HSY

Helsinki Region Environmental Services
Helsingin seudun ympäristöpalvelut

New wastewater treatment plant in Blominmäki

The new Blominmäki wastewater treatment plant in Espoo is being built underground in the bedrock. The wastewater treatment basins and many other operations will be located underground in an area of over ten hectares.

Some of the operations, as the administration and maintenance buildings, the treatment facilities for sludge and gas, and the fuel and methanol tanks are above ground, located in an area of around three hectares. A 100-metre tall exhaust chimney is the only structure which is visible from afar.

Advantages of an underground wastewater treatment plant

Placing a wastewater treatment plant underground is a normal procedure in the Nordic countries. Nearly all new and large treatment plants have been built underground. An underground plant interferes less with life in residential and recreational areas than a plant above ground would possibly do. Many of the underground plants operate in quite dense residential areas. There are even residential buildings located on top of them, for instance in Viikinmäki Helsinki, Turku, Oslo and Stockholm.

The working and maintenance conditions in an underground plant are more stable than those in an aboveground plant because the temperature remains constant year round and the rainfall and snow does not disturb the operation.

Better treatment results

In the future, the current capacity of the Suomenoja wastewater treatment plant is not sufficient to treat all wastewater of the area because the number of residents is increasing and the requirements for wastewater treatment are tightening. When the Blominmäki wastewater treatment plant replaces the Suomenoja plant, the nutrient load into the Baltic Sea will decrease compared to the present situation. Its goal is to treat wastewater by removing more than: :

- **96 percent** of phosphorus and organic substances
- **90 percent** of nitrogen.

We are prepared for growth

Once the treatment plant is completed, it will treat wastewater from Espoo, Kauniainen, Kirkkonummi, Siuntio and western Vantaa, generated by their ca. **400 000** residents. However, loading coming in to be treated will increase rapidly. Already in 2040, the estimation is that the Blominmäki plant will treat wastewater generated by **550 000 residents**. Then the plant's average flow will be 150 000 cubic metres per day. The underground facilities of the plant can be expanded to meet the requirements for treating the wastewater of even over a million residents. In other words, there is enough capacity in the Blominmäki wastewater treatment plant, at least for the next hundred years.

Highly reliable treatment process

Blominmaki wastewater treatment plant uses tried and tested technical solutions. Wastewater is treated in a multi-phased biological-chemical process. This activated sludge process, developed more than hundred years ago, have been upgraded with enhanced nitrogen removal by post-filtration and phosphorus removal by disc filtration.

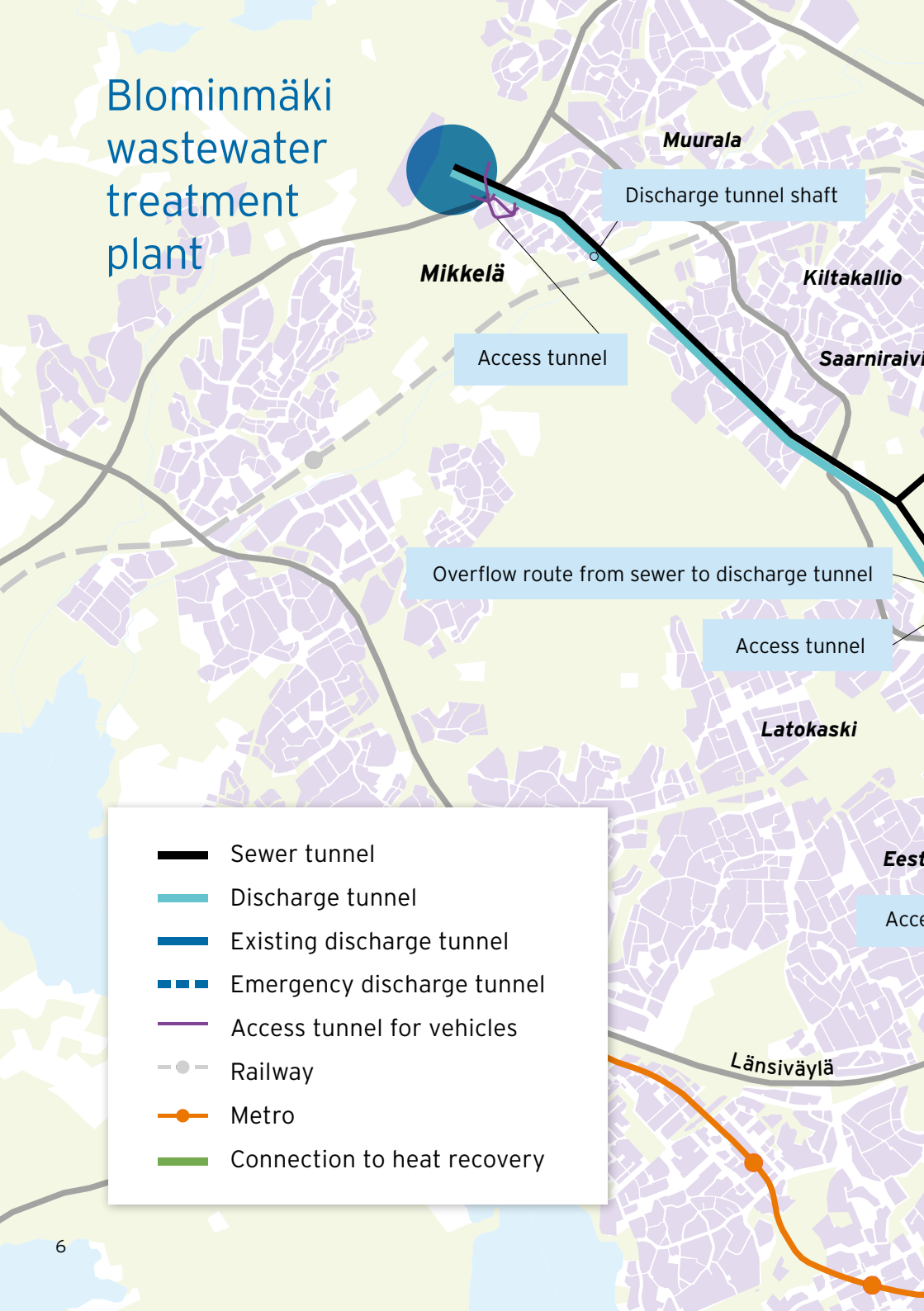
The reject water from sludge drying, with high temperature and nitrogen content, is treated separately before it is returned to the beginning of the treatment process. This improves the cost-efficiency of nitrogen removal.

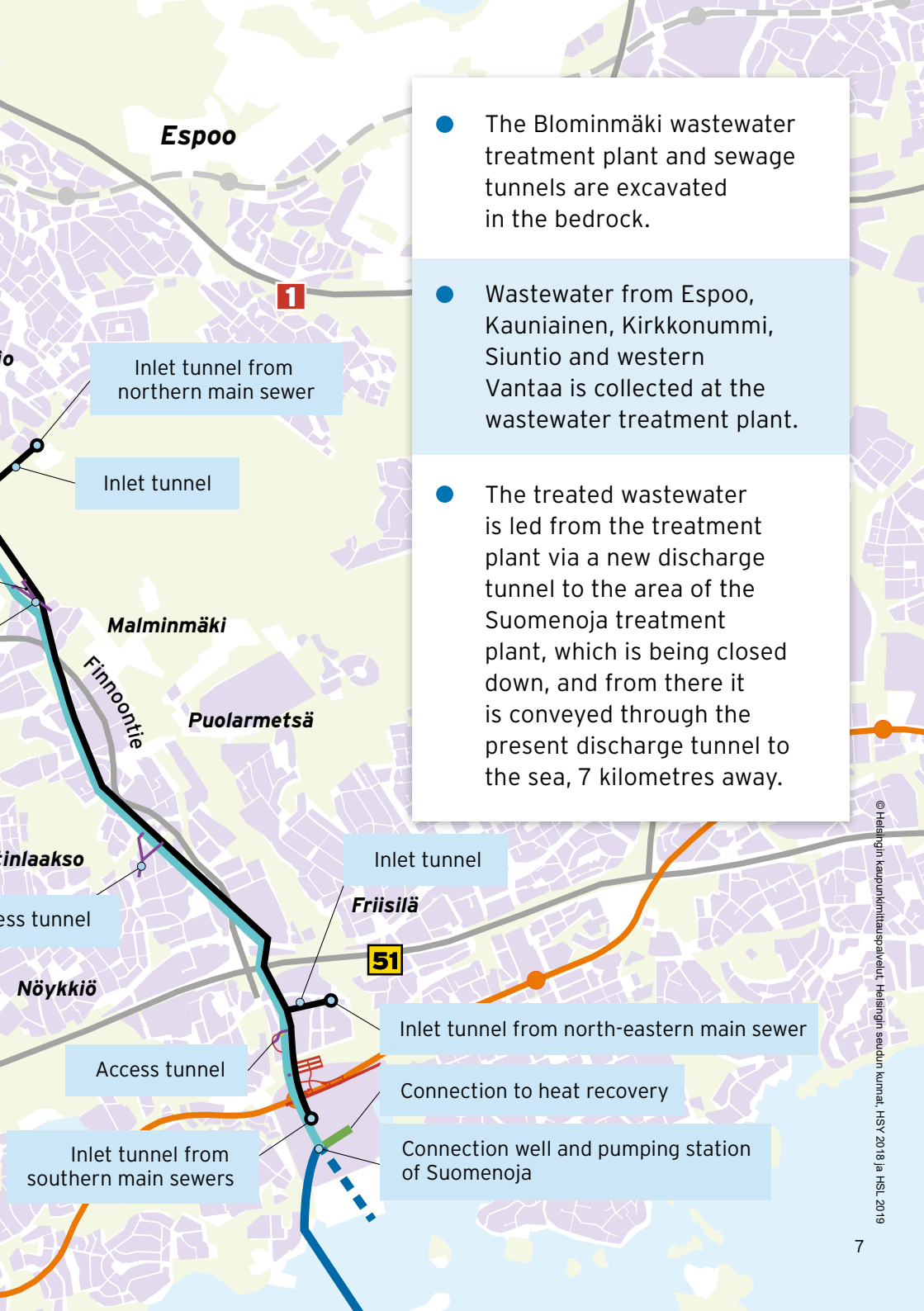
The key factors of plant's operational reliability are

- sufficient process capacity even during maintenance operations
- continuously fully operational backup equipment
- securing the electric supply.

During plant maintenance work, the wastewater can be temporarily stored in the long inlet tunnel leading to the plant. This will balance the amount of wastewater treated at the plant. The heat content of wastewater is utilised at the Suomenoja power plant for producing district heating and district cooling. For exceptional situations there is an emergency discharge.

Blominmäki wastewater treatment plant



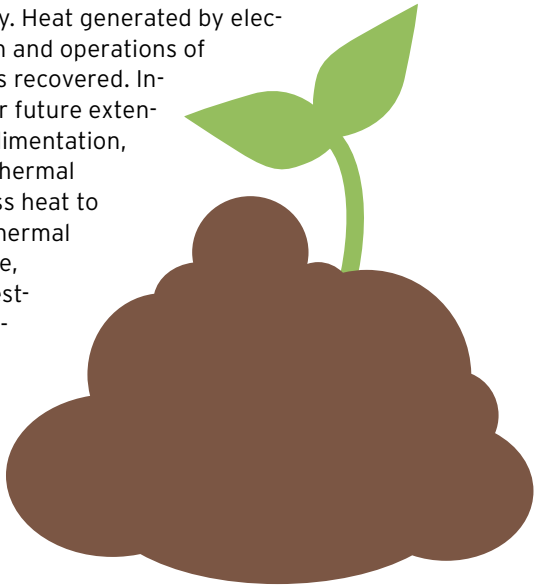


- The Blominmäki wastewater treatment plant and sewage tunnels are excavated in the bedrock.
- Wastewater from Espoo, Kauniainen, Kirkkonummi, Siuntio and western Vantaa is collected at the wastewater treatment plant.
- The treated wastewater is led from the treatment plant via a new discharge tunnel to the area of the Suomenoja treatment plant, which is being closed down, and from there it is conveyed through the present discharge tunnel to the sea, 7 kilometres away.

Making the most of sludge

Within the wastewater treatment process, sludge is removed from the water and digested. Biogas, produced in the plant's digester, is turned into electricity and heat. The digested sludge is efficiently dried in sludge centrifuges, which decrease the amount that has to be transported. The dried sludge **is processed into soil products**, which means that the nutrients in the dried sludge can be reutilised.

The treatment plant can produce heat energy exceeding its own need. The plant produces approximately over half of its electricity. Heat generated by electricity production and operations of large machines is recovered. Instead of space for future extensions for primary sedimentation, the idea is to build a thermal battery and use excess heat to warm up water. The thermal battery is, for instance, used for heating, digesting sludge and supplying air for the treatment plant.



Environmental impacts

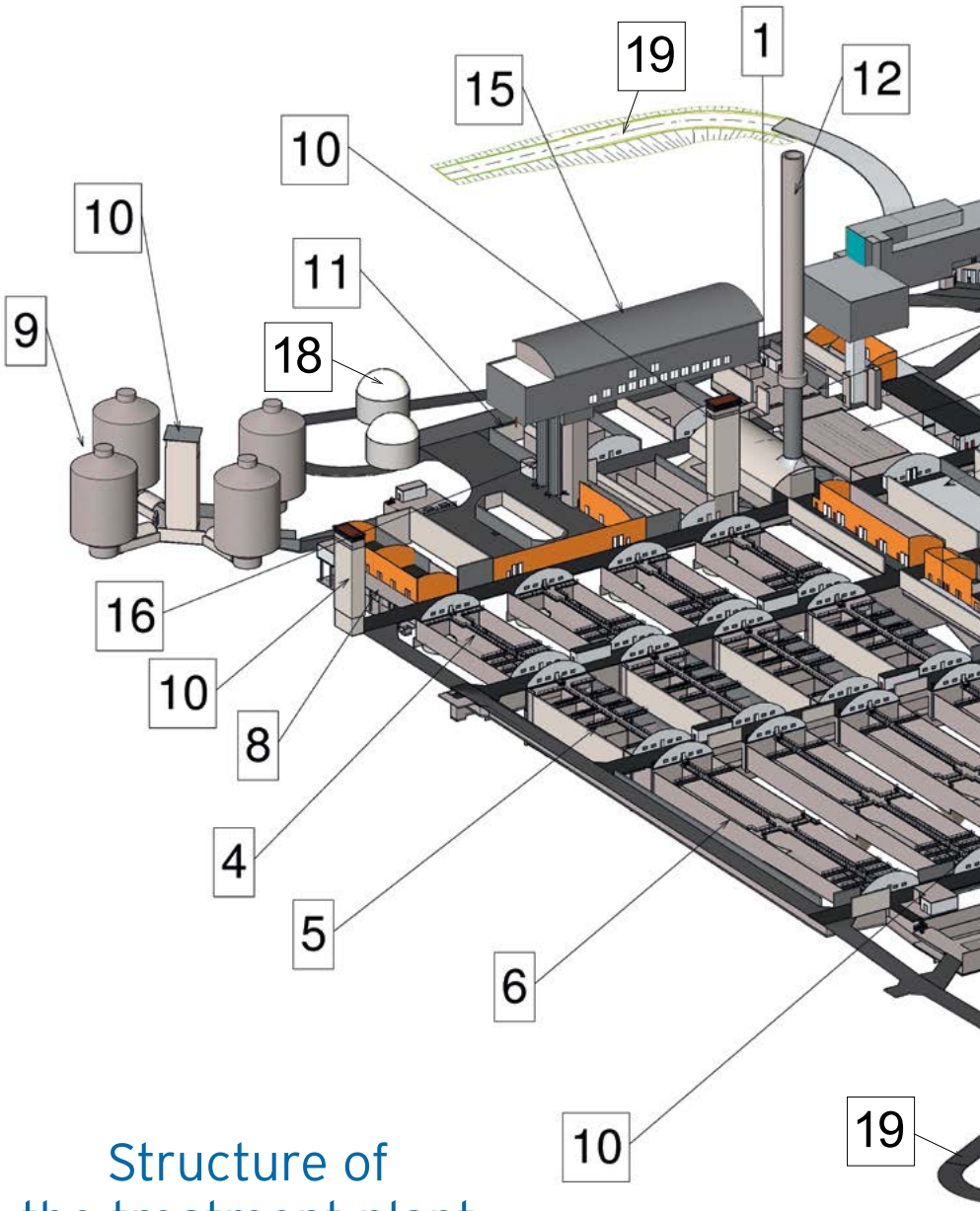
The excavation work on the Mikkelä access tunnel, which is preparing for excavating the Blominmäki wastewater treatment plant cave system, was kicked off at the end of 2014. The excavation work on the wastewater treatment plant's cave system was carried out during 2015-2017. The sewage tunnels will be excavated via a few chosen access tunnels mainly after the excavation work on the wastewater treatment plant.

When the excavation work on the Blominmäki cave system was completed, the construction of the wastewater treatment plant began in spring 2018. Altogether four years have been reserved for the building, equipping and kick-off stage of the wastewater treatment plant.

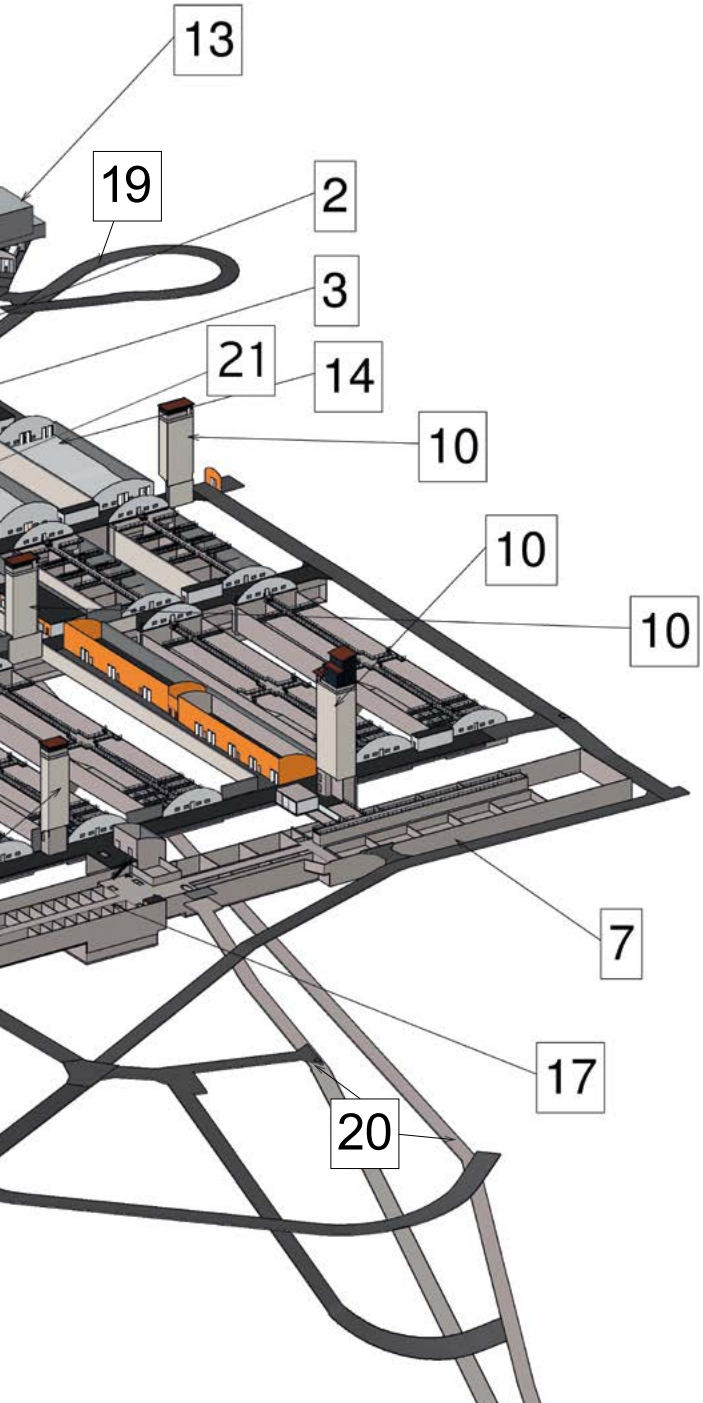
The excavation work on tunnels and cave system and other construction work cause temporary and local disruption such as an increase in heavy-vehicle traffic, noise and dust. After the construction stage, the sewage tunnels in the bedrock will not be seen, heard or felt in their surroundings. Geothermal wells cannot be drilled near the sewer tunnels but in practice the tunnels won't cause any other usage restrictions for the properties above them. Maintenance traffic in the access tunnels of both Mikkelä and sewage tunnels will be very light.

Aboveground areas remain mainly unchanged

After construction, the Blominmäki area can be used for recreational purposes or as a green area just as before, except for the yard of the wastewater treatment plant. The plant's basins and the whole cave system will be built so tightly that the nearby waterbodies of Teirinsuo swamp and nature reserve will remain. Odours generated by the plant will be directed through a high enough chimney that the **area's residents or those visiting** the recreation area are **not bothered by foul air or bad odours**. The plant's machines are mainly located in the cave system so that there won't be any noise to disturb the nearby environment.



Structure of the treatment plant



1.	Inlet pumps
2.	Fine screen
3.	Sand removal
4.	Primary sedimentation basins
5.	Aeration basins
6.	Secondary sedimentation basins
7.	Biological filters
8.	Sludge thickening
9.	Digesters
10.	Emergency exits
11.	Reject water treatment
12.	Exhaust chimney
13.	Administrative building
14.	Storage/workshop
15.	Sludge and biogas building
16.	Sludge storage silos
17.	Disc filters, approx. 20 µm
18.	Gas storage tanks
19.	Drive in tunnels
20.	Inlet and discharge sewer tunnels
21.	Thermal battery

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We practise interactive cooperation with residents

The building project is large and it cannot remain unnoticed. However, the outcome of this project is a wastewater treatment plant that blends in with its environment and achieves excellent treatment results. With the new treatment plant we will protect our coastal waters and the Baltic Sea well into the future.

During the construction stage, we aim to collaborate with the residents. We inform the residents about the building project and its progress for example in the meetings, on webpages and through a newsletter.

Information in English: **hsy.fi/en/blominmaki**
Information på svenska: **hsy.fi/blombacken**

The pages provide among others:

- an updated building schedule
- FAQs
- Additional information of the contracts

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