

*Extract from the Underground Master Plan of Helsinki*

# UNDERGROUND MASTER PLAN OF HELSINKI

A city growing inside bedrock

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The Underground Master Plan of Helsinki reserves designated space for public utilities and important private utilities in various underground areas of bedrock over the long term. The Master Plan also provides the framework for managing and controlling the city's underground construction work, and allows suitable locations to be allocated for underground facilities.

Since the 1960s, the City of Helsinki has been adept at widely utilising the opportunities for underground construction. More than 400 premises and over 200 kilometres of tunnels have already been built underground. Furthermore, there are more than 200 new reservations in the register for long-term underground projects. Demand for underground facilities in central Helsinki has grown considerably and, at the same time, the need to control construction work has increased substantially.



*Tempeliaukio Church (built into solid rock)*

As the city's structure becomes more dense, more and more facilities suited for different purposes are being built underground. There is also a growing need to connect underground premises to each other to form coherent and interrelated complexes.

When planning and carrying out new building projects, it is important to make sure that space reservations for public long-term projects, such as tunnels and ducts for traffic and technical maintenance, are retained for future construction. The growth in underground construction and planning and the need to coordinate different projects led to the need to prepare an Underground Master Plan for Helsinki. Having legal status, the Master Plan also reinforces the systematic nature and quality of underground construction and the exchange of information related to it.

Efforts have been made to alleviate the great demand for underground space in the city centre by allocating new rock resource areas suited for underground construction outside Helsinki's central area. Changing the purpose of rock facilities that have already been built is difficult, which further emphasises the importance of underground master planning.

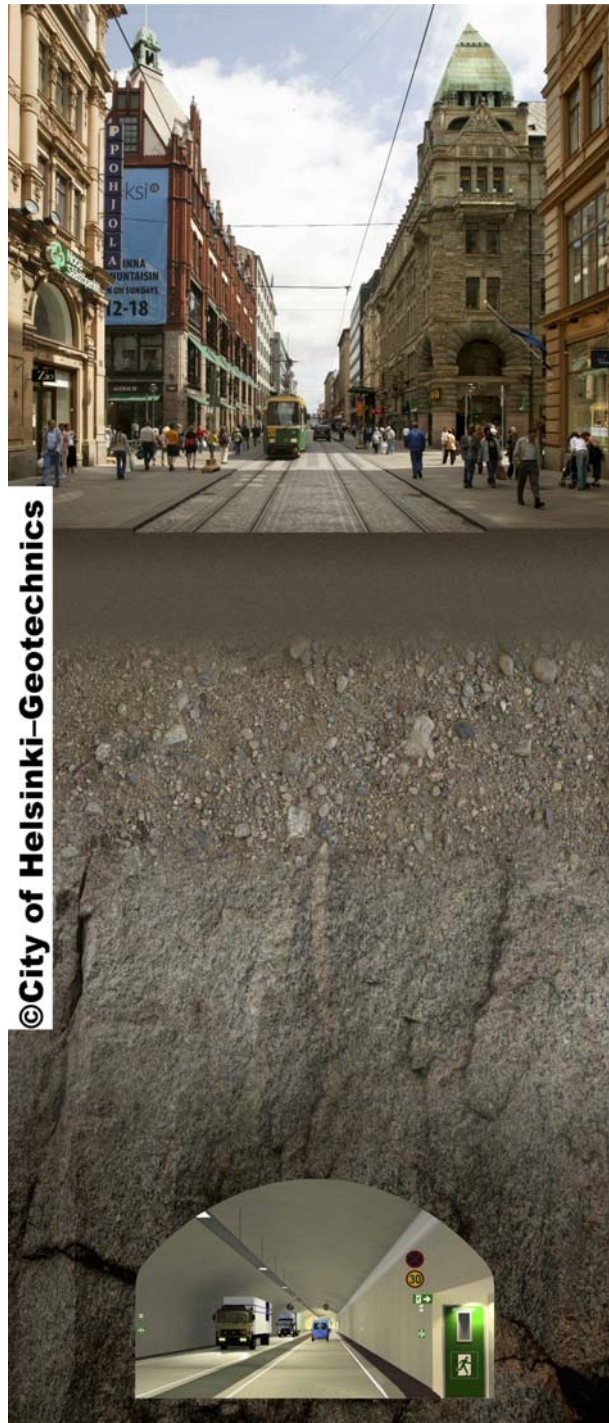


Underground reservations and existing facilities/tunnels have been divided into the following categories on the basis of their main purpose:

1. Community technical systems
2. Traffic and parking
3. Maintenance and storage
4. Services and administration
5. Unnamed rock resource (does not yet have a designated purpose)

The reservations in the Master Plan are divided into the following four planning levels:

- Project plan
- Needs specification
- Provisional space requirement
- Space requirement



*Underground maintenance route in the city centre (under construction)*

Facilities serving community technical systems (such as energy and water supply and telecommunications) are large-scale closed networks by nature. These facilities are composed of several different functions and the utility tunnels connecting them. Utility tunnels are located at such a depth that space reservations for them do not have a significant effect on other underground premises.

According to the law, the owner of a property has control over the underground part of the property, though the vertical extent of ownership is not specifically defined in legislation. When interpreting the extent of ownership, the lower boundary of a property has been limited to the depth where it can be technically utilised. In practice this means the depth of 6 m from the lowest point of the building lot. City of Helsinki charges also those companies using underground space, but the rent of “the underground building lot” is only c. 50% of the corresponding ground-level rent. Anyone constructing facilities underground must obtain agreement on the right to use the underground construction site. Right of ownership can be established either through voluntary transactions, agreements or redemption based on legislation. The prerequisite for obtaining a building permit is that the applicant has control over the construction site.

The cadastral system currently specifies properties two-dimensionally, meaning that registering possession rights to different levels or, for example, proving that an underground facility can be pledged as collateral, can be problematic. On 11 May 2006, the Ministry of Agriculture and Forestry assigned a working group to study the development of a three-dimensional cadastral system in Finland. One of the ideas behind this is that all 3D registrations of properties should be based on a town plan. Space reservations presented in the Underground Master Plan, which has legal status, would thus also have a determining effect on whether an underground property is eligible to be registered.

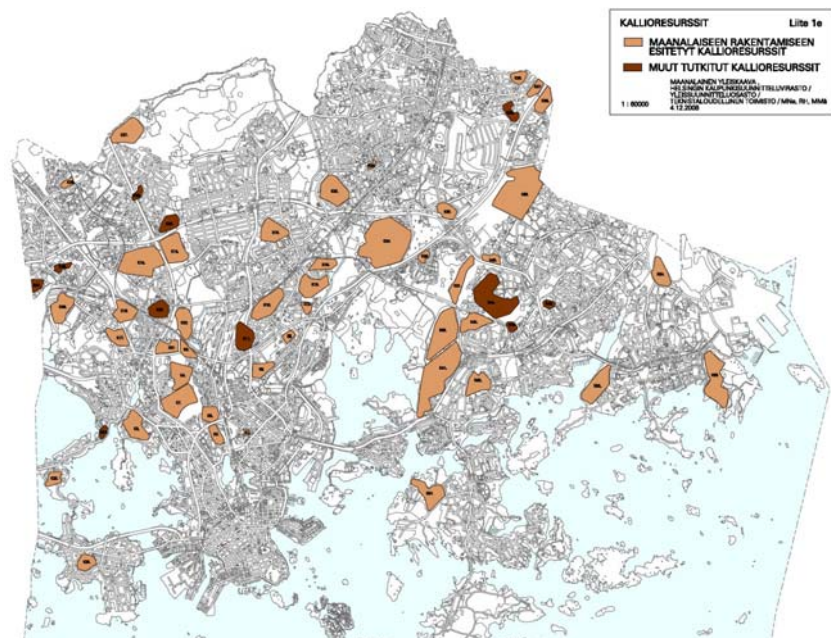


*Underground swimming pool in Itäkeskus (The hall has facilities on two floors and can hold about 1,000 visitors at a time. The hall has about 400,000 visitors a year. Quarried out of solid rock, the hall can be converted into an emergency shelter for 3,800 people if necessary.)*

Underground construction has an extremely important and central role to play in the development of the city structure of Helsinki and the adjoining areas, helping to create a more unified and eco-efficient structure. The Underground Master Plan sets the framework for further planning, enhances the overall economy efficiency of facilities located underground and boosts the safety of these facilities and their use. The planning regulations are broad, allowing facilities to have different purposes.

The Master Plan shows the most important underground facilities and plans with which the space requirements for confirmed or planned public and private projects can be secured over the longer term. Since the Underground Master Plan has legal status, landowners and authorities are obligated to adhere to it. The Underground Master Plan has some of the same features as a strategic land preservation plan. It shows land reservations for key projects that are considered important to society at large.

The Underground Master Plan shows both existing and future underground facilities and tunnels. The underground facilities are shown in two colours, grey indicating existing facilities and blue indicating planned facilities. Existing traffic tunnels are portrayed in light grey, while future traffic tunnels are coloured light blue. Space reservations on the Master Plan map are presented two-dimensionally. In the city centre area, approximate floor elevations are indicated using circled figures. Existing vital access links to underground technical maintenance facilities/tunnels are shown on the map with triangles.



*Unnamed rock resources reserved for underground construction outside central Helsinki are presented in brown and other surveyed areas in dark brown*

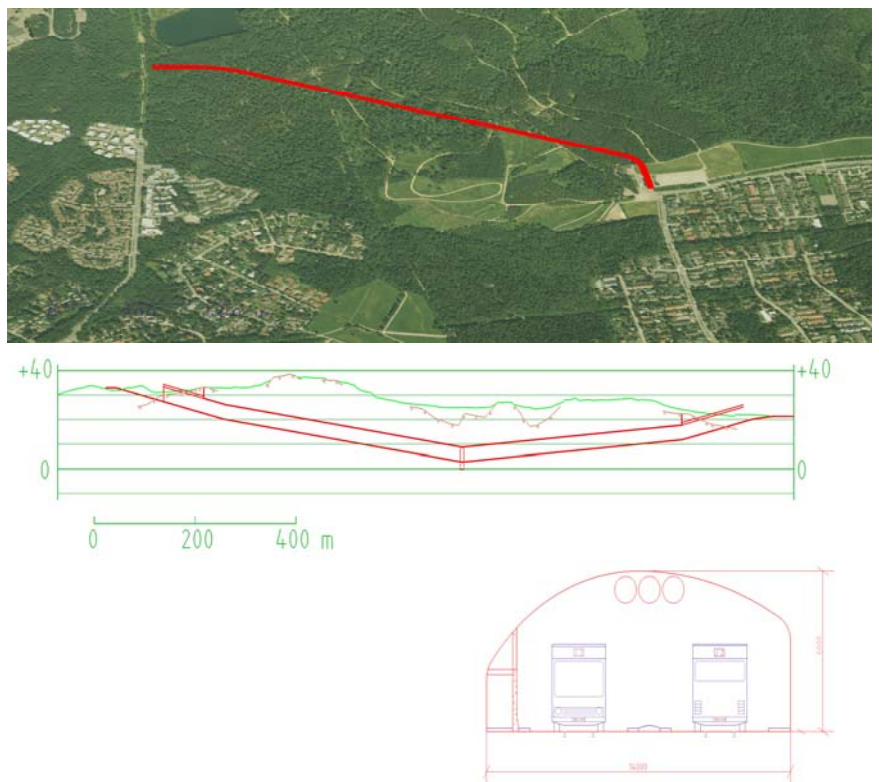
The Master Plan also includes rock resources reserved for the construction of as yet unnamed underground facilities, with the aim of identifying good locations for functions suitable for placing underground and which would also reduce the pressures on the city centre's rock resources. The suitability of rock areas for different purposes will be studied when preparing the town plan.

An initial survey examined the areas and elevation levels in Helsinki which are suited for construction of large, hall-like facilities. A model was used based on rock surface data and applying a standard-sized measurement cave (width 50 m, length 150 m, height 12 m). The model of the bedrock is based on base map data for exposed rock and land surface elevations and point data obtained using drill machine borings. The survey also took into account local weakness zones and rock resources that have already been put to use.



In general, it can be said that the bedrock in Helsinki is not far below the ground surface, and that there are plenty of locations suitable for construction of underground facilities. Outside the city centre, the survey found 55 rock areas that had a sufficient size for accommodating large underground facilities near major traffic arteries. In many areas, future underground projects can make use of entrances to existing underground facilities, which have been marked with triangles on the Master Plan map.

There are about 40 unnamed rock resource reservations without a designated purpose. The average area of these reservations is 30 ha. Unnamed reservations have a total area of almost 1,400 ha, representing 6.4% of the land area of Helsinki. When selecting these resources, the survey took into account their accessibility, the present and planned ground-level uses of these areas, traffic connections, land ownership and possible recreational, landscape and environmental protection values.



*Central Park tunnel for public transport called "Jokeri 2" (under planning)*

