

Geothermal Water

■ Introduction

This fact sheet contains basic information about geothermal hot water in the Auckland region and tips to help geothermal water users conserve the resource

Geothermal water is groundwater—water contained in underground rocks that has been heated within the earth to a temperature of 30°C or more. It can be heated in two ways.

■ 1. Volcanic heat

Groundwater can become hot when heat spreads from nearby volcanic activity.

This water can be extremely hot and sometimes comes to the surface as steam or geysers like those in the Rotorua area.



■ 2. The earth's natural heat

The earth's temperature naturally increases with depth: rocks get hotter at the rate of 30°C per km below the surface. Groundwater contained within the earth's crust is heated in the same way. When this water rises to the surface through rock fractures or faults, it is noticeably warmer than the surrounding shallow groundwater.

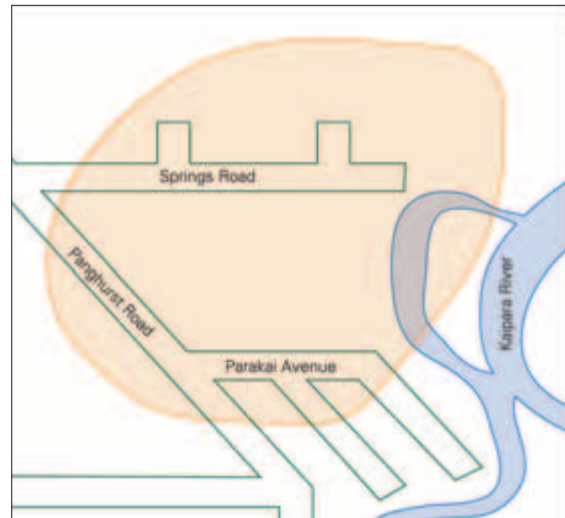
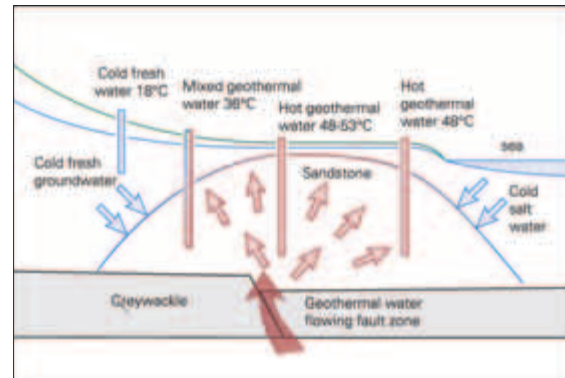
How Auckland's geothermal water is heated

This diagram shows how the geothermal water at Waiwera is heated. Water at Parakai is heated in the same way, but the geothermal field is further from the sea.

The difference between the two fields is that the hot water at Waiwera is more vulnerable to being chilled off: If too much hot water is drawn out of the geothermal field, cold sea water can all too readily flow in.

Parakai would also suffer if too much water was drawn off because cooler shallow ground water surrounding the field would flow in, with the same result.

Geothermal water is unsuitable for drinking because of high salt and mineral concentrations which dissolve in the water as it moves up from deep below the surface.



A fragile resource

At 700 metres wide, Auckland's geothermal fields are tiny compared to those in Rotorua. They are also colder, with water temperatures ranging between 30°C and 65°C compared to 100°C in Rotorua.

Because the geothermal fields are so small and the flow of water up from the deeper, hotter rocks is limited, we must control how much water can be taken from them.

When too much hot water is pumped out of the ground, the hot water level drops and so does the pressure of the field.

In inland areas such as Parakai, taking too much hot water out of the geothermal field would allow the surrounding cold groundwater to flow into it and decrease bore water temperatures.

In coastal places such as Waiwera, cooler seawater could also flow into the geothermal field, (as shown in the diagram), with the same cooling effect.



■ Protecting our geothermal fields

■ Bores

The Auckland Regional Council (ARC) ensures that bores are properly constructed and assesses how much geothermal water can be taken in order to protect the geothermal field.

Discuss your proposal with us if you intend to drill or alter a bore in any geothermal area.

Bores in the Auckland region cannot be drilled or altered without a permit. See the fact sheet "Groundwater and bores."

■ Using and conserving geothermal water?

Anyone wishing to use geothermal water requires a water permit from the ARC.

The following tips show what you can do to help preserve the resource for future generations.

■ Water Flow Meters

Reading your water flow meter as your permit requires will show you how much water you use from your bore and help you manage your water use. Ask for a copy of our fact sheet on water meters.

■ Insulation

Install thermally insulated pipes, pumps and filters to reduce heat loss.

■ Maintenance

A properly constructed and maintained bore will prevent seawater or cold groundwater from getting into it and lowering the water temperature. It will also ensure contaminated surface water does not get into the bore.

■ Pool Covers

Put insulated covers over your pool when it's not in use to slow the rate of heat loss from the water surface by keeping the wind off.

■ Windbreaks

Properly designed windbreaks around your hot pool area reduce wind speed and slow the pool's cooling. Using shrubs and trees or slatted fences as windbreaks can improve privacy and outlook, too.

■ Enclosures

Enclose your outdoor pool, where possible, to stop the wind from cooling the hot water e.g. build a gazebo

These practices will also reduce your power and pool chemical bills.

■ Where is geothermal water found in the Auckland region?

There are four areas of geothermal groundwater in the Auckland Region: Parakai, Waiwera, Great Barrier Island and Whitford.

Slightly higher groundwater temperatures have also been found in areas such as at Wenderholm and East Tamaki.

Geothermal resources gradually cool off as a result of natural processes. We can usually tell where groundwater used to be hot because the water is often high in elements such as boron, which is uncommon in non-geothermal groundwater.

Cooled geothermal groundwater is sometimes too high in boron to be safely used for horticultural irrigation.

■ Artesian bores

Artesian or free flowing bores can result in places where groundwater is under pressure. This is because the pressure can force the water level in the bore up above ground level.

Flowing artesian bores must be constructed so that geothermal water cannot run to waste. The bore head should be sealed to contain the water pressure or extended above the maximum water level.

■ Abandoning your bore

If you abandon your bore, it must be properly sealed by an experienced driller.

Decommissioning an abandoned bore is a permitted activity subject to conditions. It is essential to seal abandoned bores to:

- eliminate physical hazards and prevent accidents
- prevent pollutants getting into the groundwater
- stop water wastage from flowing artesian bores
- prevent mixing of waters from different layers of water-bearing rock.

■ For more information

The ARC has a range of fact sheets concerning the using, taking or diverting of groundwater. Copies are available online at www.arc.govt.nz or upon request.

Topics include:

- Using water wisely
- Groundwater and bores
- Why do you have to fit a water meter?
- Complying with your water permit
- So what's all this about dams?

How do I contact the ARC?

21 Pitt Street

Private Bag 92 012

Auckland

Ph: 09 366 2000 or toll free 0800 80 60 40

Fax: 09 366 2155

Email: info@arc.govt.nz

Website: www.arc.govt.nz

