A GUIDE TO HAMILTON’S WATER SUPPLY
RIVER TO THE TAP
Every time you turn on a tap in Hamilton, you’re drawing on water from the mighty Waikato River. The Waikato River’s waters flow through the heart of Hamilton at between 150-160 cubic metres per second. Every second of every day, Hamilton City Council’s water treatment plant is turning more than 2500 glasses of that river water into high quality drinking water which is then supplied to over 50,000 homes and industrial premises. That seems like a lot water to be drinking, so where does it go and what is it used for?

Actually only a very small percentage of that water is used for drinking. The rest is used for bathing, washing, toilet flushing, watering gardens and use by the commercial and industrial sector. On average, each person in Hamilton uses approximately 224 litres of water per day. In summer this volume can more than double. Our water supply is also used by the NZ Fire Service to fight fires in Hamilton (details - back page).

Looking at the river, it’s hard to imagine how our water supply could ever run out - but it will if we don’t work together to conserve our water and protect its quality.

Water Treatment Plant

Hamilton City Council’s Water Treatment Plant was built in 1971 on the banks of the Waikato River off Waiora Terrace. It was originally designed to produce a peak volume of 64 million litres per day (ML/day). This has increased through a series of improvements and upgrades and now the plant has a peak production capacity of 106 ML/day. Regardless of how much water the plant can treat, the plant operates under a Resource Consent from the Waikato Regional Council that sets the maximum amount we can take from the river each day.

Like other water users in the river’s catchment, the Council holds a ‘stepped’ resource consent to take water from the river. As the city grows, so does the amount of water we can take from the river. To ensure sufficient water is available in the future we all need to be smart with how we use our water and reduce any wastage of our important water resource.

So how does the Water Treatment Plant turn the water from the Waikato River into the high quality product we enjoy from our taps?

While the Waikato River presents a beautiful and vibrant back drop to our city, an essential taonga to Tainui, as well as a fantastic playground for us all, the water needs to undergo treatment to ensure that what you consume at home presents no risk to your health.
Why manage water?

- Hamilton City Council’s resource consent from the Waikato Regional Council has a limit for the amount of water that can be drawn from the Waikato River each day.
- Demand for the river’s water comes not just from Hamilton, but also from people living elsewhere within its catchment area.
- Ongoing high levels of water use is not sustainable.
- It costs ratepayers and water users a lot to treat and deliver extremely high volumes of water for extended periods.
- A decrease in river water quality can also affect the amount of water available for allocation and/or increase the degree of treatment it needs.

Find out more about our water supply online at hamilton.govt.nz/water
Steps 1-6 below are used to process water taken from the Waikato River to create safe drinking water (‘potable water’) ready for distribution around the city. Steps 7-9 provide safe and functional transfer and storage for the treated water around the city. Step 10 ensures that regular water quality testing is carried out on treated water leaving the plant, stored within reservoirs and within the distribution network.

**THE WATER JOURNEY**

**Screening**

Screens are used to take out large and small pieces of debris before water from the Waikato River enters the Water Treatment Plant. Large debris is caught by coarse grills as the water flows into 1.8 metre wide pipes. Narrower screens then remove any leaves, twigs and other bits. The river water is then pumped by large pumps up to the plant for the next treatment step.

**Coagulation and Sedimentation**

Screened river water still needs further treatment to remove sediments, micro organisms, organic and inorganic material and other small particles. Some of these naturally stay suspended in the water and won’t settle without a bit of help.

To assist in sedimentation (or ‘settling’), chemicals called aluminium sulphate (alum) and polymer are added. Alum works by breaking weak bonds that hold small particles in suspension. This (along with the addition of polymer) encourages the suspended material to clump together (or ‘coagulate’) to form bigger, heavier particles called ‘floc’.

This floc separates from the water to create a sludge layer or ‘blanket’. Excess floc is continually removed and discharged to the city’s wastewater system. The clearer water flows out of the top of the sedimentation tank for further treatment.

Coagulation and sedimentation remove nearly all of the particulate material entering the treatment plant. Filters in the next stage remove the rest.

**Filtration**

Fine sand is used to filter and remove any leftover floc that have not clumped together or settled in the sedimentation tanks. The water is gravity-fed through the sand, leaving remaining floc trapped on top and within the sand. These filters are cleaned automatically every 50-100 hours by backwashing with a mixture of water and air (a similar process to that used with pool filters).

Together, filtration and coagulation are the primary defence against impurities and larger micro organisms found in river water (particularly *Cryptosporidium* and *Giardia*).
Carbon filtration

Large pumps then lift sand-filtered water up to the Granular Activated Carbon (GAC) filters. The GAC filters, while similar to sand filters, serve a very different purpose. Activated Carbon has a huge surface area, with each grain of carbon covered with tiny gaps and holes. This helps the carbon to absorb any organic dissolved material not able to be removed in earlier treatment processes. This can include organic compounds originating from algae naturally found in river water. Some Algae can produce compounds that give water an unpleasant taste and odour, however there are particular types of algae (known as Cyanobacteria or Blue Green Algae) that can also potentially create toxins when present. Granular Activated Carbon filtration provides a barrier to these types of compounds.

UV disinfection

The next barrier in the water treatment process is disinfection using Ultra Violet (UV) light. Protozoa (single-celled microscopic organisms) such as Giardia and Cryptosporidium are highly resistant to chlorine if not removed in earlier treatment stages. However UV light deactivates these organisms by permanently altering their DNA structure so they are unable to infect or reproduce.

Chlorine disinfection

Treated water is made safe by the addition of chlorine, which kills any remaining bacteria and viruses left at this stage. Chlorine-dosed water is sent to a large water reservoir and left there for over an hour to maximise its effect.

Residual chlorine disinfection

A small amount of chlorine is left in the water leaving the treatment plant to provide ‘residual disinfection’ so the water remains safe between leaving the plant and coming out of your tap.

Reservoir storage

The treated water flows through a bulk water main that transports water to the distribution network and eight reservoirs around the city. Additional pumping is needed to push water into or out of specific reservoirs. This helps to ensure that agreed levels of service for pressure and flow can be achieved in both elevated and low lying areas of the city.

Backflow prevention

Additional to the protection provided in step 7 relating to maintaining a low chlorine residual in the water after treatment, back flow preventers are installed at various high risk supply points throughout the Council’s water supply network. If a contamination incident does occur, these fittings are designed to stop any affected water flowing back into the system.

Monitoring and testing

Water leaving the plant, stored in reservoirs and within the distribution network is regularly monitored to ensure that the water is safe for drinking. Sophisticated ‘online’ technology also ensures water quality is continuously monitored and maintained.

The Ministry of Health is responsible for setting drinking water standards in New Zealand. The standards specify the maximum acceptable values (MAV) of micro organisms, organic and inorganic chemicals that are of health significance.

From a Ministry of Health grading system of A1 to E, Hamilton City and Temple View both have an ‘Aa’ grade. Our water treatment and distribution have maintained this high grade since the system started in the 1960s.

Additional processes

Hamilton City Council also adds lime to the treated water. Adding alum to the water at stage 2 of the treatment process (coagulation and sedimentation) decreases the pH of the water, making it more acidic. Low-pH water could have a corrosive effect on fittings and pipe material in the water distribution network. Adding lime raises the pH back to neutral.

Fluoride is added to drinking water in accordance with the Council’s policy and as recommended by the Ministry of Health for dental hygiene. The untreated river water contains around 0.2 parts per million of fluoride; our processes adds fluoride to achieve a level of approximately 0.75 parts per million.
Nearly 97 per cent of the world’s water is salty or otherwise undrinkable. Another 2 per cent is locked within ice caps and glaciers. That leaves just 1 per cent for the agricultural, residential, manufacturing, community and personal needs of everyone on Earth.

A dripping tap can waste up to 7,600 litres of water a year.

During summer months an estimated 50 to 70 per cent of household water is used outdoors for watering lawns and gardens.

A garden sprinkler use over 1000 litres of water per hour. Summer day, the volume of water used can almost double.

The oldest reservoir in Hamilton is the Ruakiwi Reservoir (Hamilton Lake), which was built in 1935.

It takes over 420 kilowatts of power to deliver 1,000,000 litres of water from river to the tap.

THE WATERED-DOWN FACTS

Smart Water starts with you!

USE WATER WISELY

The ‘Smart Water Starts With You!’ sub-regional campaign is a water conservation initiative, which is part of a wider programme of water management for Hamilton. The campaign helps everyone understand the issues around our water supply and the part that we all can play to help manage them.

The campaign runs intensively throughout summer. It includes an Alert Level system helps everyone understand the issues around our water supply and the part we all can play to help manage it. Find out more at: [hamilton.govt.nz/smartwater](http://hamilton.govt.nz/smartwater)

SMART WATER ALERT LEVELS

NOTE: alternative day sprinkler use means residents whose letter box number is even number are permitted to use their sprinklers on even numbered dates. While those whose letter box numbers are odd are permitted to use their sprinklers on odd numbered dates.
Pipes and pressure
More than a thousand kilometres of pipe (‘mains’) make up the Council’s water reticulation network. Trunk mains (large pipes) distribute water from the bulk mains and reservoirs to each city area, while the reticulation mains carry water from the reservoirs to your tap. The reticulation pipes range between 40-600 millimetres across. Most are relatively new, (less than 50 years old) although a few remain from the early 1900s. The water supply is very reliable and flexible and in most areas, water is supplied from two directions. The Council ensures that there is a 10 metre ‘pressure head’ and 25 litres of flow per second available for each house.

Storage and distribution
Treated water flows from our water treatment plant through to a bulk water main that encircles the city. This ‘bulk ring main’ transports water to the distribution network, ‘storing’ it in each of the system’s eight reservoirs (see diagram above).

The eight reservoirs have a total storage capacity of approximately 90 million litres. Reservoirs have a dual role. They provide sufficient water for emergency storage and also assist with the supply of water during periods of high water demand. This ‘buffering of demand’ is important as it allows the treatment plant to operate more efficiently and economically by producing treated water at steady output flows.

Maintaining and mending
To ensure the network operates effectively, we carry out proactive and reactive maintenance and renewal programmes:

- regular mains flushing helps maintain water quality
- leak detection analysis ensures the network remains in a watertight condition
- regular monitoring of treatment processes, pumping, reservoirs and the distribution network
- scheduled major reviews to ensure the level of service and quality targets are being met.

Ruakiwi reservoir
Flows and fire fighting

An important function of our water supply is to provide for fire protection. Fire hydrants are provided in all streets and Hamilton has over 6000 located within its urban areas. For industrial and commercial buildings, direct fire mains connections are provided from the pipe mains:

- all connections and hydrants are required to comply with the Fire Service Code Practice standards for flow and pressure
- most streets have two water mains, which also offer fire protection to the properties from the hydrants
- in some larger streets (such as Victoria Street), there are three or more larger mains.

Bylaws and best practice

Hamilton has a water supply bylaw which provides rules for managing our city’s water demand. It also aims to ensure that activities do not adversely affect our:

- water supply
- water quality
- water supply infrastructure
- compliance with resource consents and the Ministry of Health Drinking Water Standards of New Zealand
- who can access the supply e.g. water cannot be taken from fire hydrants by anyone other than the New Zealand Fire Service
- responsibilities for maintenance
- responsibilities for the prevention of water loss and wastage.

Actions that we carry out in relation to the bylaw’s water quality requirements include:

- leaving a small amount of chlorine in our treated water to ensure it remains safe until it arrives to your tap (see step 7 on page 5)
- disinfecting and testing all new works and major repairs prior to commissioning
- fitting a back flow preventer where there is a risk of contaminated water flowing back into the reticulation system.

Need help with a water issue?

Our City Waters Unit, assisted by our City Delivery, City Development and Business Support units, provide customer and management services.

Give us a call if you need help with any issues related to water supply connections, water pressures, flows and quality, locations and general advice.

You can also take part in our regular customer surveys which we use to assess and improve our council services – your input is welcome!

HAMILTON CITY COUNCIL
CUSTOMER SERVICES
24-7: (07) 838 6699

For more information visit
hamilton.govt.nz/water

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