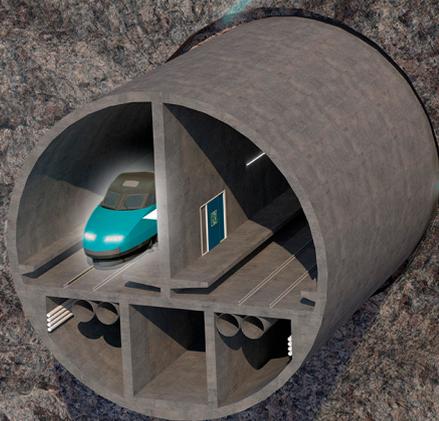


FINEST BAY AREA DEVELOPMENT OY

ENVIRONMENTAL IMPACT ASSESSMENT

Finest Bay Area - Railway tunnel between Finland and Estonia

The world's longest railway tunnel project that uses private funding



Finest Bay Area - Railway tunnel between Finland and Estonia

The goal of the project is to construct an undersea railway tunnel between Finland and Estonia that serves both passenger and freight traffic and significantly reduces travel time between the countries. The travel time target between Helsinki Airport and Ülemiste airport in Estonia is approximately 20 minutes.

The planned railway tunnel merges the Helsinki region and Tallinn into a single metropolis. The tunnel will connect Asia and Europe into a single hub for business, travel and traffic, since the tunnel project makes it possible to travel to Tallinn by train directly from Helsinki Airport. On the Estonian side, the possible connection with the Rail Baltica project will connect the region even more closely to Central Europe.

Facts about the project



- Tunnel length approx. 100 km.
- The total cost of the project is estimated at EUR 15 billion.
- The project is based on private funds. Control over the project company will remain in Finland, with project financing provided by international investors from all over the world. Equity will amount to 30% of the financing and 70% will be covered by debt.
- At the moment, a one-way ticket costs 50 euros, a return ticket 100 euros and a yearly ticket 1,000 euros. Tickets are available from an online store: <https://shop.finestbayarea.online/>
- The project involves planning an artificial island which, according to the larger option, would enable real estate development on the island.

Since an electric train is an eco-friendlier solution than ferry traffic, the construction of a railway connection will have a positive climate impact. The impacts will be analysed in more detail during the EIA procedure.

HISTORY OF THE PROJECT

Different alternatives for travel between Finland and Estonia have been studied since the late 19th century. In the 2000s, the feasibility of constructing an undersea tunnel between Finland and Estonia was examined in the FinEst Link regional development project organised by the Helsinki-Uusimaa Regional Council, Harju County, the cities of Helsinki and Tallinn, the Estonian Ministry of Economy and Communications and the Finnish Transport Agency. The project's preliminary analysis report was published in February 2018, after which the Finnish Ministry of Transport and Communications established a workgroup to assess the need for and impacts of further investigation related to the tunnel.

In May 2018, the workgroup communicated that the realisation of the project requires contributions from the private sector. In the autumn of 2017, the private project developer Finest Bay Area Development Oy started designing an alternative concept for the tunnel; in the spring of 2018, the decision was made to start the preliminary project design and environmental impact assessment procedure for assessing the environmental impacts of both the FinEst Link and Finest Bay Area concepts.

ENVIRONMENTAL IMPACT ASSESSMENT PROCEDURE

The undersea railway tunnel enables railway traffic between Finland and Estonia.

Since the project is located within the geographical areas of two countries, an environmental impact assessment will be conducted separately in each country, according to Finnish and Estonian legislation. Because the Finest Bay Area tunnel project has an international dimension, the following will also apply:

- the Espoo Convention (UNECE Convention on Environmental Impact Assessment in a Transboundary Context);
- the Bilateral Agreement between Finland and Estonia on Environmental Impact Assessment in a Transboundary Context;

The need for an environmental impact assessment in Finland is based on the Act on Environmental Impact Assessment Procedure (the "EIA Act"). The assessment procedure consists of two stages:

- 1) the environmental impact assessment programme and
- 2) the environmental impact assessment report.

The environmental impact assessment report is drawn up on the basis of the assessment programme and the liaison authority's statement regarding it.

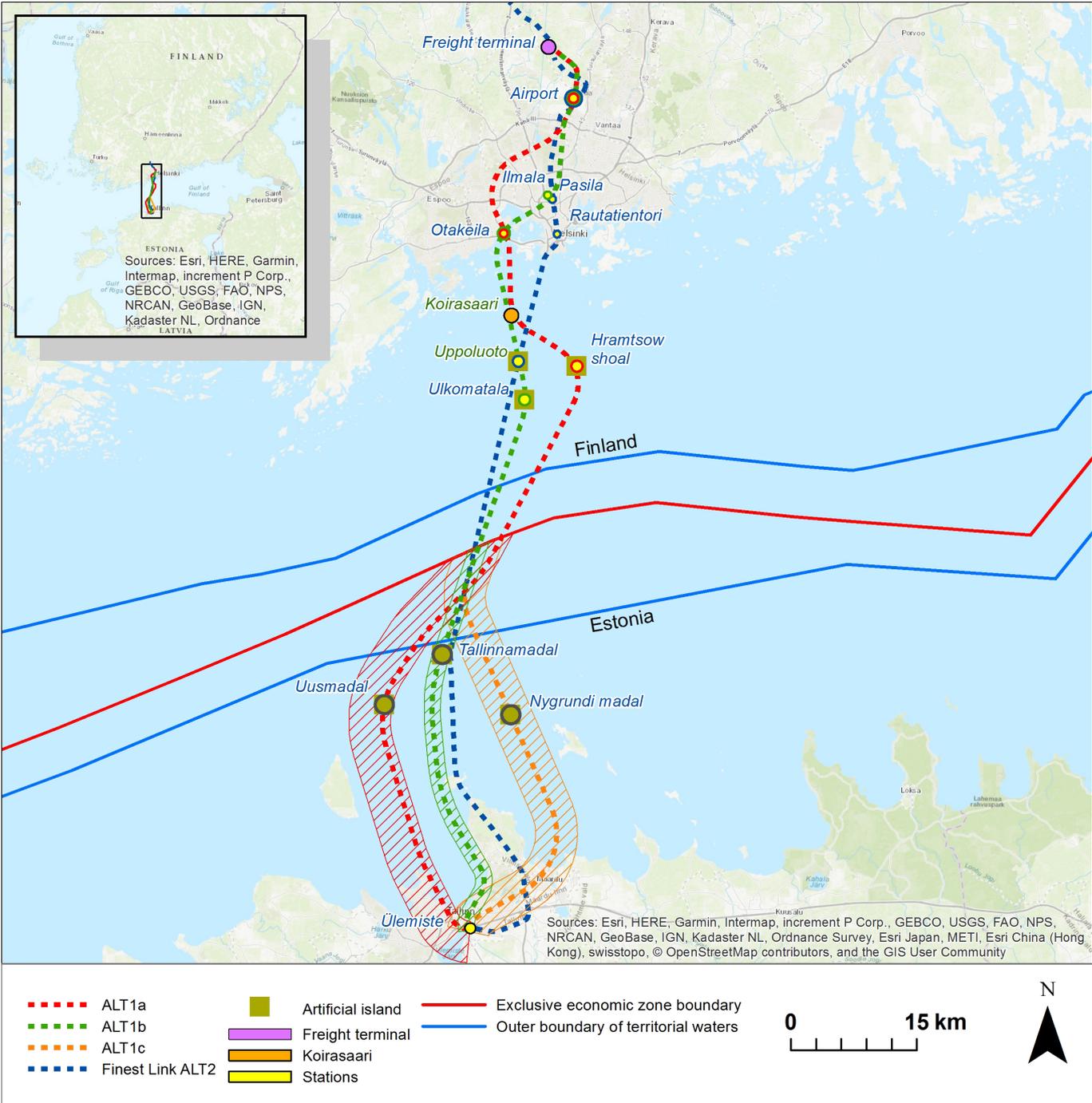
The goal of the EIA procedure is to promote environmental impact assessment and harmonised consideration of the assessment during design and decision-making. Another goal is to improve access to information and influencing opportunities for citizens and all interested parties. A project's environmental impacts must be examined in the statutory assessment procedure during the early stages of the project's planning, when the alternatives remain open. The EIA procedure does not involve decisions concerning the project; its goal is to provide information to support decision-making.

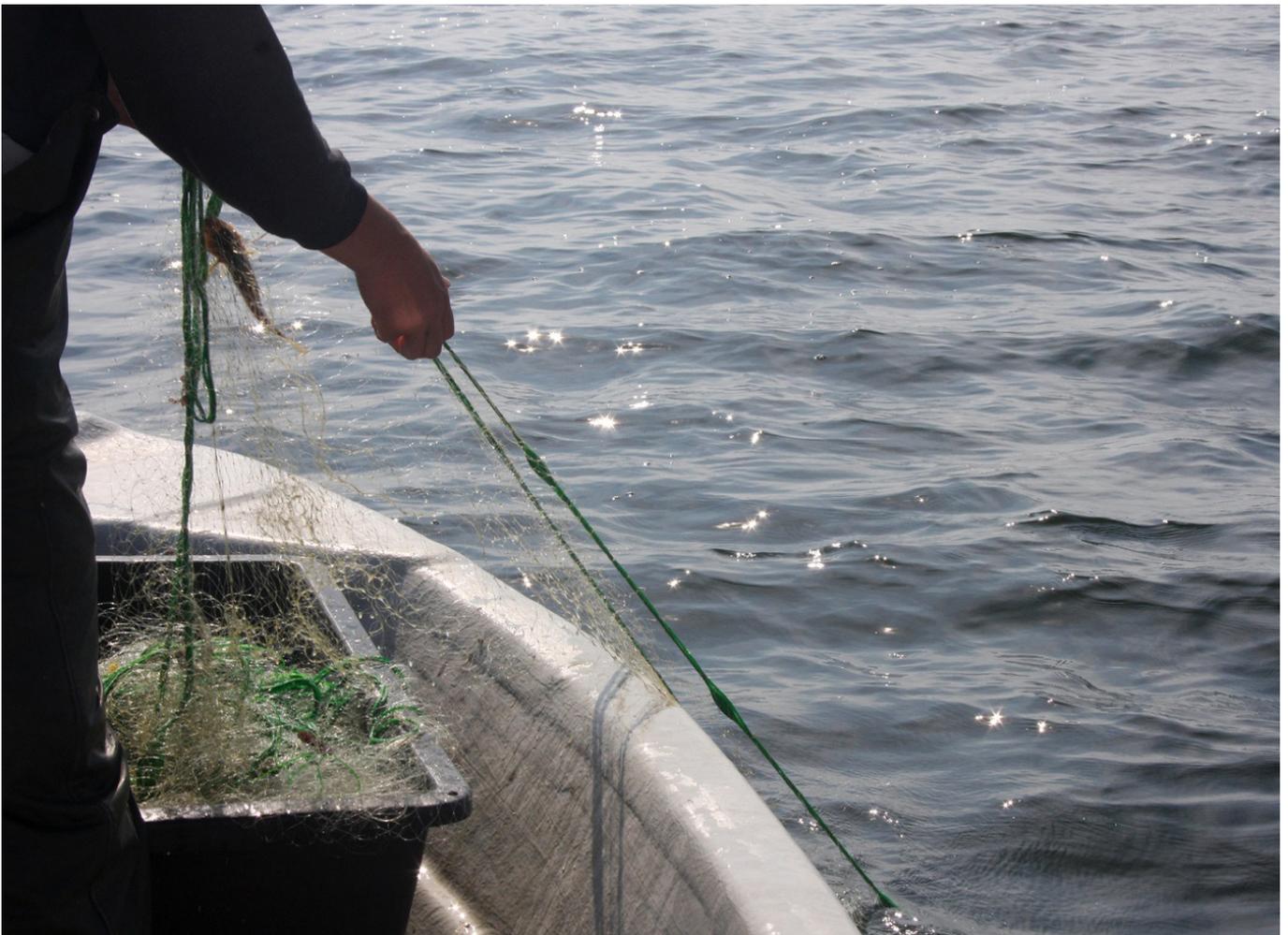
The creation of the project's environmental impact assessment programme was begun in May 2018 and the actual environmental impact assessment will be performed during 2019. The goal is to complete the EIA procedure at the beginning of 2020. In addition to the environmental impact assessment, the project requires separate zoning processes and various permits.

The EIA procedure examines three different route alternatives on the Finnish side and, correspondingly, Estonia's national EIA procedure examines four different route alternatives. All the project alternatives involve the construction of a freight terminal to the north of Helsinki Airport and a railway connection for the freight terminal. The total length of the railway tunnel will be some 100 kilometres. In addition to the project alternatives, the assessment also examines the zero alternative whereby the project is not undertaken. In the Finnish EIA procedure, environmental impacts are examined up to the boundary of the Estonian exclusive economic zone.

All examined tunnel route stations have connections to the railway network or the metro system. The project's impacts are assessed based on the transport system changes included in and required by the new tunnel connection, the other planned transport system changes, and the changes in transport demand caused by the former. The project's impacts on traffic are assessed at three levels: the international, national and regional.

Alternative ALT1a	Railway tunnel between the freight terminal – Helsinki Airport – Otakeila – Hramtsow shoal; plus a service connection tunnel built in Koirasaari
Alternative ALT1b	Railway tunnel between the freight terminal – Helsinki Airport – Ilmala – Otakeila – Ulkomatala; plus a service connection tunnel built in Koirasaari
Alternative ALT2	Railway tunnel between the freight terminal – Helsinki Airport – Pasila – Centre of Helsinki (Rautatientori region) – Uppoluoto (service connection)
Zero alternative ALTO+	Ferry traffic continues like today but with updated forecasts as regards shipping routes and number of passengers





Source: Kala- ja vesitutkimus Oy, net fishing

IMPACTS BEING ASSESSED

The project's environmental impacts refer to the direct and indirect effects on the environment caused by the railway tunnel, the structures required for it and the artificial island. Pursuant to the Act on Environmental Impact Assessment Procedure, the assessment examines the environmental impacts caused by the project:

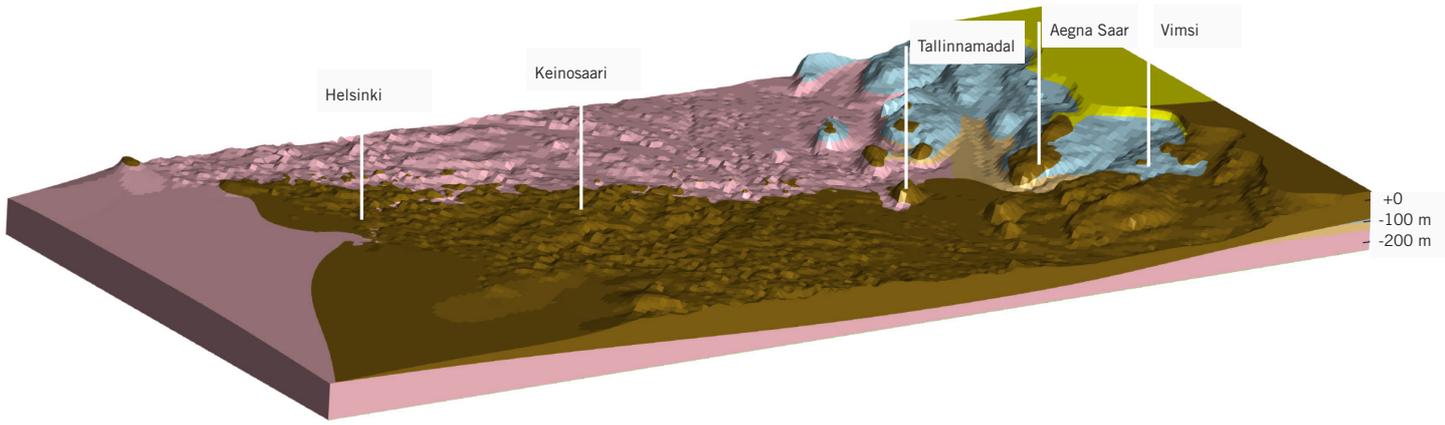
- on the population and on human health, living conditions and comfort of living
- on the land, soil, surface water and groundwater, air, climate, flora and fauna, fishes and fishing, organisms and biodiversity,
- on community structure, material property, landscape, cityscape and cultural heritage,
- on the utilisation of natural resources and
- the mutual interactions between these factors.

In addition to the impacts during operation, the environmental impact assessment takes account of the impacts of construction and decommissioning. The possible joint effects of the project with other existing or planned projects in the area are assessed.

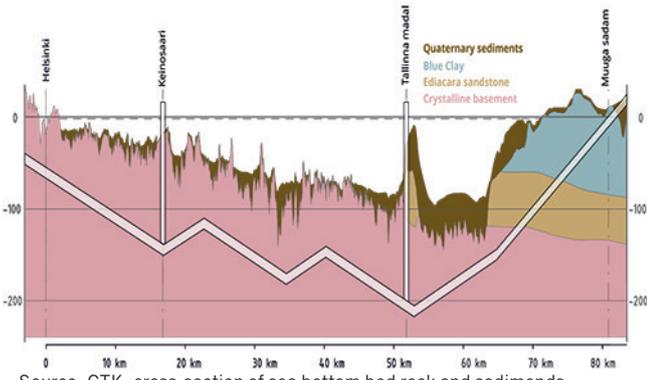
The environmental impact assessment procedure assesses the environmental impacts of activities in the project area and those that extend outside the area. Traffic related to construction and operation are examples of activities extending outside the project area. Furthermore, the possible combined impacts on the environment caused by the project and the other activities in the affected area are assessed. The combined impacts are described in the EIA report.

In order to support the existing documentation, the following separate analyses will be performed as part of the assessment:

- Underwater archaeology surveys
- Diving surveys of the marine environment
- Fish stock and fishery surveys
- Hunting surveys
- Soil quality analyses and probing, both on land and at sea
- Seabed fauna analyses
- Birdlife analyses
- Surveying of historic unexploded ordnances in the sea area
- Water quality and flow models
- Noise modelling: observing both above-ground and underwater noise
- Illustrations of the artificial island (excluding detailed depictions of the buildings)
- Traffic demand estimate and operative modelling
- Modelling of regional economy and assessment of socioeconomical impacts.



Source: GTK, topography model of the sea bottom
 GTK, Geological Survey of Finland



Source: GTK, cross-section of sea bottom bed rock and sediments

ASSESSMENT OF TRANSBOUNDARY IMPACTS

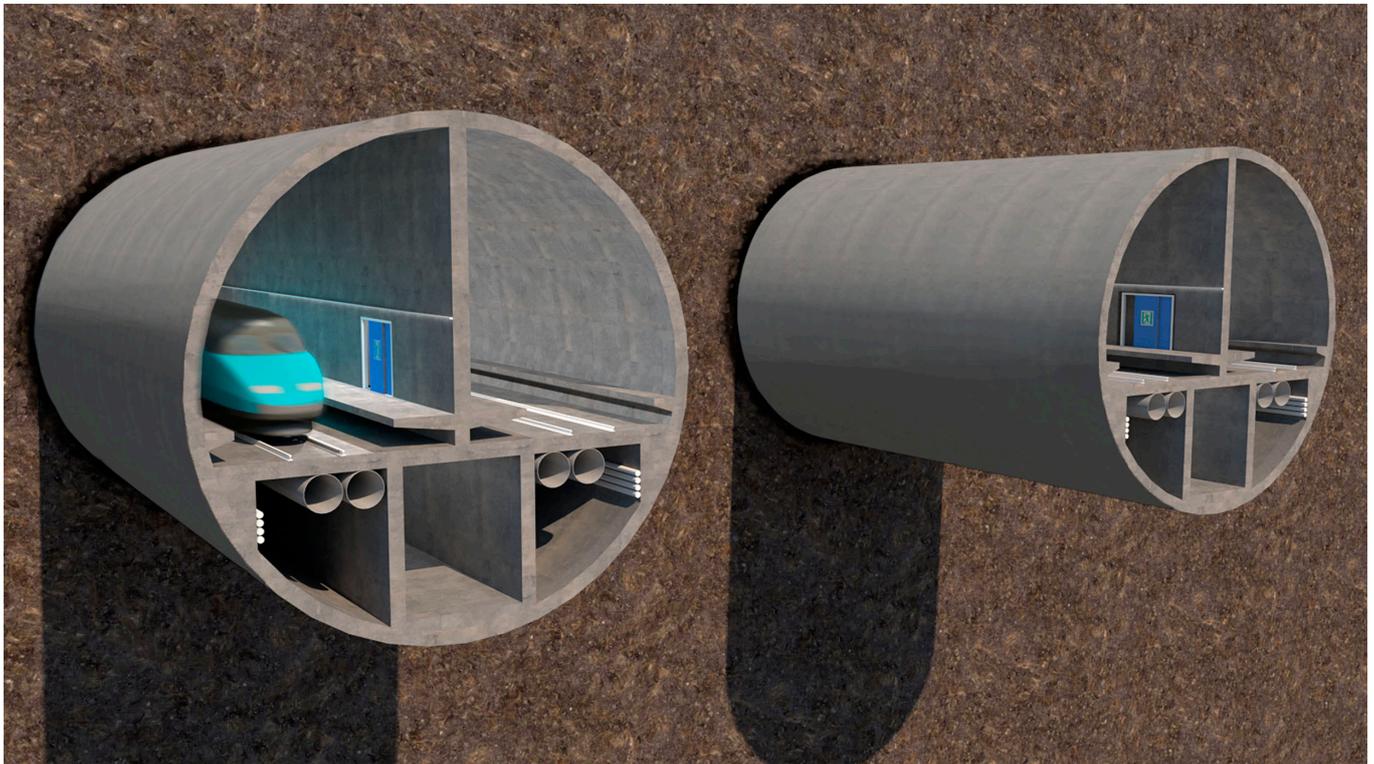
The Finnish EIA procedure assesses the project's possible transboundary impacts on Estonia and any possible other countries. The EIA report contains a separate chapter on transboundary impacts. The assessment describes the likely significant transboundary impacts. The direct and indirect transboundary impacts will be assessed according to the EU guidelines. The assessments of total impacts will utilise the quantitative and qualitative assessments of various areas, which will be used as the basis for an overview of the project's transboundary impacts. The summary regarding the transboundary impacts will be included in the summary of the project's environmental impacts drawn up for an international hearing. Correspondingly, Estonia's national EIA procedure assesses the transboundary impacts on Finland and any possible other countries.



Photographer: Karoliina Jaatinen, a diver

Source: GettyImages



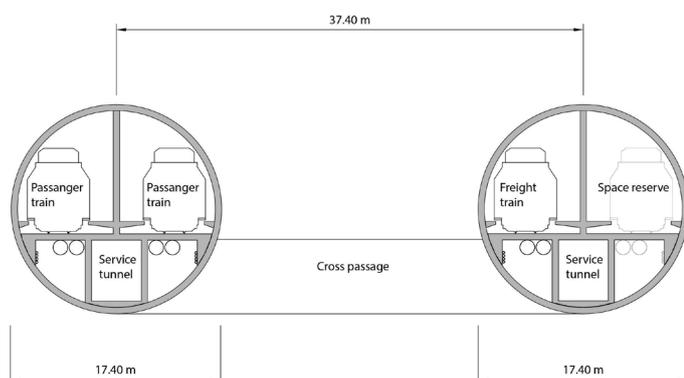


Source: A-insinöörit, Finest Bay Area Project alternative railway tunnel, conceptual design of the railways tunnel

CONSTRUCTING THE WORLD'S LONGEST RAILWAY TUNNEL

The technical description of all the project alternatives will be specified as planning proceeds, and the data used as the basis of the assessment will be described in the environmental impact assessment report.

All told, the construction of the tunnel will take roughly 5–9 years. The total duration of the tunnel's construction is heavily dependent on, among other things, the daily progress of the tunnel boring and the possibility of interleaving the outfitting and boring work in the tunnel. Daily progress will, for its part, depend on the development of tunnel boring equipment. The aim is to construct the tunnel simultaneously from several starting points.



Source: A-insinöörit, FinEst Bay Project alternative railway tunnel, cross profile

TECHNOLOGICAL CONCEPT FOR THE FINEST BAY AREA PROJECT

In the sea area between Finland and Estonia, the tunnel runs at a depth of up to 200 metres below the rock face and, even on the continent, at a depth of several dozen metres.

The railway tunnels of the Finest Bay Area alternatives (ALT1a and ALT1b in the EIA) will be built as two tunnels with a diameter of approx. 17.4 metres each. The stations in the Finest Bay Area alternatives are built as side platform solutions, where the wall structure between the tracks continues without interruption across the stations.

Escalators and/or lifts are used for ascending to ground level. In Otaniemi, Espoo, the passengers may also ascend to the nearby metro station. The new station planned for Otaniemi in Espoo (Otakeila) is located some 15–20 metres below the Keilaniemi station of the West Metro. The new station planned for Ilmala is located some 50 metres below the current train station at Ilmala.

The new station planned for Helsinki Airport is located below the airport's Ring Rail Line railway station, and escalators and lifts are used to ascend to the airport from the new station. All alternatives use the same route at the airport and their connection to the freight terminal area is similar.

The Finest Bay Area alternative uses either the European (1,435 mm) or Finnish (1,524 mm) gauge or both alternatives. The tunnel system may contain:

- tracks with a single gauge,
- tracks with two different gauges, or
- some (or all) tracks fitted with three rails, suitable for both gauges.

TECHNOLOGICAL CONCEPT FOR THE FINEST LINK PROJECT

The FinEst Link alternative (ALT2 in the EIA) has three tunnels, two of which are reserved for rail traffic and one for rescue and maintenance needs. The larger tunnels are 10 metres in diameter while the smaller one, located in the middle, has a diameter of 8 metres. In the FinEst Link alternative, shunting tracks are built on the stations for the freight trains. Tunnel maintenance work is carried out at night. A sectioning wall is used to separate the freight traffic from the passenger traffic rail.

In the FinEst Link alternative, the route is located at a depth of approx. 70 metres at the location of the Helsinki central railway station; at Pasila station, it runs at a depth of some 60 metres. The new stations will be linked with the existing stations using escalators and/or lifts.

In the FinEst Link alternative, the tracks in the tunnel are built with the European gauge. The tunnel section between Pasila and Helsinki Airport uses both gauges.

Special attention is paid to the rescue safety of the tunnel from the first stages of design to the construction and operation stage. The safety requirements for the railway tunnel are determined by the Finnish Transport Safety Agency's safety regulations and project guidelines, as well as EU legislation.

The target speed for the trains is 300 km/h. The other design basis will be specified as the project advances.

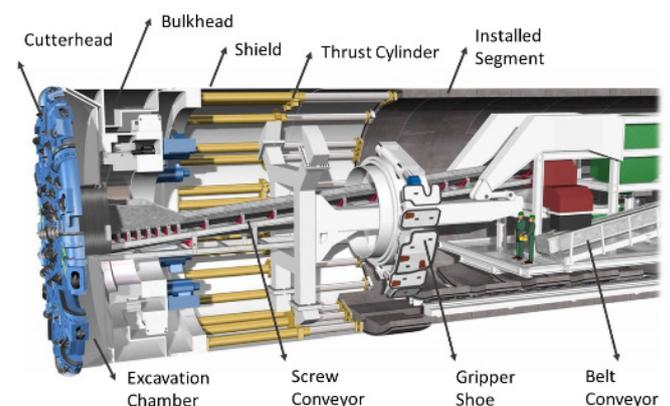
TBM METHOD AND TRADITIONAL BLASTING

The tunnel will be built using both the traditional drilling and blasting method and by means of the TBM (Tunnel Boring Machine) method. The TBM method refers to using a full-profile machine to excavate the entire diameter of the tunnel profile at once. At the same time, the necessary concrete elements are installed in order to reinforce and seal the tunnel walls. Internationally, the TBM method is commonly used for softer rock types, but the use of machines designed for hard rock is continuously increasing. Experience in using the method on hard, crystalline rock, such as granite, is available from China, Canada, Switzerland, Norway and Sweden, among other places. In these projects, the diameter of the excavated tunnels has been approx. 10–15 metres. There are no known examples of the TBM method being used to excavate tunnels with a diameter of more than 15 metres into hard, crystalline rock.

The TBM method relies on large, full-profile boring machines. TBMs use hard metal rolls as cutter heads. The hard metal blades at the front of the profile boring machine cause the rock to chip, and the broken rock that is released is transported to a belt conveyor via screens and chutes. The device weighs hundreds of tonnes and presses the cutter head, which contains dozens of cutting wheels, against the rock and breaks it. This results in a smooth, tube-like tunnel. Screw conveyors are used to feed the broken rock onto belt conveyors. The belt conveyor feeds the rock further into lorries or trolleys for removal from the tunnel.



Source: A-insinööri, TBM (Tunnel Boring Machine)



Source: Basic diagram of the operation of a TBM full profile boring system. Modified from source (<http://www.railsystem.net/tunnel-boring-machine-tbm/>).

A tunnel bored into crystalline, hard bedrock using full-profile boring is safer than a tunnel created with traditional drilling and blasting, since fewer cracks and boulders are created on the ceiling and walls. The need for reinforcing the tunnels and the vibration, noise and need for ventilation during work are clearly smaller than in the drilling and blasting method.

BEFORE THE TUNNEL CAN BE DRILLED, SEVERAL PREPARATORY WORK STAGES ARE REQUIRED, INCLUDING:

- Geological surveys (e.g. seismic examination, sounding)
- Planning and construction of supporting areas
- Construction of artificial islands and shafts
- Planning of ventilation during work
- Planning of broken rock transport routes
- Construction-time traffic arrangements
- Removal of unexploded ordnances (UXO)
- Construction of temporary harbours

PROJECT LOGISTICS AND CONSTRUCTION OF THE ARTIFICIAL ISLAND

The construction of the tunnels will create a substantial amount of broken rock, an estimated 70–80 million m³ in total, most of which will be used in the construction of a new island on the Finnish side. Other uses for the broken rock include an island off the coast of Tallinn that is intended for tunnel service operations, fillings related to project infrastructure construction and, possibly, construction projects external to the project. When refined further, some of the rock material can be used in structural layers for infrastructure construction projects.

On the continent, the belt conveyors are used to transport the crushed stone created by the TBM via construction tunnels and shafts either directly into barges (if the construction tunnels are located near the shore) or into rock trucks. The blasted stone created through traditional drilling and blasting method is transported out of the tunnel with rock trucks.

Interim storage for blasted and crushed stone may also be required for exceptional conditions. Needs for interim storage and the possible storage locations will be specified as technical design advances, and the locations will be presented in the assessment report.

The project logistics for the alternatives ALT1a and ALT1b are designed around use of the existing construction tunnels and, for example, extending the metro construction tunnels in Espoo. The FinEst Link alternative utilises the existing service tunnels in the centre of Helsinki and near Pasila railway station. The construction tunnels are excavated using the drilling and blasting method, and the excavation of a single construction tunnel from an existing one lasts approximately 4–6 months before a railway tunnel or station is achieved. If necessary, the diameter of the construction tunnels can be expanded.

In project alternatives ALT1a and ALT1b, the artificial island is located in Finnish territorial waters, some 15–20 kilometres from the coastline. Depending on the project alternative, the location will be either the Hramtsow shoal or Ulkomatala. In alternative ALT2, the existing islet at Uppoluoto would be expanded as necessary. The preliminary analysis of the Finest Bay Area concept (ALT1a and ALT1b) from the spring of 2018, which examined the possible locations for an artificial island, aimed at minimising the project's nature impacts as well as impacts on fisheries. A location of minimum natural value was sought for the artificial island, while taking account of fish spawning areas.

On the southern coast of Finland and the sea areas off the coast, the number of species and, thereby, biodiversity clearly reduce at depths exceeding 10 metres. The impacts of the project on mussel populations, for example, would be much less substantial if the artificial island were located in water with a depth of more than 10 metres, than in shallower water or near an islet sloping towards the surface. In the project area, mussels mainly inhabit depths of less than 10 metres, where they are preyed upon by various species of sea bird and fish.

If the artificial island is built in deeper water rather than a shoal, which is vital to the sea ecosystem, a new artificial reef will be created instead of a reef being destroyed, thereby promoting biodiversity in the open sea area. Artificial reefs are technologically sustainable and excellent results have been achieved in Danish sea areas, for example.



Source: A-insinöörit, Finest Bay Project, conceptual design of railway station

PARTICIPATE IN THE EIA PROCEDURE AND HAVE AN IMPACT ON THE DECISIONS

The best way to follow the project is to visit the Finest Bay Area website:

<https://finestbayarea.online/> and to follow the project on Facebook: Finest Bay Area Tunnel Project

The project's EIA programme is available for download at:

<https://finestbayarea.online/data>

The EIA liaison authority's official EIA project page contains the official form for submitting opinions and statements, and instructions on how to participate:

<https://www.ymparisto.fi/FinestBayAreaTallinnatunneliYVA>

Information is also being distributed via the Tunnel App for smartphones, which is available for download from the link below. The app also allows you to participate in a resident survey concerning the project. The results will be used in the environmental impact assessment.

<https://tunnelapp.finestbayarea.online/>

Get latest news about Tunnel project



Welcome to Tunnel App!

You can easily participate in the different phases of the Tallinn tunnel designing process.

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