

You can obtain more information about Zurich Water Supply or about guided tours through the three water plants at the following address:

Wasserversorgung Zurich
Hardhof 9
PO Box
CH-8023 Zurich
Telephone: +41 (0)44 435 21 11
Telefax: +41 (0)44 435 25 57
info@wvz.stzh.ch
www.wvz.ch

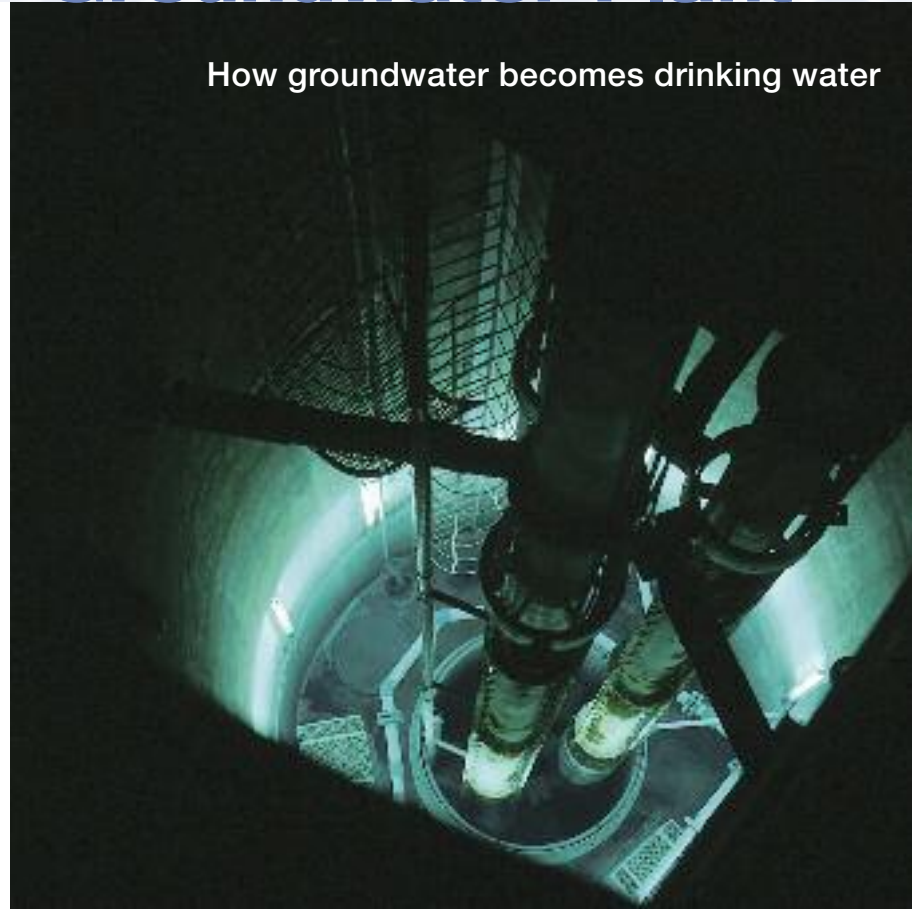
natürlich **züri**
wasser

The Hardhof Groundwater Plant

The most important facilities of Zurich Water Supply



How groundwater becomes drinking water



Safe drinking water supply for Zurich



Hand washing 2 to 4 litres, showering 30 to 90 litres,
drinking 2 to 3 litres per day: Zurich's drinking water
is healthy, tastes good and it is thanks to Lake

Zurich, the groundwater and spring water available in
virtually unlimited quantity! 20 per cent of our drink-
ing water is groundwater. It is abstracted in the
Hardhof Groundwater Plant. On the way to the tap it
flows through different stations.

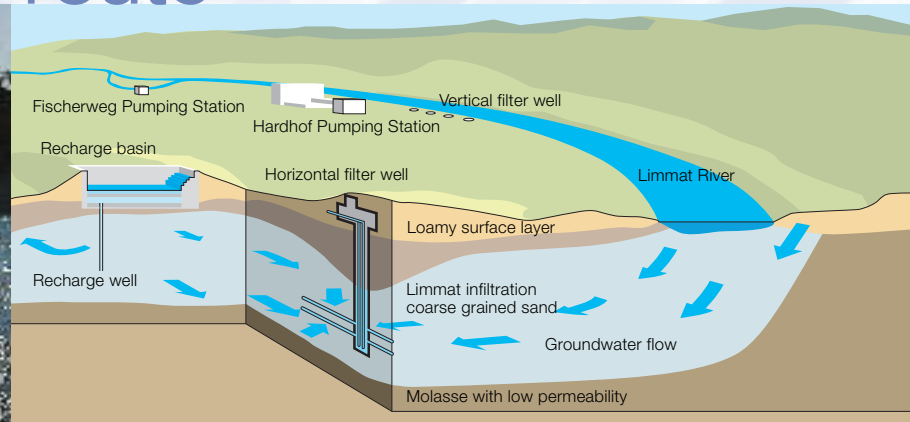
Water – (not) a matter of course

Hardly anyone asks where the water comes from when they are standing under the shower in the morning or putting some water on the stove to boil for tea. Water available at any time in unlimited quantity and top quality is a matter of course for us. But before the fresh drinking water gushes out of the tap at our home it must be abstracted, treated, pumped into the reservoirs and ultimately piped into the quarters and dwellings.

Ground as water reservoir

Zurich is in a comfortable situation with regard to water supply. Abundant drinking water is available with the huge water reservoir Lake Zurich, as well as the surrounding springs and the groundwater. At least 20 percent of this water supply comes from the ground, 70 percent is lake water and 10 percent is spring water from the Sihl and Lorze valleys. Zurich Water Supply operates three waterworks: The Hardhof Groundwater Plant, the Moos Lake Water Plant and the Lengg Lake Water Plant with the largest capacity. The groundwater is abstracted in the Hardhof Groundwater Basin in Zurich-Altstetten. In reference to its quality it is just as high in quality as the lake and spring water.

The Zurich groundwater route



Overview of the groundwater abstraction in the Hardhof Groundwater Plant.

The Zurich Water Supply has been abstracting drinking water from the Hardhof Groundwater Stream (today 25 hectares in size) for over 70 years.

A protective zone with stringent utilisation restrictions protects the groundwater against contaminations.

The Hardhof Groundwater Stream

In 1934, the Zurich Water Supply began to abstract drinking water from the Hardhof Groundwater Basin. Since the expansion of the groundwater plants in the 1970's, the groundwater basin encompasses 25 hectares. A protective zone – in which stringent utilisation restrictions exist – protects the groundwater against contamination.

An invisible underground river

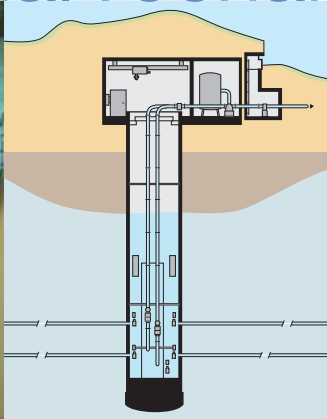
A mighty subterranean stream flows through the Limmat Valley at a depth of 4 to 6 metres. Depending on the permeability of the soil, its flow velocity amounts to 1 to 10 millimetres per second. This is not much in compari-

son with the Limmat River with about 1 metre per second. The groundwater stream is fed by the Limmat and Sihl Rivers as well as by rainwater that seeps through unsealed surface layers. A natural filtering process takes place when the water flows through the soil, after which no further treatment processes are necessary. Even in the medieval times, drinking water was abstracted from the groundwater stream by means of draw wells.

The route to the households

Three underwater pumps feed the drinking water from each of four 25 metre deep horizontal filter wells into the Hardhof Pumping Station, and from here the water is pumped into the reservoirs situated at various heights. The drinking water finally reaches the households via the distribution pipelines – and this occurs solely by means of gravity.

Additional groundwater thanks to artificial recharge



The natural filtration of the groundwater through the various geological layers is sufficient to obtain outstanding drinking water quality. In order to be able to remove more water from the underground than the natural groundwater volume allows, the ground-water is recharged with Limmat riverbank filtrate.

Not enough groundwater – a clever recharge system helps

In order to maintain the maximum delivery volume of 150,000 cubic metres per day without reduction of the groundwater table, the groundwater flow is recharged thanks to a clever method. While doing so, the riverbank filtrate of the Limmat River is collected in 19 vertical filter wells and conducted into three 4,000 square metre basins and 12 recharge wells, where it can percolate. The percolation wells are located on the perimeter of the groundwater basin. Moreover, this location gives rise to

the fact that the groundwater – which flows through the city and may be severely polluted by traffic and industry – is kept away from the groundwater abstraction sites and does not mix with the drinking water. Along the route from the riverbank to the wells and from the basins to the groundwater flow, the water flows through purifying soil passages. Afterwards, the water is of roughly the same quality as the natural groundwater itself.

Safe supply – even in the event of power failure

The Hardhof Groundwater Plant is equipped with emergency power generators to bridge any disturbances in the electricity supply. As a result, the Hardhof Groundwater Plant could supply the entire city with drinking water for more than two weeks in the event of crisis situations.

Four horizontal filter wells collect the water at depths of 20 to 25 metres. The inside diameter of a vertical shaft is 4 metres.

Hardhof Groundwater Plant Technical Data	
Recharge:	19 vertical filter wells for riverbank filtrate 12 recharge wells 3 recharge basins with a capacity of 4,000 m² each
Delivery wells:	4 horizontal filter wells (HFW) HFW depth: 20 – 25 m Well shaft diameter: 4 m Length of the horizontal filter pipes: 25 m 3 pumps per well (each 200 l/s)
Delivery capacity:	4 pumps in the Limmat zone (each 50,000 m³/day) 3 pumps in the hill zone (each 50,000 m³/day) 2 pumps in the summit zone (each 23,000 m³/day)
Emergency power generator:	2 14 cylinder diesel motors (each 5,040 HP) 2 generators (each with 4,470 kilovolt amperes)

The emergency power generator with both of the 14 cylinder diesel motors.

The Hardhof Groundwater Plant – the heart of Zurich's water supply



The Zurich Water Supply infrastructure

Zurich Water Supply maintains the following infrastructure for the treatment and distribution of the water for 800,000 inhabitants in the city and region of Zurich:

- 3 water plants
- 29 pumping stations
- 21 reservoirs
- 1,200 fountains
- 1,550 kilometres of pipes
- approx. 9,000 hydrants

The Hardhof Groundwater Plant produces and supplies between 20,000 and 150,000 cubic metres of groundwater every day. The administration, maintenance services, laboratory as well as the central control station are also accommodated here.

Where all control functions come together – the central control station

In addition to the pumping station, the central control station, the workshops and magazines, the administration, all technical services as well as the laboratories for quality monitoring are accommodated in the Hardhof Groundwater Plant. The central control station, which is equipped with a duplex computer, is staffed round the clock. All facilities are monitored and controlled from here by means of a remote control system: The lake and spring waterworks, 29 pumping stations, 21 reservoirs and the spring water surge chambers. The responsible employees plan the daily water supply requirements, which vary depending on the time of day and time of the

year. All operational and quality data arriving at the central control station are logged and archived for control of the drinking water supply.

Outstanding quality

Stringent drinking water controls – which the water supply specialists implement in the Hardhof laboratories – are made by means of regular analyses and modern analytical equipment. In order to determine the water quality in the lake and the effectiveness of the filtration process in the drinking water plants, the plant and animal organisms such as algae and zooplankton are made visible and counted. Moreover, electronic sensors continuously measure essential parameters in all plants at all critical points. Undercuts and overruns of predetermined threshold values trigger an alarm, which results in appropriate emergency measures. Facilities with trout and daphnia (water fleas) are utilised for alerting in the event of toxic contaminations. These living creatures react sensitively to pollutants in the water: If they change their behaviour, the facilities can be immediately shut down.



A green oasis in Zurich West



The abstraction of groundwater at Hardhof is a stroke of luck for Zurich West. A 20 hectare green area has been retained in the middle of the expanding city and next to the heavily trafficked roads. The stringent provisions of the groundwater protective zone ensure that this also remains so in the future.

Sports and recreation

The Hardhof Groundwater Plant green area is available to the general public throughout the entire year. In addition to groundwater abstraction, the Hardhof facility serves sports activities first of all. Brisk activity prevails during peak periods at the city's largest sports facility, which features numerous football pitches and tennis courts.

However, the Hardhof area is also an oasis of rest and relaxation. Peaceful trails amongst mown areas and forested hills invite visitors to take a stroll. Even regular visitors often do not know that the groundwater is collected underneath these hills.

Attractive location alongside the Limmat River

The Hardhof public park is an artificially designed landscape. It is particularly attractive thanks to its location directly alongside the Limmat River. It is accessible via several paths from the frequently travelled Limmat River shoreline trail. Arrival by means of public transportation is recommendable: The tram line 4 traverses the park on a secured right-of-way, and the stops are located at both ends. The park is closed to motor vehicles. Thanks to the stringent safety provisions of the groundwater protective zone, the Hardhof area will also be retained for the city's inhabitants in the future.