

CURRENT TUNNELLING ACTIVITIES

Tampere Region Central Wastewater Treatment Plant "Sulkavuori" (under construction)

- The underground treatment plant will process wastewater for up to 420,000 residents (2040)
- Budget €346M, largest single environmental investment in the Tampere region
- Started in 2018 and will be commenced in 2025/2026
- More info: <https://www.keskuspuhdistamo.fi/>

Final Disposal Facility ONKALO (under construction)

- The final disposal facility consists of two sections:
 - The above ground encapsulation plant, where spent nuclear fuel is received, dried and packed into final disposal canisters
 - The repository locate deep (450m)

Name of Association: Finnish Tunnelling Association – MTR - FTA

Type of Structure: Non-profit, independent association, founded 1974

Number of Members: 220 Individual Associate Members, 26 Corporate Affiliate Members

ASSOCIATION ACTIVITIES DURING 2023 AND TO DATE

- Nomination of the Finnish Young Tunneller 2023-2024
- Annual Meeting on 13th April 2023
- Seminar on Underground rock facilities - preparation and security of maintenance
- Activities of the Young Member Group
- BoD meetings six times during 2023
- Participation in the work of FISE Qualification of Professionals in Building, HVAC and Real Estate Sector in Finland

NEWLY COMPLETED PROJECTS

Jokeri Light Rail

- The Jokeri Light Rail line between Itäkeskus in Helsinki and Keilaniemi in Espoo and is one of the key projects for orbital cross-region public transport in the capital area
- A 400m long tunnel was excavated during 2021 as well as large open rock excavations
- Construction works started in 2019 and the line was placed into operation in October 2023
- The length of the line is approximately 25km (15.5 miles), with 33 stops.

inside the bedrock, the most important section is the tunnels where the encapsulated spent nuclear fuel is disposed of

- The volume of rock to be excavated for the repository, is approximately 1.5M³m
- The number of final disposal tunnels required is 137. The total length of the tunnels is 50km, located within an area extending over 2 to 3 square kilometres
- Final disposal starts in the mid 2020's
- More info: Posiva

Traffic Tunnel in Sörnäinen, Helsinki (planning)

- Two parallel tunnels with a length of 800m and an excavation volume of 270,000m³
- The start of the bypass tunnel (20m) in Sörnäinen was excavated in 2023
- An 800m tunnel is waiting for City decision
- Estimated cost of €160M
- Construction estimated for 2023-2029

Savilahti Underground Sport and Event Center, Kuopio (under construction)

- Re-use of an old underground military depot built 80 years ago
- New, modern facility to serve as an event center for 2,500 people and also as an air-raid shelter for 7,000 people
- Construction period 2021-2024

Art Cave Saimaa Retretti (under construction)

- Reconstruction and additional spaces
- The new Centre of Art and Culture will be built from 2021-25

Underground Parking Hall in Keilaniemi, Espoo (under construction)

- Excavation volume of 330,000m³
- Underground parking for 1,900 cars
- Construction from 2022-2027

Underground Parking Hall and other underground facilities for Laakso hospital, Helsinki (under construction)

- Underground parking for 550 cars
- Construction from 2023-2030

Underground swimming pool and spa in Lempäälä, (under construction)

- Construction from 2023-2024

Eiranranta heat pump plant (Helen, Helsinki)

- The size of the heat pump plant is about 55,000m³
- For the production of carbon-neutral district heating (93MW) and district cooling (60MW)



Savilahti Underground Sport and Event Center. Photo credit: Vicente Serra

- Construction from 1/2023-11/2025

Teollisuuskatu Waste Water Tunnel, Helsinki (under construction)

- Improve wastewater and storm water handling in Helsinki
- Length 330m
- Construction between 2023-2024

FUTURE TUNNELLING ACTIVITIES

Seasonal Heat Storage, Vantaa

- VECTES (Vantaa Energy Cavern Thermal Energy Storage) is a seasonal energy storage project, which enables the harnessing of the warmth of summer for the cold winter. The facility will be the world's largest thermal energy storage cavern at 1,000,000m³ in size. It will have a storage capacity of 90GWh of energy – the annual heat consumption of a medium-sized town
- Schedule open
- More info: <https://www.vantaanenergia.fi/en/fossil-free-2026/worlds-largest-cavern-thermal-energy-storage-to-be-built-in-vantaa/>

Garden Helsinki

- Event arena providing sports and culture events, shopping facilities, apartments, underground parking
- Private funding
- Excavation volume of 800,000m³
- Schedule open
- More info: <http://www.gardenhelsinki.fi/en/>

Underground Parking Hall, Mechelininkadun Campus, Helsinki

- Excavation volume of 60,000m³
- Underground parking for 350 cars
- Construction schedule open

West Harbour Tunnel, Helsinki (planning)

- Estimated cost of €290M
- The city council of Helsinki made a positive in-principle decision in Feb 2021
- Planning stage 2025-2027
- Construction schedule open

Esplanadi Waste Water Tunnel, Helsinki (planning):

- Improve wastewater and storm water handling in Helsinki
- Length 1km
- Estimated cost of €5M
- Construction estimated 2025-2027

West Railway (planning):

- High-speed railway connection between Helsinki and Turku
- Partly following a current track, partly new route
- Multiple tunnels with a total length of over 14km
- Construction estimated 2026-2033
- More info: <https://lansirata.fi/en/>

Lahdenperä – Jämsä - railway (planning):

- 18km of new railway between Lahdenperä and Jämsä
- 4.5km length of railway tunnel
- Construction estimated 2035-2040
- More info: Lahdenperä–Jämsä rataoikaisu ja kaksoisraide - Väylävirasto (vayla.fi)

Subsea Tunnel in Åland (feasibility study):

- Subsea road tunnel to link the island of Föglö and the Åland main island where the city of Mariehamn is located
- Tunnel length 10.5km
- Requires further works on investigations, studies and design



Art Cave Saimaa Retretti

City Rail Loop Pissararata, Helsinki (awaiting decision):

- The City Rail Loop is a planned urban railway line for commuter trains under Helsinki city centre
- The city plan has been approved but the decision on construction has not been verified
- More info: <https://vayla.fi/pisara#.WgrnfU32SM8>

Airport line (planning):

- 30km of new railway line from Helsinki through Helsinki Airport to Kerava along the main line
- 28km length in railway tunnel
- Schedule open
- More info: <https://suomirata.fi/lentorata/>

STATISTICS

Underground (UG) Spaces in Helsinki with Rock Surface:

- Area $2,145,081\text{m}^2 = 2,145 \text{ km}^2$
- Volume $13,100,000\text{m}^3$
 - UG spaces 336
 - Helsinki's surface area $215,12\text{km}^2$
 - 1m^2 UG space for each 100m^2 surface area i.e. 1%
- Tunnels 294km
 - 194km of technical tunnels
 - 34km of traffic tunnels
 - 30km of tunnels with secondary purpose as emergency shelters
 - 14km of parking caverns
 - 22km of tunnels for other purposes.



Tampere Region Central Wastewater Treatment Plant Sulkavuori

EDUCATION ON TUNNELLING IN THE COUNTRY

Aalto University:

- Engineering Geology
- Rock Excavation
- Rock Mechanics
- Rock Construction
- Seminar in Geoengineering
- Project Course in Geoengineering

Tampere University:

- Introduction to Rock Engineering
- Design of Rock Engineering Structures
- Construction of Rock Engineering Structures

University of Oulu:

- Rock Mechanics
- Mining Technology
- Rock Blasting
- Applied Rock Mechanics

- Rock Dynamic and Applications

Lapland University of Applied Sciences + Kajaani University of Applied Sciences

- Rock Excavation and Mining Technology
- Rock Engineering

Metropolia University of Applied Sciences

- Soil and Rock Construction

Saimaa University of Applied Sciences

- Rock Excavation and Safety Regulations for Blasting Works
- Underground Excavation and Rock Reinforcement Methods
- Rock Mechanics

Turku University of Applied Sciences

- Rock Engineering