



TECHNICAL INFORMATION

Waterloo Water Treatment Plant

Key statistics

Plant flow: 20 ML/d to 120 ML/d, daily average 60 ML/d

Main treatment processes:

- CO₂ stripping
- Lime addition
- Fluoridation (part supply only)

Treatment chemicals:

- Lime (Ca(OH)₂)
- Fluoride (Na₂SiF₆ and HFA)

Typical operating costs:

- Chemicals 0.55 cents/cubic metre
- Power 3.7 cents/cubic metre

40% of the Wellington urban region's water supply comes from Waterloo Water Treatment Plant.



Waterloo Water Treatment Plant

Raw water sources

Water for the treatment plant comes from the Waiwhetu aquifer beneath Lower Hutt. The water is extracted from the aquifer via eight wells and pumped to the treatment plant.

The wells are located in the following places:

- Bloomfield Terrace
- Colin Grove
- Hautana Street
- Penrose Street 1
- Penrose Street 2
- Willoughby Street 1
- Willoughby Street 2
- Mahoe Street

During peak demand periods all the wells will be supplying water to the plant. At times of low demand, only two wells are needed.

Typical raw water quality

Because the Waiwhetu aquifer has a low risk of contamination and high water quality, very little treatment is required. However, the water is slightly corrosive because of its low pH.

Turbidity:	0.02-0.1, average 0.03 NTU
pH:	5.5-7.0, average 6.3
Temperature:	13-15°C, average 14°C
Alkalinity:	20-40 mg/L as CaCO ₃ , average 32 mg/L as CaCO ₃
Conductivity:	80-110 µS/cm, average 95 µS/cm

The treatment process

Raw water from the wells enters the treatment plant and is split into two identical process streams. There is one aeration chamber and one treated water storage area for each stream.

Aeration

The aeration chamber contains a submerged mixer which directs the inlet water towards a surface aerator. The surface aerator removes carbon dioxide from the water, releasing it into the atmosphere with the help of extractor fans.

Removing the free carbon dioxide reduces the amount of lime needed to lower the acidity of the water. Approximately 30% of the free carbon dioxide is removed, reducing the amount of lime required by approximately 25%.

Lime (Calcium hydroxide)

After the water has passed through the aeration chamber, lime ($\text{Ca}(\text{OH})_2$) is added to raise its pH and alkalinity, making the water less corrosive.

Water leaving the treatment plant generally has a Langelier Saturation Index (LSI) of -1. This means that it has a slight tendency to dissolve calcium carbonate.

The amount of lime that is added to the water is controlled by the flow rate and the pH of the treated water. The desired pH for the treated water is 7.8. Because of the importance of pH in controlling the whole process, each measurement is taken three times to ensure a reliable reading.

Typical Dose

Lime: 15-30 mg/L, average 24.0 mg/L

Treated water storage

Following lime addition, the water flows to the treated water storage area. Each reservoir can hold around 800 m³ of water.

Water is pumped from these reservoirs to the water supply system.

Fluoride

There are two fluoride dosing systems for the treated water from Waterloo.

The first system doses a slurry of powdered sodium silicofluoride (Na_2SiF_6) into the Naenae and Gracefield supplies. This system is located at Waterloo.

Located at Gear Island, the second system was installed as part of the work that was required to keep Petone fluoride free. It doses a liquid hydrofluorosilicic acid (HFA) into the supply for Wellington, after the unfluoridated supply for Petone has been drawn off.

The target fluoride dose range is 0.7 mg/L to 1.0 mg/L.

Typical treated water quality

The quality of treated water from Waterloo is very high. It meets all the standards set out by the Ministry of Health in the Drinking Water Standards for New Zealand 2005. The source and treatment management is graded B. It is not possible to attain a higher than B grading without chlorination of treated water. Hutt City Council requests that GW does not chlorinate the city's water supply from the Hutt aquifer.

Treated water is monitored continuously for turbidity, and pH to ensure the standards are met and the water is safe to drink.

Typical treated water quality:

Turbidity: 0.02-2.00 NTU, average 0.95 NTU
pH: 7.0-8.5, average 7.8

The turbidity after treatment is higher than that of the raw water because of the lime that is added to increase the pH of the water.

Comparing typical mean values with popular brands of bottled water

Parameter	Pump*	Kiwi Blue*	Waterloo
Calcium (total), mg/L	2.7	2.2	22
Chloride, mg/L	5.0	6.4	14
Magnesium (total), mg/L	1.0	1.3	2.7
pH	6.5	5-7	7.8
Sodium (total), mg/L	7.8	8.3	12
Solids (total dissolved), mg/L	110	110	120

* Mean values derived from Nutritional Information supplied on product

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