW Health.

Outcomes sought

The major IWM outcomes for Central Park are:

Community participation in water

Demonstrates: *Outcome 1a – Connection with water and water literacy*

The Central Park Local Water Centre (LWC) is host to several group tours every year from local residents to school and university education groups, government delegations and other likeminded developers looking to see what is possible in IWM. For this reason, the LWC is set up with wayfinding signage throughout to help educate the community on the water cycle and the benefits of water recycling.

Leadership and capacity

Demonstrates: *Outcome 2a – Collective leadership, long-term vision and commitment; 2b – Knowledge, skills and organisational capacity; and 2d – Constructive organisational culture*

Flow Systems was founded on the principles of IWM, becoming a leader in integrated water management utility services with a strong long-term vision and capacity for creating sustainable communities, shared across the organisation.

Cities as Water Supply Catchments

Demonstrates: *Outcome 4a – Diverse fit-for-purpose water supply system*

- Alternative water supply – The Central Park local water centre supplies two qualities of fit-for-purpose recycled water to 2,271 residential apartments and 75,000 m² of commercial and retail space sourced from six different sources of water.
- Drinking water savings – Residents save up to 50 per cent of drinking water compared with typical developments and maintain a secure water supply free from water restrictions in drought.

Cities comprising Water Sensitive Communities

Demonstrates: *Outcome 4c – Integration and intelligent control*

Engaged customers – Water use monitoring and monthly e-bills keep residents aware of their water use and avoids bill-shock.

Cities providing Ecosystem Services

Demonstrates: *Outcome 5a – Healthy and biodiverse habitat*

Keeping wastewater out of the environment – ultimately at least 1 ML of treated wastewater will be harvested from the sewer and stormwater systems each day, rather than discharged to the ocean.

Options and operation

Central Park Water as the licensed network operator owns, operates and maintains all water related infrastructure within this community – effectively taking over the management of the water cycle within the precinct.

Flow Systems, the parent company, holds the retail supplier licence and bills customers directly under conditions imposed by the licence, as with other water utilities.

The recycled water network harvests multiple water sources and distributes three types of water (drinking water and two types of recycled water), covering all the water requirements of the community.

- Drinking water is sourced from Sydney Water's drinking water network. Non-potable water is sourced from:
- Wastewater from all buildings within the Central Park community;
- Wastewater from an adjacent Sydney Water wastewater trunk main ('sewer mining');
- Rainwater from roofs;
- Stormwater from impermeable surfaces/planter box drainage; and
- Irrigation water from all greenwalls (as return flow from recycled water irrigation).

DECENTRALISED WASTEWATER TREATMENT

Harvested wastewater and stormwater is treated at the local water centre through eight filtration and purification processes including the membrane bioreactor, ultraviolet and chlorine disinfection and reverse osmosis technologies. The treatment system requires minimal space and does not generate excessive noise or unpleasant smells so it can be incorporated into the basement levels of the building in the high-density urban area.

REMOTELY CONTROLLED

The wastewater treatment system has been designed to minimise operation and maintenance requirements so that it can be controlled remotely and doesn't require constant onsite supervision.

COLLECTING AND TREATING ALL FORMS OF URBAN WATER

The system collects and treats wastewater from apartments, student accommodation, shops, cafes and offices, where necessary with trade waste agreements in place. It also includes local rainwater and stormwater runoff and excess irrigation water from the gardens and greenwalls on-site.

FIT-FOR-PURPOSE USE OF WATER

Multiple pipelines are provided within the precinct to deliver water of a quality that is suited to the intended uses. This includes drinking water from Sydney Water's drinking water network and two qualities of locally treated recycled water for toilet flushing, washing machines, irrigation, greenwall watering, car washing and ornamental water features and cooling towers.

Discussion

The Central Park IWM solution has applied an innovative decentralised recycled water schemes for a masterplanned inner-city development.

Harnessing water sources from across the precinct, it can balance demand requirements with the appropriate quality of water and minimise the draw from centralised, rain-dependent potable water resources.

It is possible to export recycled water for further potable water savings in surrounding precincts.

This is largely made possible by the enabling legislation of the NSW Water Industry Competition Act 2006 (WIC Act) developed during the Millennium Drought. The WIC Act's principles include:

- Protection of public health, the environment, public safety and consumers.
- Encouragement of competition
- Sustainability of water resources
- Promotion of production and use of recycled water.

The WIC Act has proven to harness the innovation of the private sector, provide recycled water to areas that would otherwise not have access and enable servicing of residential and commercial development sooner than by public water utilities.

Whilst there is largely nothing preventing these types of decentralised recycled water schemes being developed in other states, the WIC Act in NSW provides a provides a case study of private sector involvement in the water industry for other states.

The WIC Act also allows licensed NSW water utilities to retail and distribute drinking water (sourced from public water utilities). This has enabled improved IWM Outcomes, more efficient utility interfacing for the developer and less confusing bills for customers.



Image: Ultraviolet disinfection at Central Park Local Water Centre. Source: Flow Systems

Evaluation and financing

COSTS

In the case of Central Park, the developer funded the sustainable servicing infrastructure to achieve its goal of achieving a 5-star Greenstar rating across the precinct, including the first stage of the Central Park local water centre. This achievement allowed for uplift in gross floor area which could offset these costs. There are other financial models that can be applied depending on site-specific geographic, regulatory and timing factors.

An IWM approach means that revenue can be extracted from the entire water cycle to pay for the infrastructure and operation of the recycled water scheme, although a fee for management of trunk stormwater is still collected from residents by the local public water utility.

Future capacity expansions involving greater harvesting of water sources and exportation of the recycled water to neighbouring customers assists with the scheme's economic viability by leveraging fixed assets and operating costs and reducing trade waste discharge fees given the reduced bypass of wastewater.

BENEFITS

Production of fit-for-purpose recycled water from local water sources at Central Park has proven to have many benefits, including:

- Supporting sustainable irrigation of gardens and substantial greenwalls on the award-winning One Central Park building which in turn minimises the heat island effect from this mixed-use development in inner Sydney;
- Achieves the sustainability objectives of building owners and tenants; and
- Supports the City of Sydney's Sustainable Sydney 2030 Masterplan target to maintain drinking water use across the local government area below a 2006 baseline, despite increasing development.

Reflections and lessons learned

The Central Park IWM scheme has shown what is possible in integrated water services and technology. The enabling legislation, whilst not perfect in its current form, has inspired the private sector to apply best practice integration across the full breadth of the water cycle for optimal use of fit-for-purpose water supplies. It has required perseverance but it has paid off and now serves as a living example of what is possible at this scale. The enabling legislation is currently undergoing amendment which will see even greater and more efficient application to provide recycled water and IWM servicing in new growth areas which otherwise would not have had access to such services from the public water utility.

Forward thinking has allowed the expansion and optimisation of the Central Park scheme. Recycled water produced at the Central park local water centre may now be exported to surrounding precincts because the opportunity was identified and seized to bore connecting pipework whilst the basement was excavated and exposed for the Duo building.

Planning for multi-utility sustainable services has also enabled a symbiotic relationship with the energy services in the precinct with the provision of recycled water to the precinct's central thermal plant which in turn powers some of the water network infrastructure.

The establishment and ongoing success of the Central Park water utility shows that high density new urban development can be sustainably serviced while adhering to IWM principles for the benefit of not just the new residents of that precinct, but the surrounding areas as well, which benefit from open space irrigated with recycled water and reduced heat island where recycled water is used for greening and cooling.

Regular tours and visitor-friendly signage has also enabled the scheme to provide leadership and inspiration to others to implement similar IWM Outcomes in new urban developments around the world.

Given technological advances since the first stage of the Central Park local water centre was commissioned in 2015, options for the optimal use of the physical constraints of the site are now being investigated to maximise recycled water output and beneficially reuse other waste streams, supporting circular economy principles.

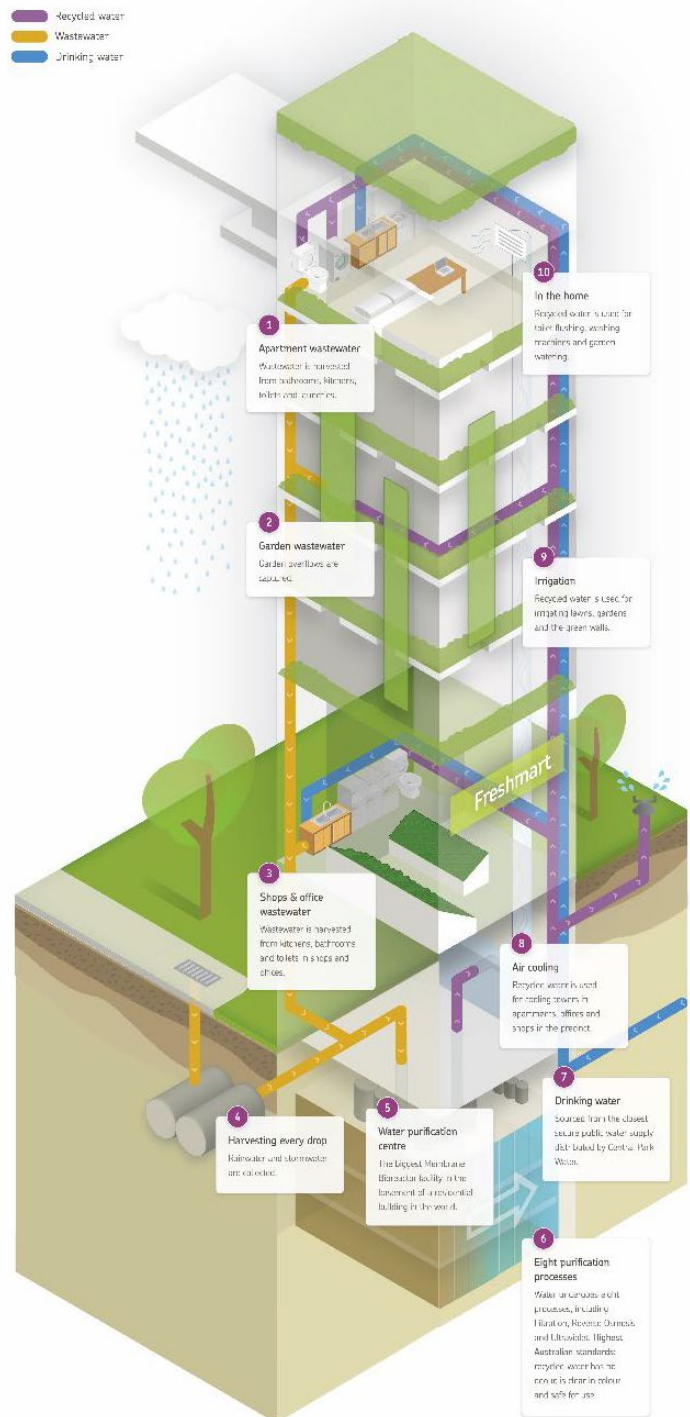


Figure: Central Park water system schematic. Source: Flow Systems.