

TE MARUA

Water Treatment Plant



Photo: Lloyd Homer, IGNS

The Hutt River was first recommended as a water source for Wellington in 1919, but the expense of laying pipes from Kaitoke to Wellington delayed work until the 1950s.

Since that time the Hutt River supply has been carefully developed to meet the growing demands of Upper Hutt, the Porirua Basin and Wellington City. The most significant development was the completion in 1985 of the storage lakes, treatment plant and pumping station at Te Marua.

The catchment area used for water collection is closed to the public because of the risk of water borne diseases such as typhoid, cholera and giardia getting into the water supply. The Wellington Regional Council manages this area as part of its responsibility to supply safe drinking water to consumers.



Treatment of Drinking Water

You may think the water in a mountain river is pure enough to drink the way it is, but this is not necessarily the case. If you look closely at the Hutt River, you will notice it is often discoloured by leaf stain and dirt. Along with dirt the water carries a multitude of microscopic organisms. To make it safe to drink, the water must be free from organisms that are capable of causing disease, and from minerals and organic substances which could be harmful to health. We also prefer our drinking water to have a pleasant taste and appearance.

Before the days of closed catchments and water disinfection, water borne diseases were responsible for many health problems in Wellington. Diseases such as typhoid and cholera, which regularly claimed lives until late in the nineteenth century, must have been a constant concern for residents of the young city. Until quite recently, water supplies were often unpleasantly discoloured when heavy rain fell in catchment areas.

The Te Marua treatment plant can produce 140 million litres of fully treated water every day, and supplies half of all the water used by greater Wellington. The plant removes micro-organisms, dirt and colour from the water, leaving it more "pure" than the river water.



The headwaters of the Hutt River rise among the rugged peaks and forests of the southern Taranaki mountains.



The Treatment Process

Water is drawn from the river at Kaitoke and strained to remove leaves, sticks and sand. The water is then piped through a tunnel to the treatment plant. When the river floods, however, the intake must be closed to prevent gravel from passing through the intake grill and blocking the pipeline.



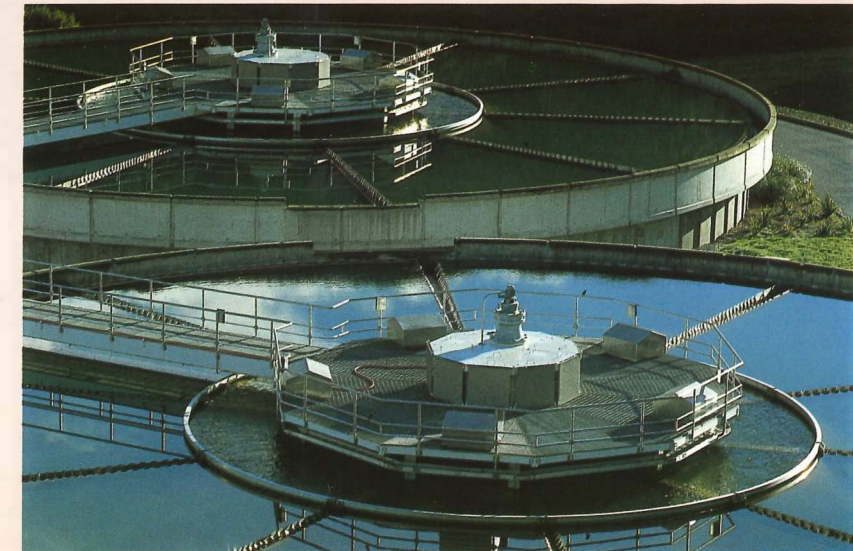
Kaitoke Weir, showing the intake structure at right.

As water enters the plant, carbon dioxide and lime are added to reduce its natural acidity. This is critical for the success of the treatment process, and prevents the water corroding pipes and fittings in the supply system and in your home.

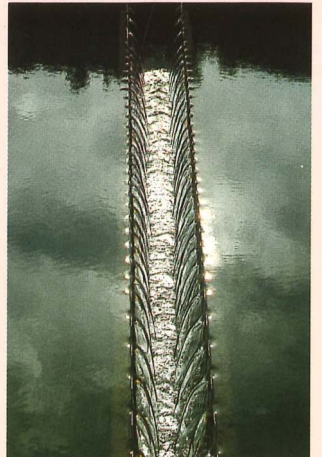
The first stage of treatment is the removal of micro-organisms and dirt with a process called "flocculation". A coagulant chemical (which is usually aluminium-based) is mixed with the water.

The coagulant binds dirt, colour, bacteria, viruses and protozoa together to form small, congealed blobs which look like tiny tufts of brown cotton wool. These are called "flocs".

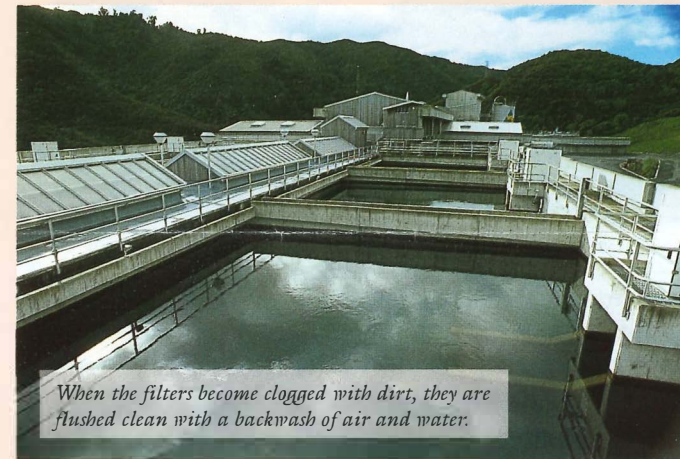
The water, with the coagulant chemical, moves slowly through the large, circular clarifier tanks while the flocs continue to gather dirt. When they are heavy enough the flocs settle to the bottom and mechanical scrapers sweep away the residue for disposal.



Te Marua has two clarifier tanks, which hold 2.5 million litres each.



Shallow channels radiate across the surface of each clarifier. They collect the clear water and deliver it to a common pipeline flowing to the filters.



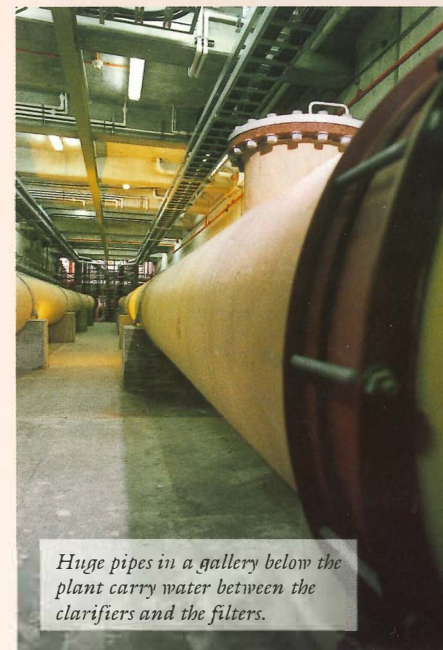
When the filters become clogged with dirt, they are flushed clean with a backwash of air and water.

The clarified water is decanted from the top of the clarifiers and filtered through a bed of gravel, sand and anthracite coal. Any remaining dirt or pieces of floc are left behind in the filter media.

The filtered water is disinfected by adding about one gram of chlorine to every 1,000 litres of water. Chlorination protects against any contamination which may occur between the treatment plant and your tap. The acidity is reduced with caustic soda for corrosion control, and fluoride is added for dental health protection.

The waste material produced by flocculation is currently stored in lagoons until it dries out, then taken to a landfill. A wash water recovery plant, which will separate the waste into solid matter and water, will soon be constructed. The solids will be disposed of while the retrieved water is recycled through the treatment process.

The plant is fully automated and controlled by a series of computers linked to a central control room. The plant can operate unattended for up to five days, and an automatic alarm will page a technician if any problem arises.

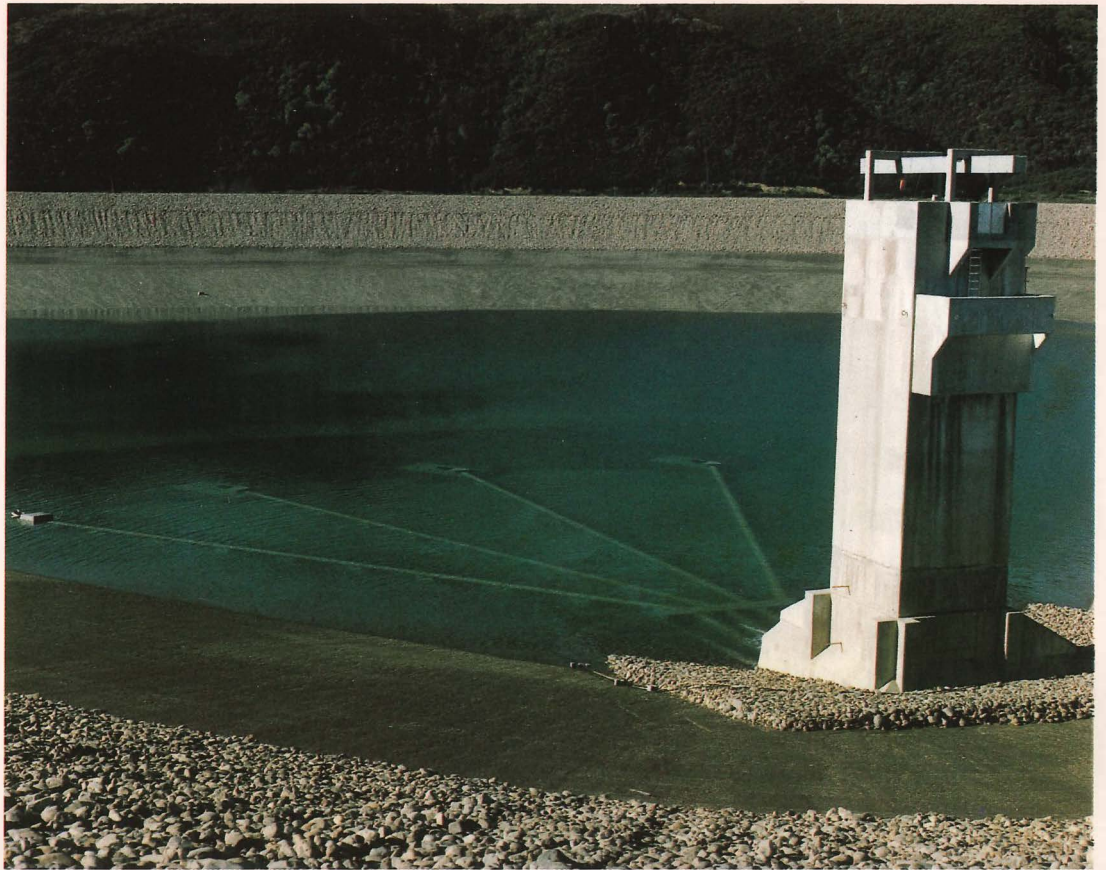


Huge pipes in a gallery below the plant carry water between the clarifiers and the filters.



The Storage Lakes

Water in each lake is kept from stagnating by the arrangement of inlets and outlets in the tower. Water coming into the lake is piped to the base of the tower and distributed around the lake bed by radiating pipes. Outlets above the lake bed ensure the clearest water is taken for treatment.



The two lakes have a combined capacity of nearly three thousand million litres, enough for one month's supply. They store water for the plant to use when river flow falls below demand, or during flooding when the Kaitoke intake is shut off to keep gravel from the pipeline.

The lakes are self contained basins, protected from run-off from the surrounding land by concrete diversion channels. Only high quality water is fed into the lakes, and this quality is maintained by the inlet arrangements which ensure the lake water is constantly mixed and renewed.

Surplus water from the Kaitoke Weir bypasses the treatment plant and flows into lake one. Surplus water from lake one then overflows into lake two, and the surplus from lake two returns to the Hutt River. The entire process relies solely on the action of gravity. When it is required, water from either lake may be pumped to the treatment plant.



Construction of the lakes took five years from 1980. During this time work continued around the clock.

The water supply network developed by the Wellington Regional Council and its predecessors is widely acknowledged as one of the best in the world. The Regional Council is committed to providing the people of greater Wellington with safe drinking water. The Te Marua treatment plant is an important part of the water supply system, converting river water into clean, safe drinking water. Next time you turn on a tap, take a moment to think about where that water has come from.