

What's in wastewater?

Wastewater is 99% water. The remaining one per cent is made up of things you've added to water as you've used it.

Along with items like toilet paper, wet wipes and plastics it includes things like:

- Human waste
- food scraps
- fats, oil and grease
- bacteria and viruses
- detergents, soaps and cleaning chemicals
- paints, solvents, pesticides and fuel
- medicine and cosmetics.

What pollutants are in raw wastewater?

Raw wastewater is wastewater that has not been treated. We need to separate and remove these pollutants. We measure concentrations of specific pollutants as they come to a plant.

Table 1. Typical composition of raw (untreated) wastewater for Penrith Water Recycling Plant.

Pollutant	Average concentration (mg/L)
Nitrogen (total)	6.44
Phosphorous (total)	0.83
Carbonaceous Biochemical Oxygen Demand (CBOD)	28.8
Aluminum	60.8
Cadmium	0.12
Copper	13.9
Iron	65.8
Total Suspended Solids	31.7
Zinc	25.9

What are the pollutants?

Carbonaceous biochemical oxygen demand (CBOD). A measure of the amount of oxygen used by carbonaceous microorganisms in water when breaking down nutrients such as nitrogen and phosphorus. It's a way to measure the amount of organic pollution in wastewater.

Nitrogen (total) is an essential nutrient for plants, animals and humans. Excessive nitrogen can cause algal blooms and excessive aquatic plant growth in waterways (Eutrophication).

Phosphorous (total) is an essential nutrient for plants, animals and humans. Much like nitrogen, too much phosphorous can cause algal blooms and excessive aquatic plant growth in waterways (Eutrophication).

Total Suspended Solids (TSS) is the "total" count of all the small and light particles dispersed through water that do not dissolve, sink to the bottom or float to the top. Suspended solids can make water look murky or cloudy and reduce the clarity of water.

Aluminium, cadmium, copper, iron and zinc are all naturally occurring metallic elements. Large concentrations they can be harmful to aquatic life.

Did you know?

About 70% of wastewater is made inside homes, with the rest coming from businesses and industry.

Where do these specific pollutants come from?

Nitrogen and phosphorous can be found in:

- urine and faeces
- laundry detergents
- food waste
- soaps
- medicated ointments and medicines

Household cleaning products, paints and solvents will often contain metal pollutants such as; chromium and selenium.

What is the typical composition of treated wastewater?

Treated wastewater has been treated to separate and remove pollutants before being released into the environment or reused.

Table 2. Typical composition of treated wastewater for Penrith Water Recycling Plant.

Pollutant	Average concentration (mg/L)
Nitrogen (total)	0.71
Phosphorous (total)	0.01
Carbonaceous Biochemical Oxygen Demand (CBOD)	0.18
Aluminum	0.02
Cadmium	0.00005
Copper	0.004
Iron	0.01
Total Suspended Solids	0.2
Zinc	0.003

How much is removed?

With the data provided in the above two tables try to calculate the percentage of how much of each pollutant is removed in the treatment process.

If we didn't treat the water and remove the pollutants how would this impact the Environment? Or public health?

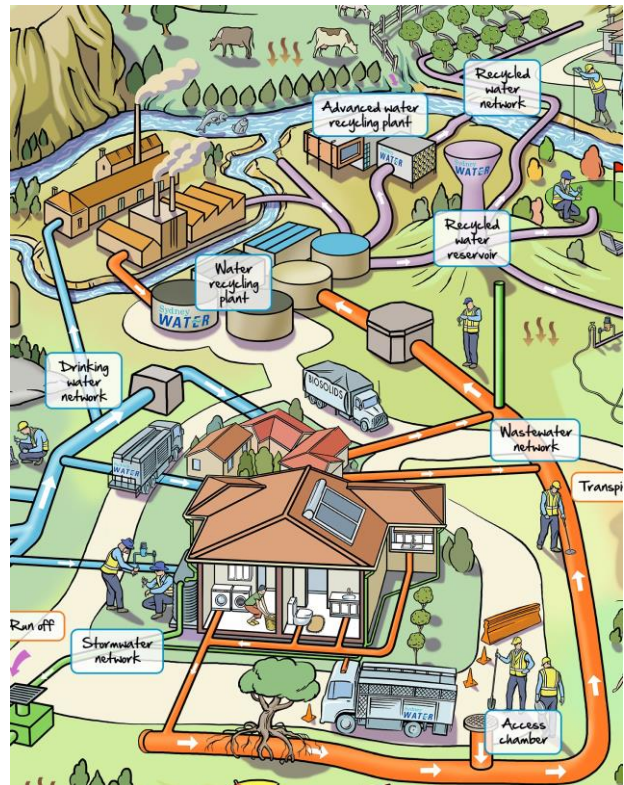


Figure 1. Wastewater network (orange pipes) from home to the wastewater recycling plant.

Want to know more?

Wastewater treatment

<http://www.sydneywater.com.au/SW/water-the-environment/how-we-manage-sydney-s-water/wastewater-network/epa-reports/wastewater-treatment-plants/index.htm>

Penrith Water Recycling Plant

<http://www.sydneywater.com.au/SW/education/Wastewater-recycling/Solids-recycling/index.htm>

EPA Pollution monitoring

<http://www.sydneywater.com.au/SW/water-the-environment/how-we-manage-sydney-s-water/wastewater-network/epa-reports/wastewater-treatment-plants/index.htm>

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