

2019-20

WATER MANAGEMENT PLAN

021

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VICKI SARA BUILDING
IMAGE: DURBACH BLOCK
JAGGERS AND DVN

The UTS 2027 Strategy commits to cultivate sustainability values in our students and staff, striving for continual improvement in our sustainability outcomes, and ensuring best practise in our processes and systems, research, learning, campus operations and community collaboration. UTS aims to:

- Minimise the environmental impact of its operations and move towards restoring environmental integrity
- Promote social justice, equity and diversity
- Contribute to human health and well-being
- Maintain its financial viability.

As part of its commitment to sustainability, UTS has a Sustainability Policy and Sustainability Strategy 2017 - 2021. Within this strategic framework

sits a series of Sustainability Management and Action Plans to support implementation of the Policy and Strategy. This document is the UTS Water Management Plan 2019 – 2021.

A COLLABORATIVE APPROACH

The pathway towards sustainability demands a collaborative approach, in which organisations work together to share knowledge and learn from each other. UTS collaborates with many organisations, working closely with the City of Sydney, Frasers Property, the ABC, Ultimo TAFE and the Powerhouse Museum on sustainable development of the Ultimo precinct. UTS also works closely with NSW state government agencies and utility providers and actively participates in several collaborations to improve building sustainability, including the Sydney Better Buildings Partnership (<http://www.sydneybetterbuildings.com.au>), the Green Building Council (<http://www.gbca.org.au>) and the Living Future Institute (<http://living-future.org>).

1.1 WATER MANAGEMENT AT UTS

As a leading university of technology, UTS is committed to strategies and actions to improve water management and reduce overall water consumption.

This Plan sets out a pathway towards sustainable water use at UTS. In doing so it aims to;

- reduce water use intensity (litres per person) – achieving a 5% reduction annually
- reduce total water consumption – achieving a 20% reduction between 2007-2020
- reduce institutional water costs
- increase the use of recycled water
- improve the quality of stormwater runoff
- integrate sustainable water management practices into the curriculum
- raise awareness of water management and wastewater conservation amongst the UTS community, including staff, students, contractors and visitors.



2.1 THE ISSUE

Australia is one of the driest continents on Earth and a highly urbanised nation. Water resources in our cities and towns are under increasing pressure from population growth, climate change, extreme drought and waterway degradation. Per capita water consumption has increased to unsustainable levels and increasing amounts of technology and energy are used to produce water for human requirements. At the same time, climate change, increased extreme weather events (storms, floods, drought and bushfire conditions) put pressure on water resources and threaten future water security. Water used for human uses also removes water required for a healthy functioning environment, and to provide ecosystem services.

To secure urban water supply, governments have traditionally built dams, but this ability is limited and has significant environmental costs. More recently cities have turned to desalination plants such as Sydney's Kurnell plant that is capable of providing 250 ML of water per day. However the desalination process is highly energy intensive and the Sydney Desalination Plant required the construction of a wind farm that, arguably, would have been better used to replace carbon emissions from existing energy sources.¹

Rather than the traditional approach of managing urban water supply, stormwater and wastewater separately, governments are moving to a more integrated approach and treating all three as a single resource by creating a closed loop system where all water is used as effectively as possible. This approach includes water demand management, where the demand for water is reduced, and water is recycled and reused (where appropriate).

250ML

Desalination water provided per day

1. The Sydney Desalination Plant operates when dam levels fall to below 60%.

2.2 POLICY RESPONSES

NSW GOVERNMENT

State governments have primary responsibility for water policy in Australia, particularly in urban areas. The primary agency responsible for water management in Sydney is Sydney Water. With the aim of mandating a minimum standard of water and energy efficiency of residential buildings the NSW government introduced the Building Sustainability Index (BASIX), a score based rating tool, as mandatory for all residential developments. This means any new residential development in NSW must comply with BASIX water commitments of 40% reduction in use compared to the average for residential use in 2000. This includes student accommodation at UTS.

WATER EFFICIENCY

The NSW State Government requires large water users to develop 'Water Savings Actions Plans' and UTS fully participates in this program. Sydney Water also runs water efficiency initiatives, including the 'Every Drop Counts' program in which UTS participates. From time to time the state government may introduce targeted water restrictions in response to drought or low dam levels – such as occurred in 2019. UTS fully complies with all water restrictions, modifying operational systems if necessary.

CITY OF SYDNEY COUNCIL

Locally, the City of Sydney is working to implement its sustainable 2030 vision outlined in the Sustainable Sydney 2030 City of Sydney Strategic Plan. The City of Sydney has published a Decentralised Water Master Plan 2012-2030 and a Recycled Water Plan. These Plans set various targets, including a target to reduce mains (potable) water consumption by 10% through water efficiency and a target to replace 30% of potable water with recycled or alternative non-potable water generated from local water resources by 2030.² As one of the major institutions in the city, UTS has responded to the challenge by developing the UTS Water Operations Management Manual with water specific initiatives for individual UTS buildings.

30%

mains water consumption to be replaced with recycled or alternative non-potable water generated from local water resources by 2030.

2. City of Sydney, 2012, Decentralised Water Master Plan 2012-2030.



2.3 SUSTAINABILITY AT UTS

HISTORY OF SUSTAINABILITY AT UTS

UTS has a long history of engaging with sustainability, stretching back to the establishment of the Institute for Sustainable Futures (www.isf.uts.edu.au) in 1997 and the signing of the Talloires Declaration (http://www.ulsf.org/programs_talloires.html) in 1998. Organisational sustainability commitments have been in place through a Sustainability Policy since 1999.

In 2008, UTS joined with other universities in the Australian Technology Network of Universities to declare a commitment to local, national and global sustainability.

The UTS Sustainability Strategy 2017-2020, originally established in 2012, guides sustainability across research, teaching and learning, community engagement and campus operations. A high-level Sustainability Steering Committee provides strategic guidance and dedicated resources, with four FTE staff implementing sustainability initiatives identified in the Strategy.

Today, the UTS Sustainability Policy and Sustainability Strategy contain sustainability targets, goals, KPIs and indicators to drive continuous improvement in the University's sustainability performance towards national and international best-practice.

The 10 year UTS City Campus Masterplan that ran from 2008-2018 transformed the university with major renovations to existing buildings and the construction of eight new buildings. With sustainability principles at its core, this Plan required all new buildings to achieve a minimum 5 Star Green Star rating. In 2016 UTS won the prestigious Green Gown award for continuous improvement, and in 2019 UTS won the TEFMA award for continuous improvement, recognising consistent and demonstrated improvements over the five year period from 2013-2018.

THE BIG PICTURE

The UTS Sustainability Strategy 2017 - 2020 commits to reducing water use intensity (ie. litres per person) by 5% each year, and to reduce total overall consumption by 20% between 2007-2020, despite any growth in floor space and staff/student numbers.

These targets will be achieved by upgrading existing buildings to current best practice water management standards, and ensuring new buildings incorporate these standards, achieving Green Star Certification under the Green Building Council of Australia. All new UTS buildings have been designed for, and achieved, minimum 5 Star Green Star certification. The Vicki Sara Building housing the Science Faculty has a 6 Star rating.



Standard features across campus buildings now include;

- Dual-reticulation systems for grey water
- Low-flow fittings in kitchens and bathrooms
- Automated taps in public areas
- Waterless urinals
- Automated leak detection with alarms
- Drought tolerant landscaping
- Automated landscape irrigation using recycled water
- Recycled water in air conditioning cooling towers
- Collection and recycling air conditioning flush water
- Water efficient management in laboratories.

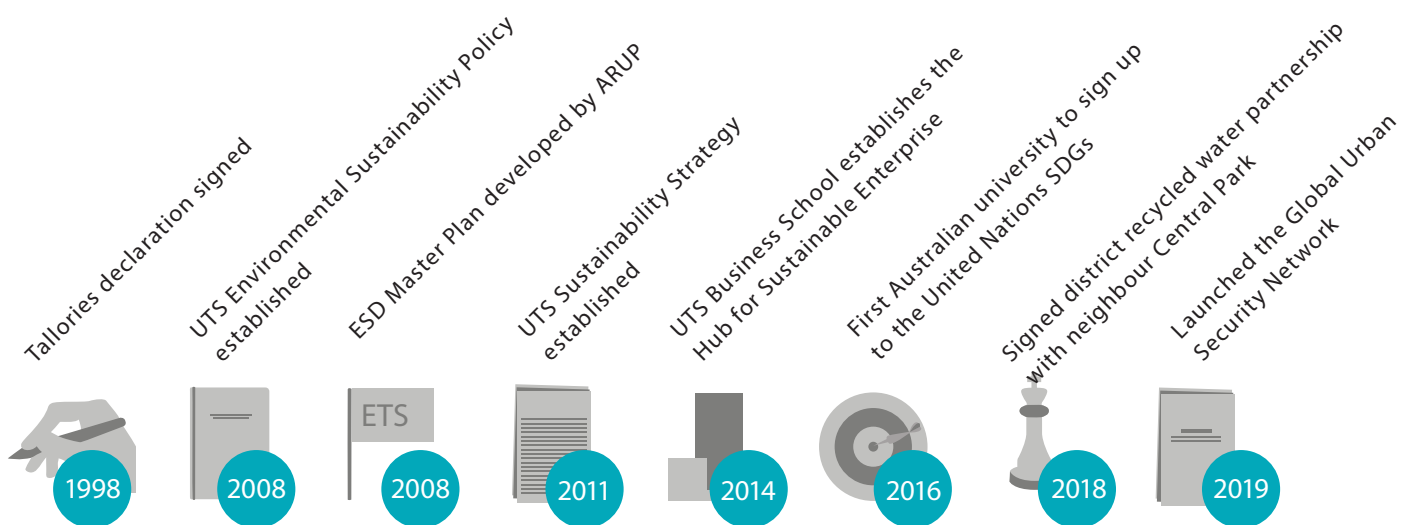


FIGURE 1: THIS WATER MANAGEMENT PLAN GUIDES IMPLEMENTATION OF ACTIONS CONSISTENT WITH THE ABOVE STRATEGIC INITIATIVES.

3.1 KEY ACTIONS TO DATE

WATER EFFICIENCY

Water efficiency measures implemented over the past 10 years have resulted in a fall in water use intensity – as measured by litres per person or by floor area. Between 2008 and 2018 per capita water use fell from 5.8kL to 4.4kL per person per annum. Over the same period total campus floor area increased by 34.4 % and staff and student numbers rose by 55.4%. Due to improved efficiency total water use rose by a much smaller 18.58%. This improvement was achieved by a combination of technological improvements and operational changes

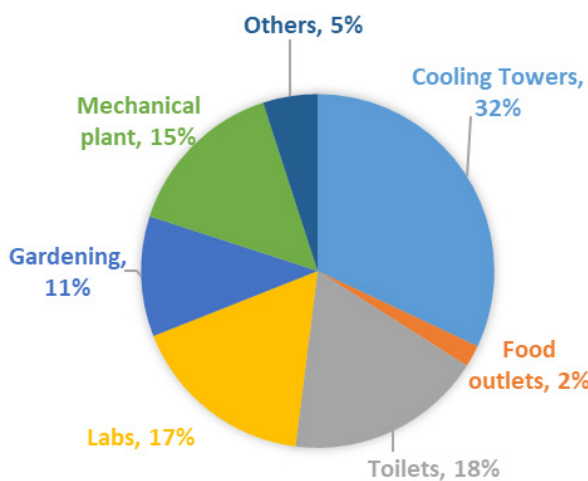


FIGURE 2 - BREAKDOWN OF WATER USAGE AT UTS.³

Waterless urinals were introduced into the design guidelines and become standard across the campus from 2008/9. In science labs water for vacuum aspiration was replaced with mechanically driven air vacuum aspiration, which became standard from 2013/14. A major step forward was the reduction in potable water used for air conditioning. Over a 15 year period UTS upgraded air conditioning to more efficient technology, and introduced management regimes to reduce water use. Approximately 8% of bleed water from the main cooling tower in Building 1 is now treated, recycled and

used for toilet flushing, avoiding approximately 3500 kL per annum of potable water. The Dr Chau Chak Wing Building opened in 2015 with an innovative air cooled air conditioning system, displacing the need for evaporative water chilling.

A mix of different approaches, with iterative steps over a ten year period combined to achieve significant water intensity improvements, with opportunities for further improvements constantly being investigated. Figure 2 shows the main uses for water across campus.

METERING AND LEAK DETECTION

UTS undertook a major upgrade of the water metering system between 2012 -2016 resulting in 203 water meters across campus, enabling fine grained monitoring and water management. Most of the meters are linked to the building management system (BMS) with alarms and automated leak detection. This system of sub-metering with real time monitoring, alarms with email and text warning systems, integrated into the BMS enables tighter control of water wastage. The system also provides data to improve monitoring and reporting with quarterly performance reporting to management via the Utility Steering Committee, annual KPI reporting to the senior executive, and performance data for the annual Sustainability Report.

3. The breakdown of water use in the campus is derived from water audits, fixture surveys and from the water sub metering installed or logged.

ACHIEVEMENTS SO FAR

RECYCLED WATER

In 2018 UTS entered into an innovative water sharing partnership with its Central Park neighbour, the first commercial arrangement of its kind in Australia. Central Park is a residential complex and recycles water from its four apartment towers on-site, selling recycled water excess to its own requirements to UTS. The agreement is for up to 10,000 kL per annum. This water is used within the main UTS Tower building for the air conditioning cooling towers, and supplies the UTS Central building with water for toilet flushing and garden irrigation. As part of this project pipes were installed under Broadway connecting Central Park to UTS and this infrastructure has the potential to provide recycled water beyond the university into the ultimo precinct, further helping to improve urban water management in Sydney.

RAINWATER

As part of the ten year 1 billion dollar Campus Masterplan new buildings and infrastructure developed since 2008 have included rainwater capture. This is subject to UV treatment, filtered and re-used for garden irrigation and toilet flushing in the Multi-Purpose Sports Hall, the Dr Chau Chak Wing, Vicki Sara and Engineering buildings, as well as Alumni Green. Recycled water meters have been installed to the stormwater tanks in the Vicki Sara and Dr Chau Chak Wing buildings to measure recycled water use. These meters can be viewed centrally on the campus-wide EMS (Energy Management System). This system now captures and recycles approximately 100,000 kL of rainwater annually, further reducing UTS's demand on the potable water supply.

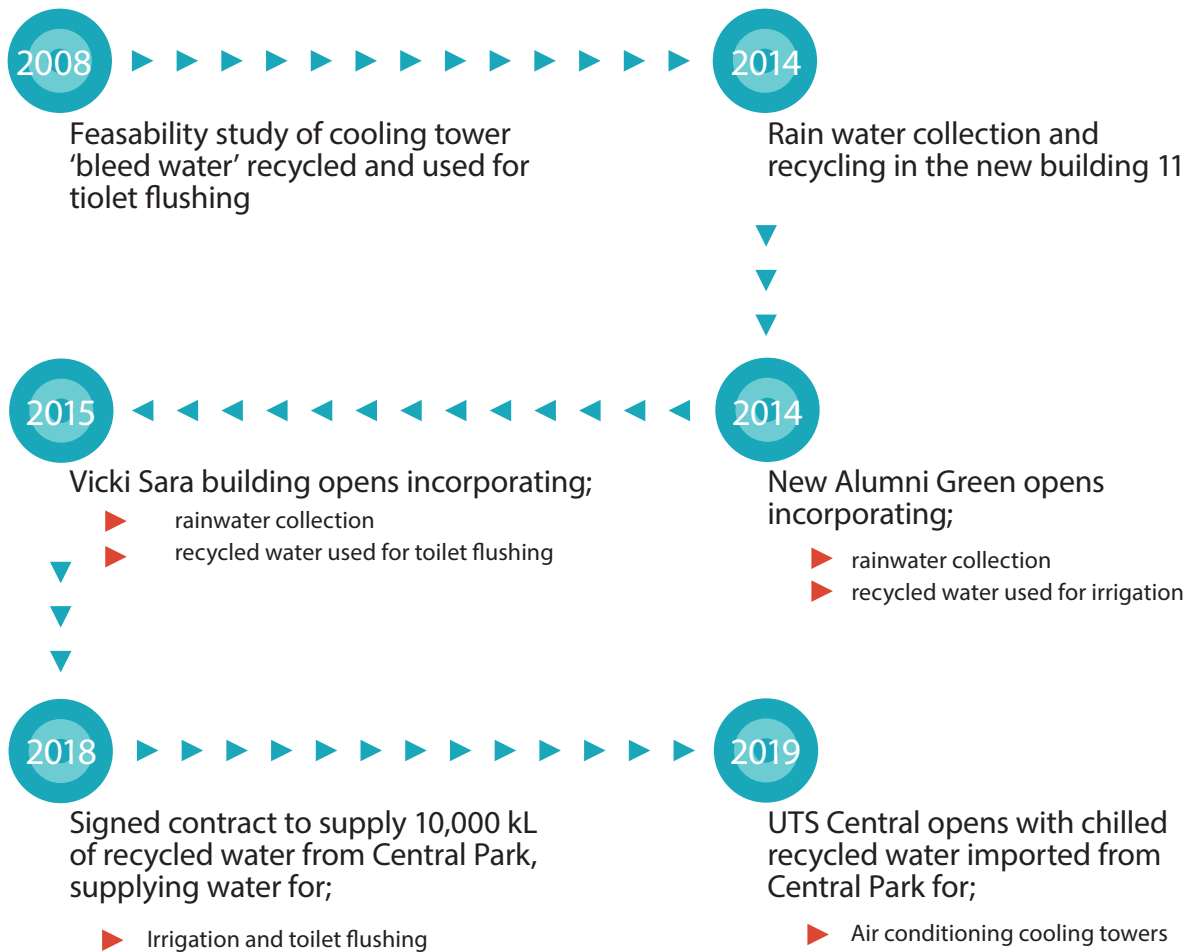


FIGURE: UTS'S RECYCLED WATER JOURNEY.

ACHIEVEMENTS SO FAR

UTS ACHIEVES SWC'S "WELL MANAGED BUILDING" BENCHMARK

During the period 2008 and 2018, in conjunction with Sydney Water, UTS developed a water usage monitoring and measurement system. Taking into account Sydney Water's best practice guidelines of a 'Well Managed' building, key performance indicators (KPIs) for each building and the cooling towers were established. As Table 1 shows, the KPIs for the water

usage of UTS buildings and cooling towers is lower than the best practice benchmark (kL per square metre per year) established by Sydney Water Corporation (SWC).

	'WELL MANAGED' BUILDING BENCHMARK (SWC BEST PRACTICE GUIDELINES)	UTS KPI
BUILDINGS 1, 2, 3, 4, 6, 7, 11	0.77	0.51
BUILDING 8	0.4	0.26
BUILDING 10	0.77	0.39

TABLE 1: UTS WATER USAGE KEY PERFORMANCE INDICATORS

COMMUNITY ENGAGEMENT

Recognising the importance of education and behaviour change UTS has undertaken the following initiatives:

- A target to increase the number of water bottle refill stations on campus between 2017-2020, with associated education campaigns promoting water awareness.
- Posters and electronic displays promoting water saving placed in strategic locations such as lobbies, toilets, lifts, etc.
- Water saving information on the UTS website and social media.
- Plumbing contractors and specialist staff made aware of, and required to comply with, water saving strategies.
- Building Services and Facilities Management Operations staff provided with training in water saving, and liaise regularly with high water users on campus such as laboratory managers, food retailers, and cleaning staff on strategies to reduce water usage.
- Staff, students, and visitors encouraged to participate in specific water saving initiatives.
- Displays and tours promoting the use of recycled water, including water sharing with Central Park.

ACHIEVEMENTS SO FAR

3.2 PERFORMANCE TO DATE

In the decade between 2008 – 2018 water efficiency measures combined with the use of over 100,000 kL of rainwater and recycled grey water used annually, resulted in per capita use of potable water falling from 5.8kL to 4.4kL per year. Figure 4 shows potable water use remained relatively stable, despite the significant increase in floor space and student numbers over this period.

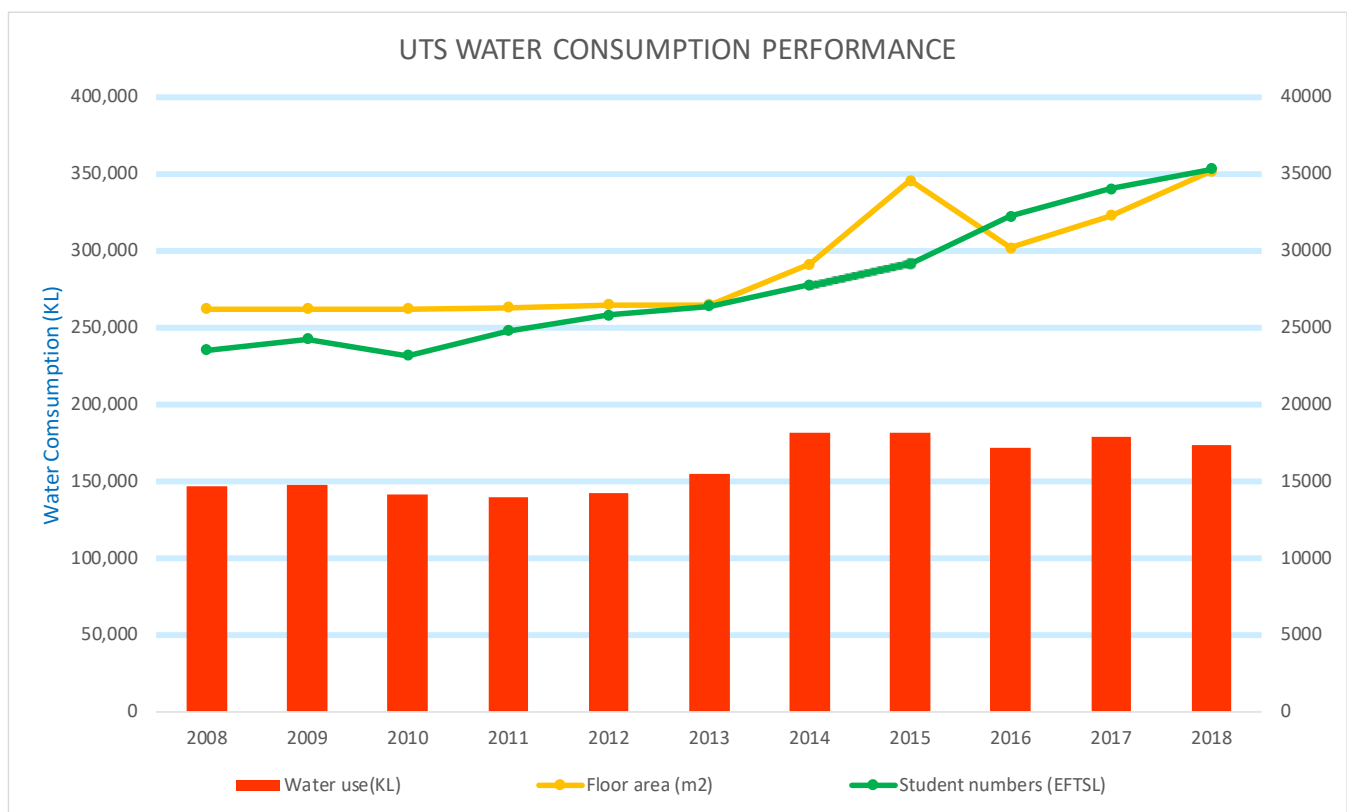
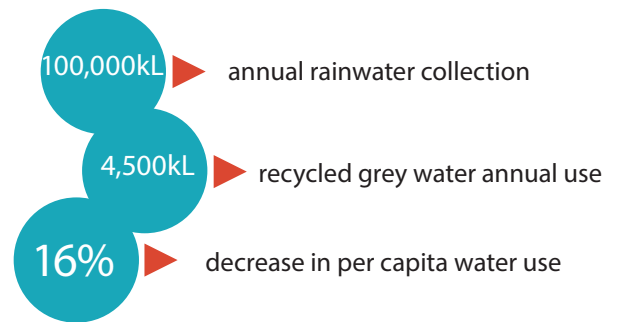


FIGURE 4: UTS WATER CONSUMPTION PERFORMANCE

Figure 5 shows UTS's water consumption performance against the KPIs used by the Tertiary Education Facility Managers Association (TEFMA), measured in kilolitres per square metre per annum. UTS's water usage per square metre per annum fell by approximately 16% between 2008 and 2018, and was also consistently lower than the TEFMA KPIs.

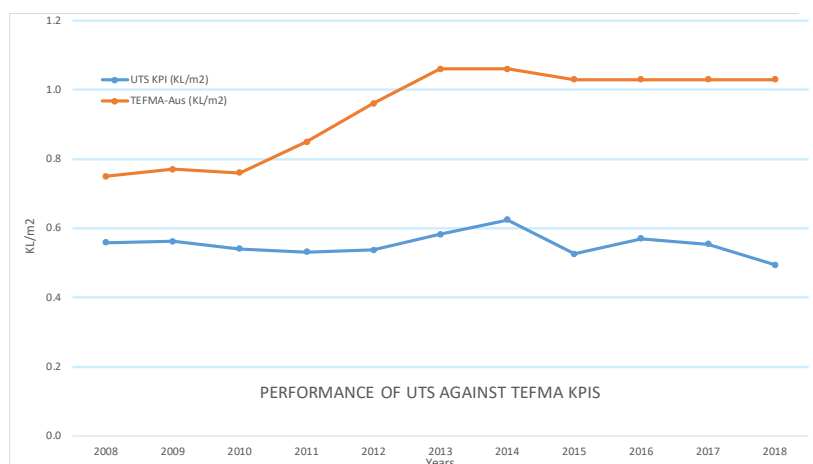


FIGURE 5: PERFORMANCE OF UTS AGAINST TEFMA KPIS

COMMITTED ACTIONS



In the future UTS will continue to deliver initiatives designed to improve water performance on campus. Committed actions will come primarily through ongoing efficiency measures and increased use of recycled water.

The new UTS Central building which opened in 2019 collects approximately 2400 kL of rainwater and imports 4,500 kL of recycled water per year, which is used for toilet flushing and garden irrigation. Other specific water management initiatives are outlined below:

WATER EFFICIENT FIXTURES, FITTINGS AND APPLIANCES

All new buildings under construction and major refurbishments will have the most efficient Water Efficiency Labelling and Standards (WELS) ratings for toilets, urinals, taps, showerheads, dishwashers etc.

STORMWATER CAPTURE AND REUSE

Rainwater is now collected from the roofs and terraces of buildings 2,4,7,8,11,20 and from Alumni Green. The new science building 4A which is due to open in 2021 will include rainwater collection for reuse. All rainwater is treated with UV before being reused for toilet flushing and irrigation across the campus.

WATER RECYCLING

UTS has a target to achieve a 2% increase in the volume of recycled water annually. Currently there are legislative, operational and legal barriers to the widespread use of recycled water across Sydney and UTS is working collaboratively with the City of Sydney, Sydney Water, and other key stakeholders to overcome these barriers. In the meantime, the university is investigating opportunities to expand the use of recycled water within our existing arrangement with neighbouring Central Park. One specific initiative under consideration is the use of Central Park water for the cooling towers of building 11.

COMMITTED ACTIONS



IMAGE: ALUMNI GREEN

WATER METERING AND MANAGEMENT

Existing water meters and sub-meters in conjunction with the BMS web-based management system enables real-time monitoring with alarms and email warnings to identify unusual water consumption patterns. The next step is to improve overflow detection systems, and explore ways to integrate this with the Environmental Management System (EMS) to further detect and isolate leaks, ensuring a process of continually improving water conservation.

GARDEN PLANTING AND IRRIGATION

UTS has five green roofs; three on the UTS Central building, one on the Vicki Sara Building, and Alumni Green (which forms the roof of the Multi-Purpose Sports Hall and LRS). All five are watered using collected rainwater and recycled grey water. The use of native and drought tolerant plants further reduce the need for water. The plant selection and watering regimes will be continually monitored to reduce water requirements.

STUDENT RESIDENCES

UTS has five student residence buildings, housing approximately 1200 students in independent living apartments. Kitchens and bathrooms have been fitted with water efficient fixtures and all appliances are WELS rated. Human behaviour plays a major role in residential water consumption and UTS Housing run awareness and education programs promoting wise water tips. Residents are provided with shower timers and encouraged to take 4 minute showers, and only run dishwashers and clothes washing machines when full.

Resilience & future proofing

Climate change, reduced rainfall, increasing droughts and rising population will put increased pressure on Sydney potable water supply in the years ahead.

The types of initiatives outlined in this Plan – from smart time-controlled metering, to water wise landscaping and irrigation, improved water efficiency within buildings, and the increased use of recycled water, are all designed to reduce the demand UTS places on Sydney's water supply.

Further future potential initiatives being explored are:

- Using recycled water from Central Park for Building 11 cooling towers
- Ongoing development of the urine diversion plumbing in Building 11
- Better utilisation of the Energy Management System (EMS) to detect and isolate leaks across the campus.

The University fully complies with all water restrictions imposed by Sydney Water, and works collaboratively with industry partners, the City of Sydney and the NSW Government to help improve the resilience of Sydney's water infrastructure.



Photo credit: Andrew Worssam

