ARA Neugut

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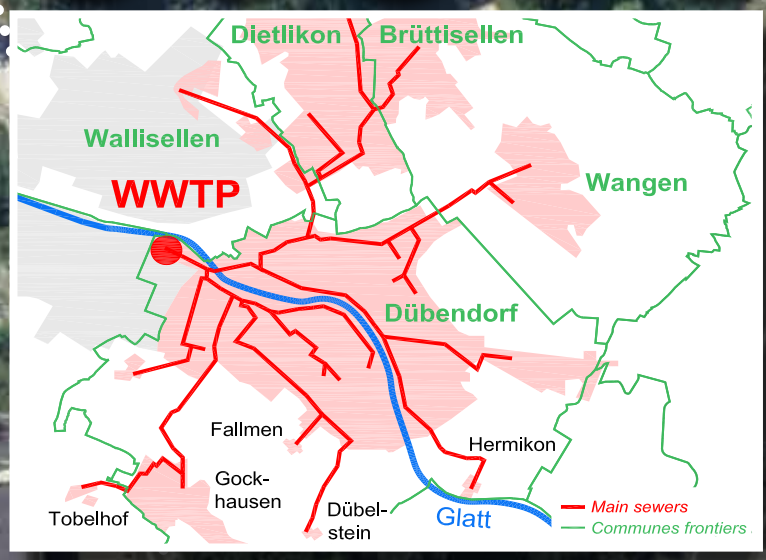
The pathway to clean water ...

Dübendorf | Dietlikon | Wangen | Brüttisellen | Wallisellen



WWTP entrance

When it opened in 1964, the NEUGUT wastewater treatment plant (WWTP) was one of the first plants treating municipal wastewater in Switzerland.
From 1987 to 1993, it was overhauled to incorporate four treat-ment steps – mechanical treatment, biological treatment, phosphate removal and sand filtration.
From the end of 2013, the NEUGUT WWTP is operating Switzerland's first full-scale ozonation facility – a micro-pollutant reduction process providing state-of-the-art water protection for the Glatt.

Key figures
- **Treatment capacity 150,000 population equivalents**
- **Current load 105,000 population equivalents**
- **Treats 20–50 million litres of wastewater per day**
- **Biological treatment performance 96–99%**

June 2013

Wastewater treatment

1 Coarse screen

The coarse screen removes larger debris (toilet paper, plastic bags, sticks, etc.) from the influent wastewater. The screenings are dewatered, compressed and disposed of at the municipal waste incinerator.

2 Grit and fat removal

A spiral-flow aeration system causes grit to settle in the separating tank. This material is removed by suction, cleaned and subsequently reused at the gravel works. In the adjacent fat trap, substances floating on the surface, such as fat and grease, are skimmed off and then undergo sludge treatment. 11

3 Fine screen

The fine screen removes any residual solids from the wastewater stream (cotton buds, scraps of paper, plastics and food waste). These screenings are also dewatered, compressed and disposed of at the municipal waste incinerator.

4 Preliminary clarification

In the preliminary clarification step, solids (sludge) settle out as a result of the low flow velocity. A scraper transfers the sludge and floating particles to the sludge screen. Here, the retained solids are separated and the sludge is sent on for further treatment. 11

5 Biological treatment tanks

In the biological treatment tanks, comprising aerated and non-aerated zones, dissolved pollutants are decomposed by bacteria and other microorganisms. The air required for this process is introduced via diffuser plates.

6 Biological phosphorus removal

In one part of the biological treatment tanks, environmental conditions can be created which cause bacteria to accumulate phosphate within their cells. Phosphorus is thus removed from the wastewater, and the bacteria are separated with the excess sludge. This process is known as biological phosphorus removal.

7 Secondary clarification

In the secondary clarification step, activated sludge settles out and is collected by a scraper at the bottom of the tank. Most of the activated sludge is fed back into the biological treatment tanks to maintain the decomposition process; the rest is withdrawn as excess sludge. 11

8 Ozonation

Ozone is a potent oxidizing agent which reacts with the contaminants in wastewater, leading to the breakdown of various persistent compounds. During this process, pharmaceuticals, environmental toxins and hormones are inactivated, and bacteria and viruses are destroyed. In the ozonation reactor, ozone is injected via diffusers.

9 Filtration

Filtration (quartz sand filter) is used as a biologically active treatment step. Here, the oxidation products of ozonation are biologically decomposed. In addition, any remaining suspended particles are removed before the treated effluent is discharged into the Glatt.

10 Discharges to the Glatt

Water discharged into the Glatt from the NEUGUT WWTP is 99% free of biodegradable substances (BOD_5). Nutrient removal rates are over 70% for nitrogen and over 95% for phosphorus. The effluents leaving the NEUGUT WWTP are clean, clear and odour-free.

The NEUGUT WWTP achieves a high level of performance in the treatment of incoming wastewater.

Sludge treatment

11 Anaerobic digestion

The sludge arising from preliminary and secondary clarification undergoes anaerobic digestion. In the digesters, most of the organic matter in sludge is decomposed as a result of the anaerobic environment and the constant temperature of 38°C. The digestion process not only reduces the volume of sludge but also produces valuable biogas.

12 Sludge dewatering

To reduce the water content of sludge and save energy, a large proportion of the water is removed by centrifugal force. The volume of sludge is thus reduced by a factor of 10. By means of sludge drying, the volume is further reduced by a factor of 4, so that only 2.5 m^3 remains per 100 m^3.

13 Sludge drying

Sludge is dried in a drum dryer so that it can be used as a fuel in cement production. This makes it possible to reduce the consumption of coal or other primary energy sources at cement works and cut CO_2 emissions.

Environmental efforts

14 Energy storage

Biogas produced during the digestion process is temporarily stored in gas tanks. Before being used in the cogeneration plant, biogas is preheated and contaminants (sulphur and siloxanes) are removed by activated carbon filtration.

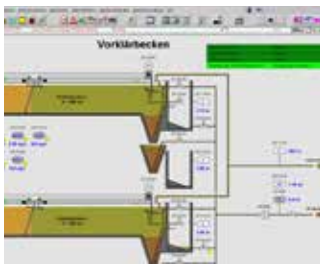
15 Heat / power generation

The biogas-fired cogeneration plant produces up to 220 kW electrical and 360 kW thermal energy per hour. Both of these green energies are used internally, with sufficient heat being produced to meet 100% of the NEUGUT WTTP's requirements.

16 Waste-heat recovery

Treated wastewater (13–24°C) contains a large amount of heat; with the aid of heat pumps, this is recovered and used for property heating (e.g. the Zwicky Areal district). CO_2 emissions are thus significantly reduced compared to conventional heat production. To compensate for fluctuations in heat demand, sufficient water is stored in buffer tanks at the WWTP.

Monitoring and control



17 Process monitoring

Information on WWTP processes is managed by the process control system, which generates process messages and alarms if necessary. Plant staff need to combine the knowledge and skills of mechanics, process managers, electrical engineers and lab technicians. Their expertise guarantees safe operations – and clean effluents.

18 Quality control

In the plant laboratory, wastewater quality is constantly monitored and controlled – from the moment it arrives to the discharge of clean effluent into the Glatt.

The net result: clean water

Biological wastewater treatment at the NEUGUT WWTP is a combination of biology and technology. Thanks to extensive removal of carbon compounds and micropollutants, the water discharged into the Glatt is very well cleaned. Removal of the nutrients nitrogen and phosphorus helps to reduce unwanted algal blooms both in the Glatt and in downstream waters all the way to the North Sea.

The NEUGUT WWTP thus practises state-of-the-art water pro-tection, sustaining the cycle whereby drinking water is ab-stracted, then used (and contaminated) in households and industry, and finally released into surface waters – where it serves once again as a source for drinking water production.