

# Purified recycled water



*Three new Advanced Water Treatment Plants in Brisbane can produce up to 232 megalitres of pure water a day. This is equivalent to 90 Olympic size swimming pools.*



*First Water being released at Tarong storage lake in June 2008*

## What is purified recycled water?

Purified recycled water is water that has been filtered, cleaned and purified to a very high standard using advanced technologies of microfiltration, reverse osmosis and ultraviolet light. The purified water meets and exceeds standards set in the Public Health Regulations.

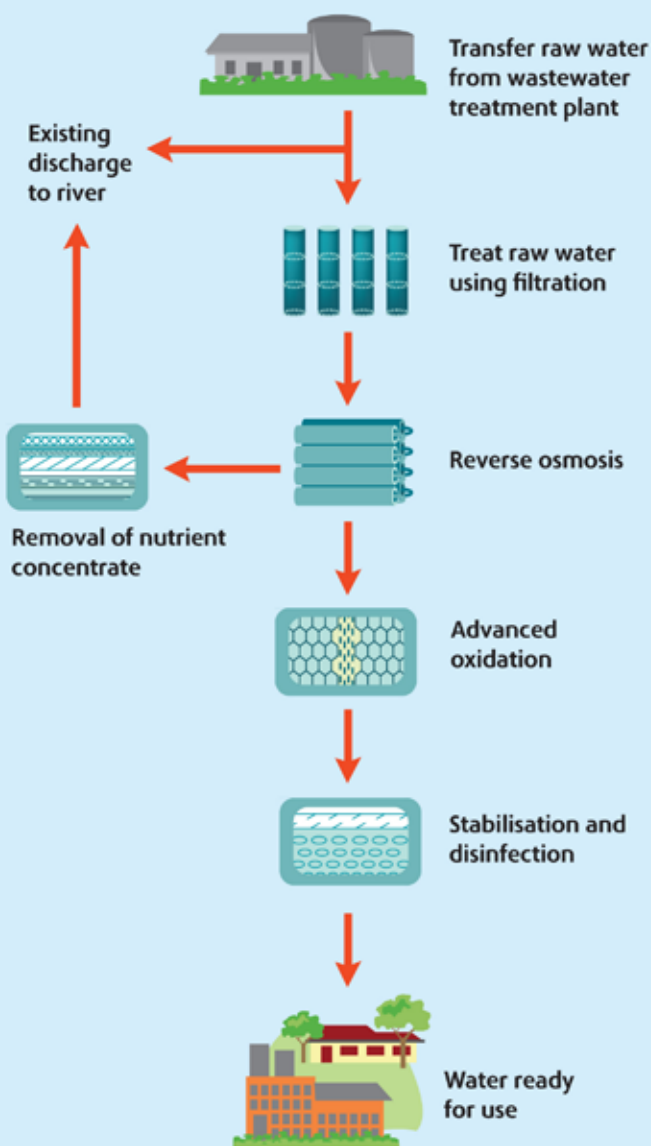
Recycled water is purified by passing it through special technology to remove all sediments, nutrients, bacteria, viruses, hormones and minerals. Recycled water in south-east Queensland's Western Corridor Recycled Water Project is purified in several stages.

## Did you know?

*Purified recycled water is vital to securing south-east Queensland's water supply*



## The advanced water treatment process



**Transfer raw water** from wastewater treatment plants at Gibson Island, Luggage Point, Oxley, Wacol, Goodna and Bundamba via a network of pipelines. The treatment plants remove a significant amount of impurities and micro pollutants. **Pre-treating** involves adding chloramine to limit bacterial growth and ferric chloride to remove phosphorous.

**Microfiltration** involves passing wastewater through very fine hollow fibre membranes 0.1 to 0.4 micrometres in size (human hair ranges in size from 20 to 200 micrometres in diameter) that remove particulate matter, protozoa and some viruses. After passing through the membrane, the filtered water mostly contains dissolved salt and organic molecules.

**Reverse osmosis** involves forcing filtered water through a special membrane at high pressure to remove impurities such as dissolved salts, viruses, pesticides and most organic compounds. The membrane acts like an artificial kidney. RO produces water of a higher level of purity than drinking water. It is the same process used to desalinate seawater.

**Advanced oxidation** exposes the water to ultraviolet light combined with hydrogen peroxide to eliminate remaining organic compound traces. The UV intensity is around 300 times that of the sun's rays.

**Stabilisation** prevents corrosion of piping and pumping equipment, involving the addition of lime and carbon dioxide to water to create hardness and alkalinity. **Disinfection** involves adding chlorine to prevent biological growth in water pipes and storage tanks.

**Purified water** is ready for use by industry, agriculture and adding to drinking water supply, if needed. Blending purified water with reservoir water is called indirect potable use.

## Why do we need purified recycled water?

Purified recycled water is vital to securing south-east Queensland's water supply. Currently, 95% of our water supply comes from dams and weirs. Increasing population, recent drought and climate change have put pressure on our water supplies and we are facing shortages.

Currently, almost 2.8 million people live in south-east Queensland. This figure could increase to more than 6 million by 2056. Even with significant new water efficiency measures to reduce consumption, our increasing population

is substantially increasing our demand for water.

We need to change the way we think about urban water management, and acknowledge that water recycling is already happening, and do it better and more often. Purified recycled water, along with desalination, is expected to provide up to 30% of our water supply by 2056. It can be used safely for agricultural irrigation, industrial manufacturing and power stations, and to supplement our dam water supply.

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Purified recycled water has a long history of safe indirect potable reuse.

## How do you ensure it is safe?

Purified recycled water must meet strict water quality and health standards before it can be added to drinking water supplies.

Queensland Health has developed health-based water quality criteria for purified recycled water, based on national guidelines and recommendations from peak health bodies such as the World Health Organisation and the National Health and Medical Research Council.

New legislation, the *Water Supply (Safety and Reliability) Act*, has been introduced to regulate recycled water and drinking water in Queensland. There is also a *Master Recycled Water Management System Plan* and an individual *Recycled Water Management Plan* for each facility.

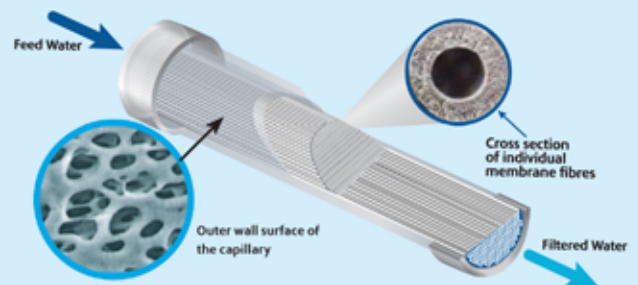
The standards set quality control levels to ensure the water is safe. Using world class technology, the water goes through a number of high level engineering and filtering processes to meet these stringent health standards. Water quality is monitored at each plant and tested at external laboratories for the presence of over 200 specific chemicals, viruses and bacteria.

Once added to Wivenhoe Dam, purified recycled water blends with dam supplies before being transported 60 kilometres along the mid-Brisbane River where it is treated by the Mt Crosby Treatment Plant before being supplied to households.

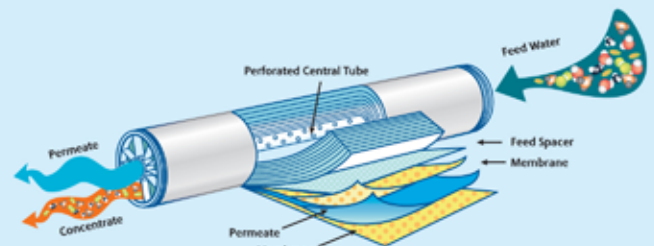
WaterSecure's Interim Water Quality Report (2009) results show that the final quality of the purified recycled water conforms to the guideline levels prescribed by Queensland Health in the Public Health Regulation. The report states the Western Corridor Recycled Water Project is capable of consistently producing purified recycled water that is safe to be used to supplement Wivenhoe Dam.

## How are bacteria and viruses removed from the water?

Bacteria and viruses are removed at various stages. Some are removed at wastewater treatment plants. After this, treated water is diverted to an advanced water treatment plant, such as at Gibson Island, Luggage Point and Bundamba in Brisbane. Here, recycled water is extensively purified by microfiltration, reverse osmosis and advanced oxidation processes.

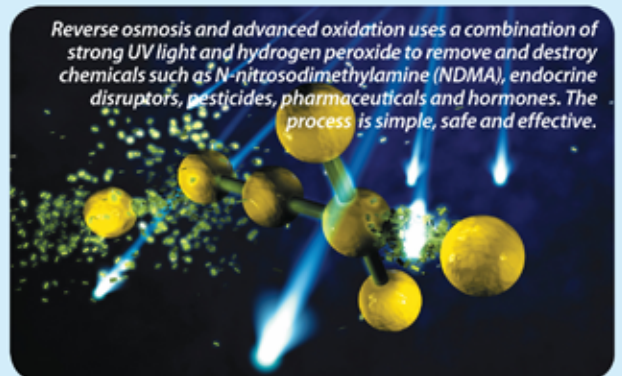


**Microfiltration** forces water through bundles of hollow fibres with microscopic pores which are much smaller than bacteria and some viruses. This step removes most of the bacteria and even some viruses, particularly those that adhere to particles in the water.



**Reverse osmosis** involves forcing the filtered water through an ultra-fine membrane made of sheets of synthetic material (cellulose acetate) which is tightly wound into a roll. This removes any remaining bacteria and viruses.

*Reverse osmosis and advanced oxidation uses a combination of strong UV light and hydrogen peroxide to remove and destroy chemicals such as N-nitrosodimethylamine (NDMA), endocrine disruptors, pesticides, pharmaceuticals and hormones. The process is simple, safe and effective.*



**Advanced oxidation**, the final step of the advanced water treatment process, uses hydrogen peroxide (a powerful oxidant) and strong ultraviolet light that provide an extra level of disinfection.

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Inserting a reverse osmosis membrane into a fiberglass element.

## How are chemicals such as pharmaceuticals, hormones, industrial chemicals and pesticides removed from the water?

Conventional sewage treatment in Queensland is so effective that most pharmaceuticals (including chemotherapy drugs), hormones and industrial chemicals have already been reduced to concentrations below health guideline values.

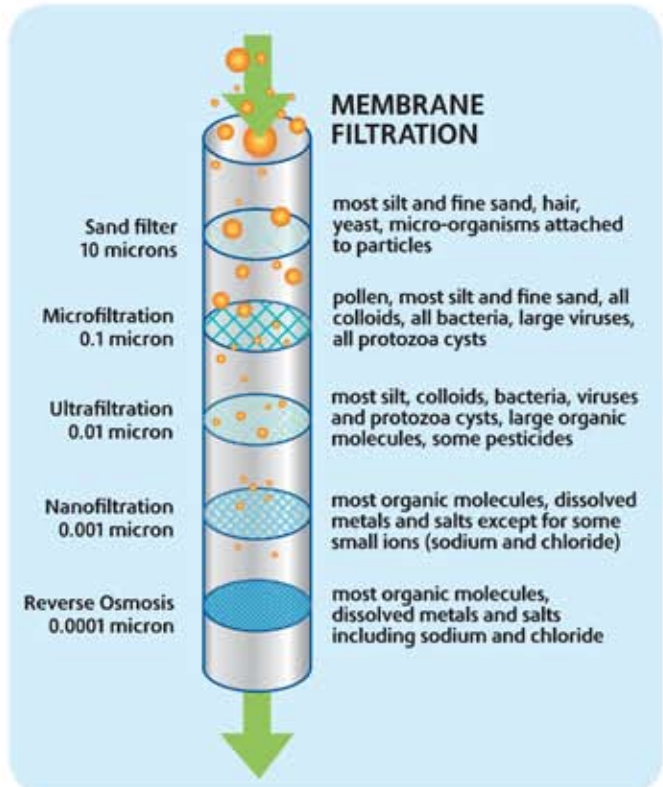
The guidelines are based on the Australian Drinking Water Guidelines which were used as a model for the World Health Organisation's Drinking Water Guidelines and on Australian Guidelines on Water Recycling.

The advanced wastewater treatment process, particularly reverse osmosis and advanced oxidation, removes the remaining chemicals, or reduces them to undetectable levels to a few parts per trillion or less (see also Reverse Osmosis Fact Sheet).



## Did you know?

Membrane filtration can be used to produce high quality water and to desalinate seawater.



## How much purified recycled water is produced?

The Western Corridor Recycled Water Project, which purifies recycled water at three large advanced water treatment plants, has the capacity to produce up to 232 megalitres a day – approximately 93 Olympic-sized swimming pools of pure water. Each plant can adjust its daily production depending on need.

## Further reading

WaterSecure  
[www.watersecure.com.au](http://www.watersecure.com.au)

Queensland Water Commission  
[www.qwc.qld.gov.au](http://www.qwc.qld.gov.au)

Waterwise  
[www.nrw.qld.gov.au/waterwise](http://www.nrw.qld.gov.au/waterwise)

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