Recycled water

This fact sheet describes and evaluates recycled water as a water source option for cities and towns in NSW.

The NSW Government has released the draft Recycled Water Roadmap for consultation and is inviting residents, communities, and stakeholders to have their say to provide more secure and resilient water supplies for decades to come.

The draft Roadmap sets out a new vision for expanding water reuse across the state where it is safe, beneficial, and cost-effective, ensuring a robust policy and regulatory framework is in place for future projects. It also starts a conversation about whether highly treated purified recycled water could become part of the drinking supply in the future, subject to community support and appropriate regulation.

The information below provides facts about recycled water and evaluates its use as a water source for NSW.

Table 1. General information about recycled water.

Water source name	Recycled water (generally)
Description	We recycle our wastewater through the environment every day. Recycled water is water that has been treated to remove contaminants so it can be used again. Recycled water is another important water source. The NSW Water Strategy and the 12 regional and 2 metropolitan water strategies support the development of recycled water schemes, particularly as this source is less dependent on rainfall. When we refer to recycled water, we commonly mean water that is captured from our wastewater treatment plants before its release into the environment and is further treated. Recycled water can be used for a variety of non-drinking purposes, or it can be further treated to produce purified recycled water that is safe for human consumption. Recycled water and purified recycled water are rainfall independent sources of water that can contribute to our overall water supply and secure supplies when rainfall is limited.
Rainfall dependence	Less rainfall dependent than stormwater and groundwater.

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Table 2. Information about recycled water for non-drinking purposes.

Water source name	Recycled water for non-drinking purposes
Description	Recycled water for non-drinking purposes can be used for: • irrigation for agriculture, sports fields, parks and public gardens • industrial processes like mining operations • commercial uses like snow making and cooling towers • domestic use for laundry, toilet flushing, garden watering and car washing. Recycled water for non-drinking purposes is distributed in a dedicated pipe that is separate from the drinking water supply and is commonly referred to as 'purple pipe'. **How is recycled water produced?** How the recycled water will be used determines the type and combination of processes that are needed to produce water appropriate for that use and to meet the national guidelines. There are different treatment processes that can be used in combination to produce recycled water from wastewater. Common processes include: • lagoon treatment that allows the time to settle particles and for natural processes to cause die off of disease-causing microorganisms • media filtration - using sand or other materials to remove fine particles • membrane filtration – which is like a super fine sieve that is used to remove finer particles and some disease-causing microorganisms. The holes in the membranes can range from one tenth to one millionth of the diameter of a human hair • disinfection to kill or inactivate disease-causing microorganisms including viruses. Chlorine, ultraviolet light and ozone can be used as disinfectants. In cases where there is minimal treatment, public exposure to recycled water is restricted by what is known as end use controls. These may include irrigation at night or fences to restrict public access during irrigation. Regardless of what combination of treatment processes or end use controls are used, all recycled water production has multiple barriers or treatments, so if one process fails, others remain to protect water quality. All recycled water which is supplied by a water utility is required to meet the Australian Guidelines for Water Recycling - Phase 1.

Water source name	Recycled water for non-drinking purposes
Strengths	• Reduces the demand on drinking water systems and reduces the volume of water extracted from the environment for human use. • Provides multiple environmental benefits by reducing the nutrients and volume of treated wastewater released to waterways and oceans. • Recycled water schemes can delay the need for investments in other parts of a utility's water or wastewater systems because they reduce the demand for drinking water and reduce wastewater releases
Challenges	• Cost of infrastructure – due to multiple treatment requirements and associated infrastructure, costs can be high to build and operate. • Medium to high energy use and associated greenhouse gas emissions, unless offset by green energy. • Demand for recycled water for irrigation and watering can vary depending on weather which can contribute to reduced cost effectiveness. • Supplying water in a separate and dedicated recycled water pipe is expensive.
Other considerations	• Volume and flow of source wastewater. • Reduction in the volume of treated wastewater that can contribute to river flows, especially during dry conditions.

Table 3. Information about purified recycled water for drinking

Water source name	Purified recycled water for drinking
Description	Purified recycled water is recycled water that is further treated to ensure that it is safe for human consumption. Currently there are 35 cities in the world, including Perth, where purified recycled water contributes to the drinking water supply. Stringent water quality assurance programs need to be in place before water is provided to consumers. **How is purified recycled water produced?** Additional processes are required to ensure the production of safe and reliable drinking water from recycled water. These include: • Ultrafiltration, which removes microorganisms, particles and large molecules • reverse osmosis filtration, which removes viruses, salts and other small molecules

Water source name	Purified recycled water for drinking
	• advanced oxidation, which breaks down harmful chemicals and pollutants by the action of additional chemicals with ultraviolet light. The purified water is added to the water supply in a dam or reservoir. Utilities providing purified recycled water are required to meet the Australian Guidelines for Water Recycling - Phase 2 and the Australian Drinking Water Guidelines.
Strengths	In addition to the strengths listed for recycled water: • There is no need for a separate and dedicated pipe network for supply to consumers, as the water is added to the drinking water supply and is safe for human consumption. • Demand for purified recycled water is more stable than for recycled water as demand is not dependent on weather.
Challenges	• Public confidence for drinking purified recycled water is required prior to adding it to the water supply. • Meeting stringent regulations to ensure continuous safe water quality. • High energy use and associated greenhouse gas emissions, unless offset by green energy.
Other considerations	• Additional for costs for extra treatment, continuous monitoring of processes and water quality testing.
References and resources	• Australian Guidelines for Recycled Water Phase 1 (2006) • Australian Guidelines for Recycled Water Phase 2 Augmentation of Drinking Water Supply (2008) • Australian Drinking Water Guidelines (2011) • Draft NSW Recycled Water Roadmap • Sydney Water (2021) 'How we purify our recycled water' [video], SydneyWaterTV, YouTube, accessed 9 January 2024. • Water Services Association of Australia (n.d.), Purified Recycled Water resources, Water360 website, accessed 9 January 2024. • Water Services Association of Australia (2022) 'What is purified recycled water for drinking?', WSAA, accessed 9 January 2024. • Water Services Association of Australia (2023), 'All Options on the Table: Toolkit on Purified Recycled Water for Drinking', WSAA, accessed 9 January 2024.