

Fact Sheet – Purified Recycled Water

HOW IS PURIFIED RECYCLED WATER MADE?

7-barrier process

Purified recycled water is wastewater that has been treated to a very high standard through a 7-barrier process.

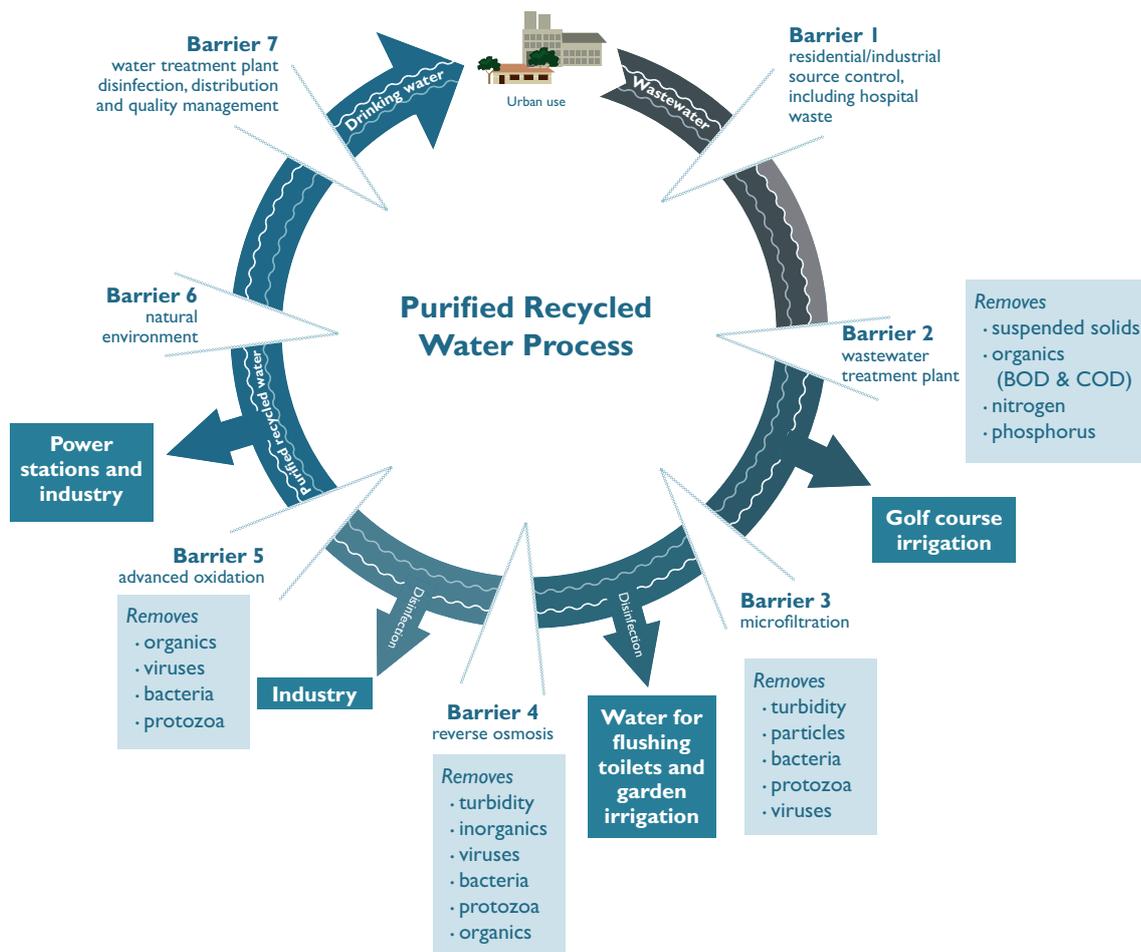
The 7-barrier process is designed to be a fail-safe system to ensure the quality and purity of the water.

The process, which uses world class technology and a strict testing regime to ensure the safety of the water, provides multiple opportunities to identify and fix any problems that might occur.

For example, reverse osmosis (barrier 4) is very effective in purifying waste water. However, advanced oxidation (barrier 5) has been added to further guarantee the safety of the water. The dam (barrier 6) provides further time and environmental buffers to ensure water quality standards are met. The water then passes through the existing treatment process currently used to produce drinking water.

Multiple barrier processes are standard practice in any manufacturing process where the safety of human health is paramount.

The purified recycled water process



BARRIER 1: Source Control

The first step in managing water quality is to control what is put into the sewerage system.

The *Water Act 2000* prohibits the unauthorised discharge of wastes, other than domestic sewage, into the sewerage system. Councils provide a sewerage system primarily for transporting and treating domestic sewage.

With council approval the system may also be used for the acceptance and treatment of trade waste, which is liquid waste generated by industry, small business and commercial enterprises. A trade waste approval is the written approval from council that states the requirements and conditions under which discharge to the sewer is allowed.

All hospitals must obtain a trade waste approval, and have waste management plans in place to ensure that hospital waste, such as unused pharmaceuticals, clinical waste, cytotoxic waste from cancer treatments and radioactive waste are disposed of appropriately and do not enter the sewers.

While source control is currently an important barrier in the process, source management will be reviewed and strengthened as part of the introduction of purified recycled water. Ongoing monitoring through sophisticated control systems will also be in place.

Barrier 1 - Source Control: Controls the release of harmful chemicals into the sewerage system

BARRIER 2 : Wastewater Treatment Plant

Our current wastewater treatment plants already provide an important role in treating water to a safe standard to discharge to our waterways. A wastewater treatment plant uses a process of physical separation and biological degradation to destroy or separate organic compounds, solids and most nutrients to produce clear effluent suitable for discharge into a waterway.

The extended “activated sludge” process used in South East Queensland wastewater treatment plants is very effective at reducing many synthetic and other chemicals, and also reduces potentially harmful microbes.

Barrier 2 - Wastewater Treatment Plant: reduces nutrients such as phosphorus and nitrogen, some microorganisms and chemicals.

This water can be used for outdoor irrigation, such as golf courses, when appropriate on-site controls are in place to prevent human exposure.

Barriers 3, 4 and 5 are in the advanced water treatment plants.

BARRIER 3: Microfiltration

The wastewater is then treated using microfiltration. In the microfiltration process, water is forced under pressure through bundles of tiny plastic straws with microscopic pores which act as a filter to separate small particles. They allow passage of water and dissolved chemicals but sieve out suspended material and microorganisms such as *Cryptosporidium* and *E. coli*. This step removes most of the bacteria and even some viruses, particularly those that adhere to particles in the water.

These membranes, (which are made of artificial organic polymer material such as polypropylene), are used in the food and pharmaceutical industries to provide fine filtration and to remove bacteria from products that can't be heat-sterilised.

The physical integrity of the membranes will be monitored regularly through pressure tests.

Barrier 3 - Microfiltration removes small particles and most microorganisms.

This water is disinfected and can be used for flushing toilets and garden irrigation in dual reticulation areas.

BARRIER 4: Reverse Osmosis

At Barrier 4, reverse osmosis membranes are used to purify recycled water. The water is forced at high pressure through sheets of synthetic material (cellulose acetate) which is tightly wound into a roll.

The process removes any remaining viruses, inorganic chemicals such as salt and reduces the level of organic compounds such as pharmaceuticals and pesticides to extremely low levels. These levels are at or below the low concentrations defined by the national standards on drinking water and recycled water for potable augmentation.

Barrier 4 - Reverse Osmosis: removes vast majority of dissolved chemicals and any remaining microorganisms.

This water is currently used for industry purposes at Luggage Point.

BARRIER 5: Advanced Oxidation

Advanced oxidation is the final step of the advanced water treatment process. It uses hydrogen peroxide (a powerful oxidant) and ultraviolet light that provide an extra level of disinfection should it ever be required. The combination of these steps ensures no viruses and bacteria are found in purified recycled water and that it is safe to add to drinking water supplies.

After the purified recycled water has been through Barrier 5, it will meet all water quality criteria contained in the *Australian Drinking Water Guidelines* and the *Australian Guidelines for Water Recycling*.

Barrier 5 - Advanced Oxidation: removes any remaining microorganisms and destroys any remaining chemicals.

This is purified recycled water. It is required to be safe to drink before it is transferred to the next barrier.

BARRIER 6: Natural Environment

After meeting the water quality criteria in the *Australian Drinking Water Guidelines* and the *Australian Guidelines for Water Recycling*, the purified recycled water will be blended into Wivenhoe Dam. This allows the dam to act as a time and environmental buffer.

Any trace amounts of chemicals that may remain after advanced water treatment will then be diluted by the large volume of water in the environmental buffer. The water is also subject to effective natural treatment processes such as biodegradation (from natural processes in the buffer) and photolysis (degradation by ultraviolet light from the sun).

BARRIER 7: Water Treatment Plant

Water extracted from Wivenhoe Dam is treated at a drinking water treatment plant prior to consumption. The primary objective of treating drinking water is to remove potentially harmful microorganisms that are introduced from surface run-off from activities such as farming or human settlements.

The drinking water treatment process in South East Queensland usually involves a combination of flocculation, sedimentation, filtration and disinfection.

The most common methods to remove microorganisms in the water supply are filtration, oxidation with chemicals such as chlorine, or treatment with ultra-violet (UV) radiation.

The secondary objective of drinking water treatment is to improve the aesthetic quality of the water including the colour, taste and odour that may be due to iron, manganese, algae and organic matter from the catchment. A chlorine residual is added to the water to ensure an adequate level of disinfection is maintained before the water is distributed to consumers.

Barrier 7 - Water Treatment Plant: removes taste, odour, turbidity and microorganisms.

This is treated drinking water.