



Future-proofing our water supply



Sydney Water has been providing world-class water services to Greater Sydney, the Blue Mountains and the Illawarra for 135 years, but with climate change and an increased demand on our services we need to think about water differently.

As Australia's largest city on the driest inhabited continent in the world, we can't rely on rainfall alone. Prolonged dry weather, drought conditions and intense rainfall have shown us how quickly our water supply can deplete and replenish. In fact, we've already invested in the Sydney Desalination Plant that can supply up to 15% of our drinking water needs.

Purified recycled water (PRW) is another option.

Purified recycled water is water recycled from industry and homes (including from kitchens, showers and toilets) that has been purified to meet strict Australian Guidelines for Water Recycling to supplement drinking water sources (such as rivers and dams). It could provide up to 25 per cent of Greater Sydney's water needs by 2056.

Sydney Water has constructed a Purified Recycled Water Demonstration plant. This facility, known as the PRW Discovery Centre, is located on an existing Sydney Water site at Quakers Hill.

Why have we built the PRW Discovery Centre?

The NSW Government's Greater Sydney Water Strategy (GSWS) considers the needs of Greater Sydney from our immediate future through to 2040 and beyond.

One of Sydney Water's actions in the GSWS is to build a Purified Recycled Water Demonstration Plant to provide the community with the opportunity to see how purified recycled water technology works.

It also allows us to work closely with NSW Health to develop a Water Quality Management Framework for purified recycled water. This framework will ensure that the water supplied is safe.

Water from the Discovery Centre will be piped back to the tertiary filters at the Quakers Hill Water Resource Recovery Facility or utilised on site for irrigation. Once regulatory requirements and stakeholder consent are achieved, it will be the water source for the local dual pipe scheme when completed.

Water from the Discovery Centre does not contribute to Sydney's drinking water supply. A future decision to include purified recycled water would include community consultation and require stringent Government approvals.

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Discovery Centre operational specifications

Sydney Water's Purified Recycled Water Discovery Centre is the first facility of its kind in New South Wales. It demonstrates some of the treatment technology used to produce purified recycled water.

The facility has been designed to produce 0.5 megalitres per day, which is between five to six litres per second. It uses less than 2000kWh per day throughout operations.

Eleven chemicals for fouling/scale control, membrane cleaning, disinfection and final water conditioning are used throughout the treatment process. All chemicals must meet quality assurance criteria to ensure they do not add any contaminants to the purified recycled water.

Discovery Centre treatment processes

After being treated at the Quakers Hill Water Resource Recovery Facility, recycled water is fed to the Discovery Centre where it undergoes several treatment processes, starting with Ultrafiltration. This process pushes water through membranes with tiny pores one 10 thousandth of a millimetre in size, removing any particles and suspended solids that are too big to fit through the holes.

Next, a process called Reverse Osmosis (or RO) uses high-pressure and more membranes with pores 100 times smaller than the previous stage, to remove most of the salts, chemicals and micro-organisms, such as viruses, from the water. The RO system uses an innovative barrel design which is both safer for Operators and takes up less space compared to other RO arrangements.

Advanced oxidation, which is Ultraviolet light, combined with a chemical oxidant (in this case chlorine), is used to break down chemicals that can pass through the RO process. There are two mechanisms by which this occurs: UV-Photolysis, where UV light destroys contaminants by breaking apart chemical bonds and UV-Oxidation, where UV light in conjunction with sodium hypochlorite, oxidises any remaining chemicals.

Lastly, as we do for our drinking water, chlorination ensures both the water and pipes are free from any remaining microorganisms, producing high-quality water that meets the Australian Guidelines for Water Recycling.

All our treatment processes have continuous online monitoring to ensure all performance parameters are maintained. The brine stream and any off-specification water will be returned to the head of the Quakers Hill Water Resource Recovery Facility.

Treatment process	Technology / Specifications
Ultrafiltration	Dupont UF skid
Reverse osmosis	Veolia Barrel technology utilising DuPont membranes
Ultraviolet and Advanced Oxidation	Trojan Swift unit utilising hypochlorite as the oxidant

Purified recycled water is part of an adaptive plan that will enable us to look beyond rainfall to future-proof Greater Sydney's water supply sources. With the Department of Planning and Environment predicting an increase of 1.8 million people to Sydney's population by 2050 (a 35% increase), investing in PRW will help reduce the need for expensive drinking water investments by exploring existing resources.

Our plan is aligned with the NSW government's vision for Greater Sydney and our customer values, and will support growth and resilience for future generations. With meaningful conversations with our stakeholders, customers and community we can consistently and reliably produce purified recycled water that meets water quality guidelines, protects human health and the environment.



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