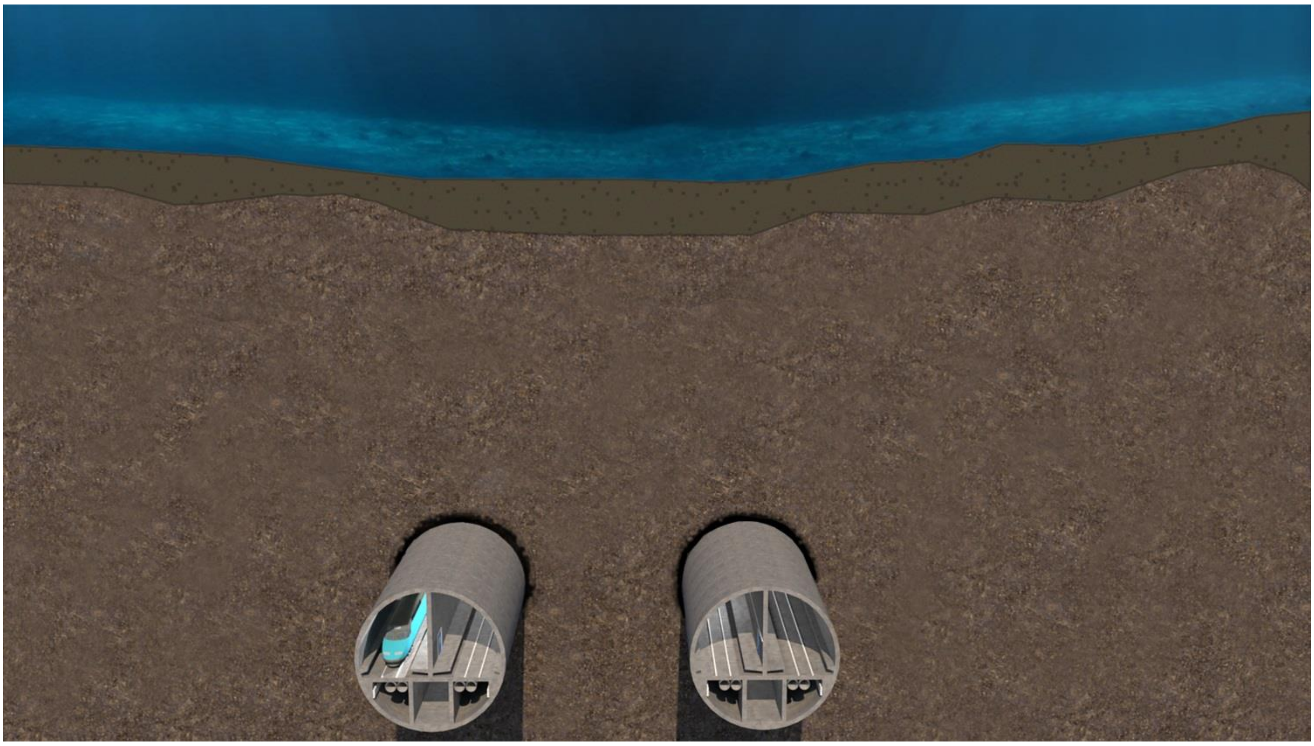
MARCH 2019

DOCUMENT CONCERNING THE PROGRAMME FOR TRANSBOUNDARY ENVIRONMENTAL IMPACT ASSESSMENT



Finest Bay Area Development Oy

Finest Bay Area - Railway tunnel between Finland and Estonia

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1 INTRODUCTION

Finland is a party to The Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention). It's aim is to promote cooperation between states and citizens' possibility to participate when a project planned in a certain country (the country of origin) is assessed to have possible adverse transboundary impacts in the territory of another country (the affected party). This document is a summary of the environmental impact assessment (EIA) programme intended for the international hearing pertaining to the Espoo Convention, that is, for the notification and the hearing of the affected parties' authorities and citizens.

Finest Bay Area Development Oy is planning to construct an undersea railway tunnel between Finland and Estonia. The project will significantly reduce the travel time between the countries. This summary presents the information on the project and its alternatives, the planning schedule, a plan on how the environmental impacts will be analysed in connection with this procedure and how the analyses are made as well as a plan on the arrangement of participation and public information. The EIA programme describes the current status of the environment in the alternative project areas from a Finnish perspective up to the boundary of the Estonian exclusive economic zone.

The figure (Figure 1-1) presents the route of the railway tunnel across its entire length in the different project alternatives. The alternatives pass through the Uusimaa region, Finnish territorial waters and the Finnish exclusive economic zone as well as the Estonian exclusive economic zone, territorial waters and Tallinn and Viimsi areas in Harju County.

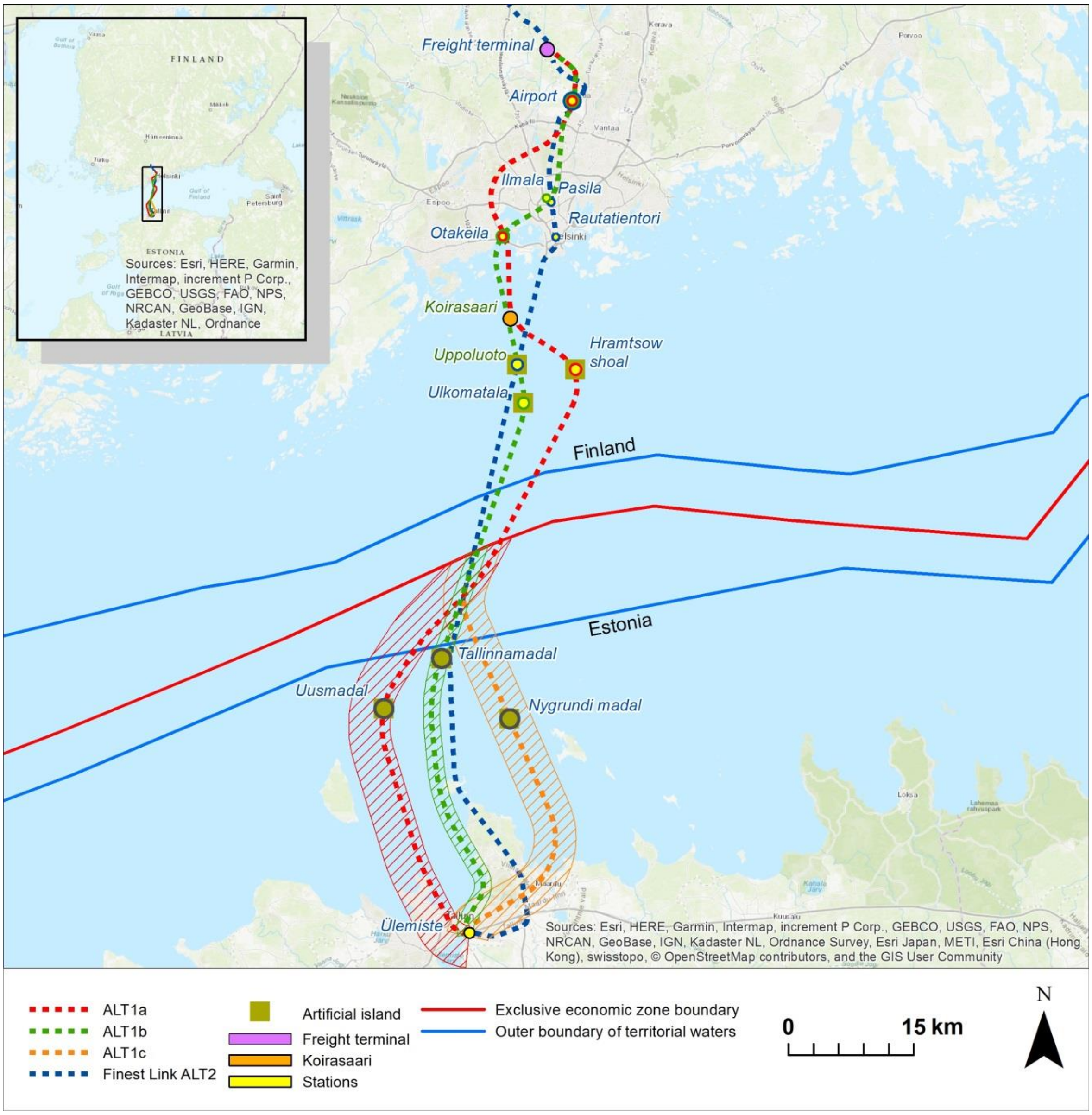


Figure 1-1. The route of the railway tunnel across its entire length in the different project alternatives.

The project's environmental impact assessment procedure is carried out in Finland and Estonia pursuant to the national legislation of both countries. Due to the project's international nature, the EIA procedure will also adhere to the Espoo Convention and the Bilateral Agreement on EIA between Finland and Estonia concerning transboundary environmental impact assessments.

In Finland, the need for the EIA procedure is stipulated by the EIA Act (252/2017, number/year) whose Appendix 1 lists the projects to which the environmental impact assessment procedure is applied. The need for an EIA procedure in this project is based on section 9) traffic, subsection d) construction of long-distance railways in the list of projects and subsection h) tunnels between Finland and Estonia. Furthermore, the need for an EIA procedure is based on the Agreement between the Government of the Republic of Finland and the Government of the Republic of Estonia on Environmental Impact Assessment in a Transboundary Context (51/2002, number/ year) and its Appendix 1, list of projects, section 7) Construction of motorways, express roads and lines for long-distance railway traffic and of airports with a basic runway length of 2,100 metres or more. Section 7) also covers tunnels between Finland and Estonia.

The Finnish EIA programme examines two technical solutions, Finest Bay Area (ALT1a and ALT1b) and FinEst Link (ALT2), which differ in terms of railway tunnel routing, the number and location of the stations, and the technical solutions used in the tunnel (tunnel size and number of tracks). In project alternatives ALT1a and ALT1b, the Finnish side of the railway tunnel route would run from the Airport via Otaniemi to an artificial island in the sea area off the coast of Helsinki, and in project alternative ALT2, the route would run from the Airport via Pasila and the centre of Helsinki to an artificial island in the sea area off the coast of Helsinki. On the Estonian side, four alternatives are being studied (ALT1a, ALT1b, ALT1c ja ALT2) and they would run to Tallinn based end station.

After the EIA programme stage, the project will proceed to the EIA report stage. In Finland, the goal is to complete the EIA procedure during 2019. The goal is to start the EIA procedure for Estonia during spring of 2018 and to advance it, in part, simultaneously with the Finnish EIA procedure.

1.1 A summary of matters concerning other countries

In addition to the impacts affecting Finland, the Finnish EIA procedure also assesses the project's possible significant adverse transboundary impacts on Estonia and other countries that will be notified and participate into the EIA of the project.

The assessment of transboundary impacts will be included in the EIA documentation.

The construction work relating to the project will mainly take place deep in the bedrock. Hydraulic construction in marine waters will be limited to the region of the service connection island and the planned artificial island. Furthermore, the project involves vessel traffic for the purpose of transporting rock material from the construction sites of railway tunnels, service connection tunnels and stations to be used elsewhere.

The possible transboundary impacts of the project may include the following, among others:

- Direct and indirect impacts related to dredging and rock material piling caused by the construction of the artificial island (increase in water cloudiness, solid matter and nutrient content)
- Possible impacts on ship traffic, shipping lanes, sea currents and ice conditions during the use of the artificial island
- The impact of the artificial island as a possible artificial reef and, thereby, the possible increase in biodiversity in the open sea area
- Impacts caused by crossing infrastructure (land and sea cables, main water lines, sewage lines and two NordStream gas pipelines)
- The traffic assessment will model the impacts on transboundary passenger and goods streams in rail, sea and air traffic using traffic forecast model.
- Disposal of any unexploded historical ordnance which may be found in surveys.

The scope and significance of any transboundary environmental impacts vary depending on their nature and the environmental conditions. For example, water quality modelling is used during environmental impact assessment report stage to determine to which extent dredging will cause water cloudiness and the dispersion of solid matter and nitrogen. Any possible transboundary impacts during operation will also be assessed (such as ship traffic, shipping lanes and the ice situation). The changes in currents caused by the artificial island are assessed by modelling the currents in the island's neighbourhood in the current situation and following the construction of the artificial island. The infrastructure intersection points will be defined in more detail as technical design advances, and the specified information will be presented in the environmental impact assessment.

According to preliminary estimates, the project's total transboundary impacts of activities during construction in Finland are relatively minor, and it is estimated that the impacts will be limited to the vicinity of the hydraulic construction sites (surroundings of the artificial island) within Finnish territorial waters.

The impacts on traffic during the project operation will extend beyond Finnish borders to Estonia, and they will be evaluated in the environmental impact assessment report stage. The traffic assessment will model the impacts on transboundary passenger and goods streams in rail, sea and air traffic using a traffic forecast model. The project's impacts are assessed at three levels: international, national and regional.

2 PROJECT DESCRIPTION AND ALTERNATIVES BEING CONSIDERED

2.1 Developer and background and purpose of the project

The Developer for all the project alternatives being considered is the Finnish company Finest Bay Area Development Oy.

The purpose of the project is to construct an undersea railway tunnel between Finland and Estonia in order to significantly reduce travel time between the countries. In the Developer's vision, the railway tunnel would merge the Helsinki region and Tallinn into a single metropolis. The region may develop into a hub connecting Asia and Europe, as the tunnel project opens the opportunity to take the train from Helsinki Airport directly to Tallinn as well as Helsinki.

Previously, 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. The FinEst Link regional development project's railway tunnel route of Airport–Pasila–Centre of Helsinki–Tallinn constitutes alternative ALT2 of this EIA procedure.

2.2 Project location and alternatives being considered

2.2.1 Project scope

The figure (Figure 1-1) presents the route of the railway tunnel across its entire length in the different project alternatives. The alternatives run in the Uusimaa region, in Finnish territorial waters and the Finnish exclusive economic zone as well as in the Estonian exclusive economic zone, territorial waters and, in the Harju province, in the Tallinn and Viimsi regions. The location alternatives for the tunnel route, station and service connection island located on the Estonian side will be assessed in the Estonian EIA procedure.

2.2.2 Project alternatives in Finland (ALT1a, ALT1b and ALT2)

The EIA procedure examines three different route alternatives in Finland (ALT1a, ALT1b and ALT2) and four route alternatives in Estonia (ALT1a, ALT1b, ALT1c and ALT2). This EIA procedure examines the impacts of the project in Finland up to the border of the Estonian exclusive economic zone. The location alternatives for the tunnel route, station and service connection islands on the Estonian side will be assessed in the Estonian EIA procedure. In addition, the transboundary impacts in both countries will be assessed.

Alternative ALT1a examines the railway tunnel's route from Helsinki Airport via Otaniemi to an artificial island constructed in the Hramtsow shoal and from there towards Tallinn. Alternative ALT1b examines the railway tunnel's route from Helsinki Airport via Ilmala and Otaniemi to an artificial island constructed in the Ulkomatala shoal and from there towards Tallinn. For alternative ALT1b, the possible traffic connection to Pasila is also considered. The assessment also considers a service connection that would be located in the Koirasaari region. However, the actual railway tunnel route will not run via Koirasaari; instead, it will pass by it at a distance of a few hundred metres.

Alternative ALT2 examines a railway tunnel route from Helsinki Airport via Pasila and the centre of Helsinki towards Tallinn. Alternative ALT2 does not include the construction of a habitable artificial island. The service connection would be built in the Uppoluoto region, where the existing islet would be expanded as necessary.

In the Finest Bay Area project alternatives (ALT1a and ALT1b), the railway tunnel route runs via Espoo, whereas in the FinEst Link alternative (ALT2) the route runs through the central railway station in the centre of Helsinki. In the Espoo location alternative, the connection from the railway tunnel to the existing traffic network would be built below the Otaniemi metro station. In the route alternative running via Helsinki railway station, escalators or lifts running below the central railway station would be used. In the route running via Espoo, the ascent to the station is significantly shorter than in the alternative located below Helsinki central railway station. In the project alternatives ALT1a and ALT1b, Otakeila station is located some 15–20 metres below the Keilaniemi station of the West Metro. In the FinEst Link alternative (ALT2) the route runs at an approximate depth of 70 metres at Helsinki central railway station.

All project alternatives also include the construction of a freight terminal north of Helsinki Airport with a railway connection. The route from the airport to the freight terminal is similar in all alternatives. The difference between the alternatives is that, in project alternatives ALT1a and ALT1b, the railway tunnel starts as an underground track at the airport, surfacing to the northeast of Myllykylä, Tuusula, some 300 metres east of the Tuusulanjoki river. In alternative ALT2, the route starts as an underground track that surfaces in Maantiekylä, Tuusula, immediately north of the airport.

Table 2-1. The implementation alternatives being examined.

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 ALT0+	Ferry traffic continues like today, but with updated forecasts as regards shipping routes and number of passengers.

The figure (Figure 2-1) presents the railway tunnel routes, stations and the locations of artificial islands and service islands on the Finnish side for the project alternatives.

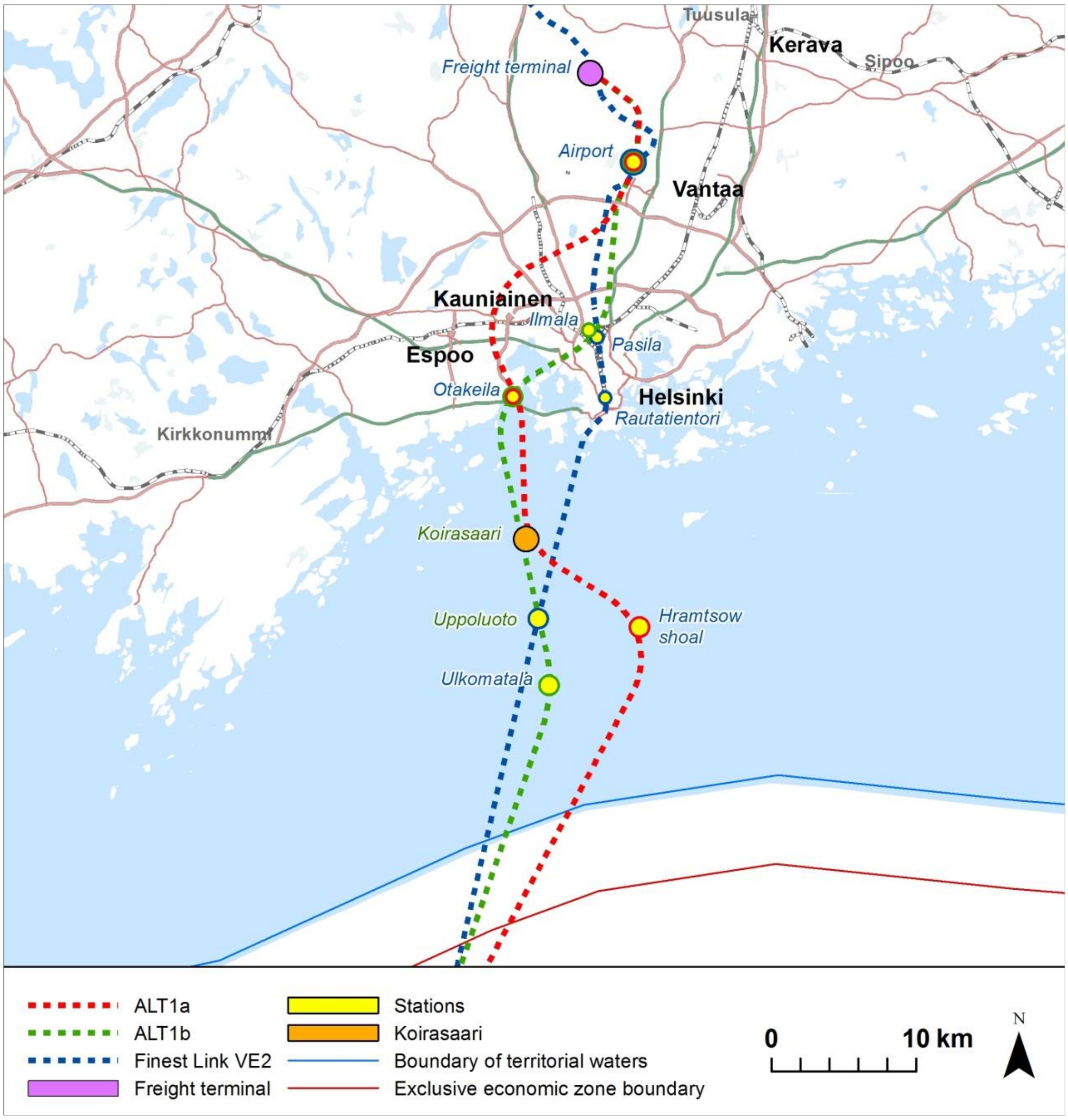


Figure 2-1. Railway tunnel routes, stations and the locations of artificial islands and service islands on the Finnish side for the project alternatives. The artificial islands are as presented separately in figure 1-1.

The length of the railway tunnel between Helsinki and Tallinn is some 100 kilometres. The alternatives considered in Finland are located within the cities of Helsinki, Espoo and Vantaa. In addition, the assessment examines the placement of a possible freight terminal at the border of the municipalities of Tuusula and Nurmijärvi. The alternatives run in the Uusimaa region, in Finnish territorial waters and the Finnish exclusive economic zone as well as in the Estonian exclusive economic zone, territorial waters and, in the Harju province, in the Tallinn and Viimsi regions. This EIA procedure examines the impacts of the project up to the border of the Estonian exclusive economic zone.

The EIA procedure also examines the following related projects:

- Construction of a freight terminal to the north of Helsinki Airport and a railway connection there

The following functions are not covered by this EIA procedure; however, they are described in the environmental impact assessment report on a general level:

- Track route from the freight terminal to the national railway system
- Any buildings and economic life that may appear on the artificial islands in the future
- The development of community structure and infrastructure in the vicinity of the stations possibly enabled by the project, such as the construction of new property, functions and traffic connections

2.2.3 Zero alternative (ALT0+)

In addition to the project alternatives, the EIA procedure also examines the zero alternative where the project is not undertaken. However, the assessment of the zero alternative takes into account, among other things, the development of the surrounding transport system and the improvement measures possibly required due to increased demand, due to which the expression ALT0+ has been chosen. The ALT0+ alternative is mainly based on the scenarios and traffic forecasts made in connection with the FinEst Lin project (*FinEst Link 2018*); however, the ALT0+ used in this EIA procedure is not completely identical to the one assessed in the Finest Link project.

The analyses indicate that the current ferry traffic capacity may be increased to meet increasing demand. However, it should be taken into account that capacity growth is limited by the limited size of the existing ferry fleet and traffic congestion in the areas close to the ports. In the future, the duration of the ferry trip may be reduced by modernising the equipment. The ALT0+ alternative in this EIA procedure is based on the current harbours Länsisatama, Eteläsatama, Katajanokka and Vuosaari. As regards ferries, the ALT0+ alternative uses a forecast of 14.1 million ferry passengers per year (two-way trip) and, for freight traffic, the Finnish Transport Agency's national sea traffic forecast that will be published in late 2018. The current ferry capacity has been considered to be sufficient the needs of the above passenger scenario. Capacity may be increased by increasing the size of the vessels or adding sailings. As regards freight traffic, the estimate is that the forecast increase in traffic does not require significant new investments (*FinEst Link 2018*).

2.3 Current transport network

2.3.1 Current availability of public transport

The current rail system in the Helsinki region consists of the main railway (Tampere direction), the Coastal Railway (Turku direction), the Kerava-Lahti Railway Line (Lahti direction), the Vantaankoski railway and the Ring Rail Line (Tikkurila–Vantaankoski) that connects it to the main railway (Figure 2-2). The track is maintained by the Finnish Transport Agency and the trains are operated by VR-Yhtymä Oy. The selection of passenger train traffic includes commuter trains and long-distance trains. The Helsinki and Espoo region also has a metro service that terminates in Itäkeskus and Mellunmäki in Helsinki and Matinkylä in Espoo. Tram service is also available in the central city area of Helsinki and Pasila. The metro and tram service is operated by HKL (Helsinki City Transport).

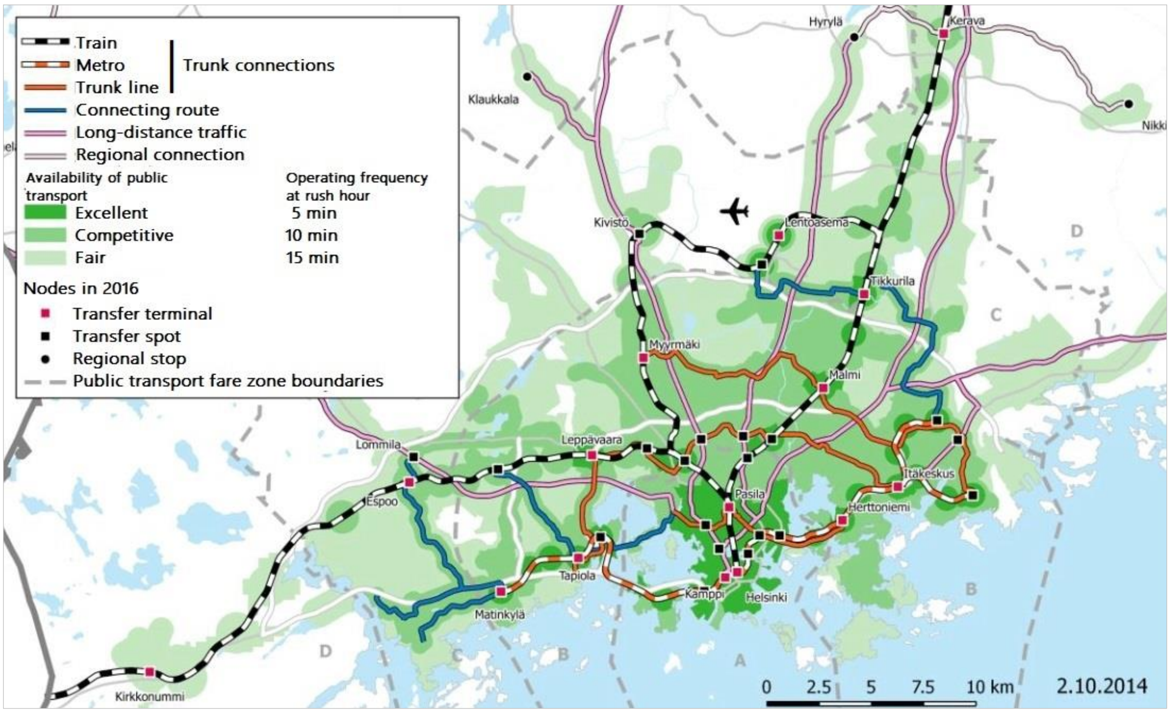


Figure 2-2. Trunk public transport network for the Helsinki region in 2016. Extract from the public transport strategy for the Helsinki region, 2015 *(Helsinki Region Transport 2014).*

2.3.2 Current road networks

Road traffic (freight and passenger traffic) from the Airport to the main roads runs along Lentoasemantie, Terminaalitie, Ilmakehätie, Tietotie, Junkersintie and Kiitoradantie. Lentoasemantie and Tietotie merge with Tikkurilantie to the south of the Airport. In the south, Lentoasemantie has an exit to Kehä III. In the east, Junkersintie connects to Tuusulanväylä. Kiitoradantie has an exit to Kehä III.

The railway connection closest to Helsinki Airport is the Ring Rail Line that runs in a tunnel below the Airport at a depth of approximately 40 metres. The stations in the Airport region are Aviapolis and Helsinki Airport.

Several shipping lanes managed by the Finnish Transport Agency and the Port of Helsinki run in the sea area near Koirasaari, Uppoluoto and the Ulkomatala and Hramtsow shoals. A 10.5-metre lane managed by the Finnish Transport Agency (Record no. 4193/1042/2014) runs to the north of Koirasaari, at a minimum distance of 500 metres. A 10.8-metre lane to the West Port of Helsinki (Record no. 506/1042/2012) runs to the east of Koirasaari, at a minimum distance of 3 kilometres. The lane ends at the West Port of Helsinki, in front of Jätkäsaari. The West Port lane also runs to the east of Uppoluoto and Ulkomatala. A 9.6-metre shortcut lane for passenger traffic to Helsinki (Record no. 115/76/2000) runs to the south of Ulkomatala, at a minimum distance of approximately 500 metres, and it is classified as a class 1 shipping lane for VL1 merchant shipping. The lane connects to the Helsinki West Port lane. A 9.6-metre lane managed by the Finnish Transport Agency (Record no. LIVI/999/06.02.02/2015) terminating at West Port runs between Ulkomatala and the Hramtsow shoal. An 11-metre lane managed by the Finnish Transport Agency (Record no. 3233/1042/2011) terminating at the Port of Vuosaari runs to the east of Hramtsow shoal, at a distance of approximately 7 kilometres. The sea shipping lanes near the project area are shown in the figure (Figure 2-3).

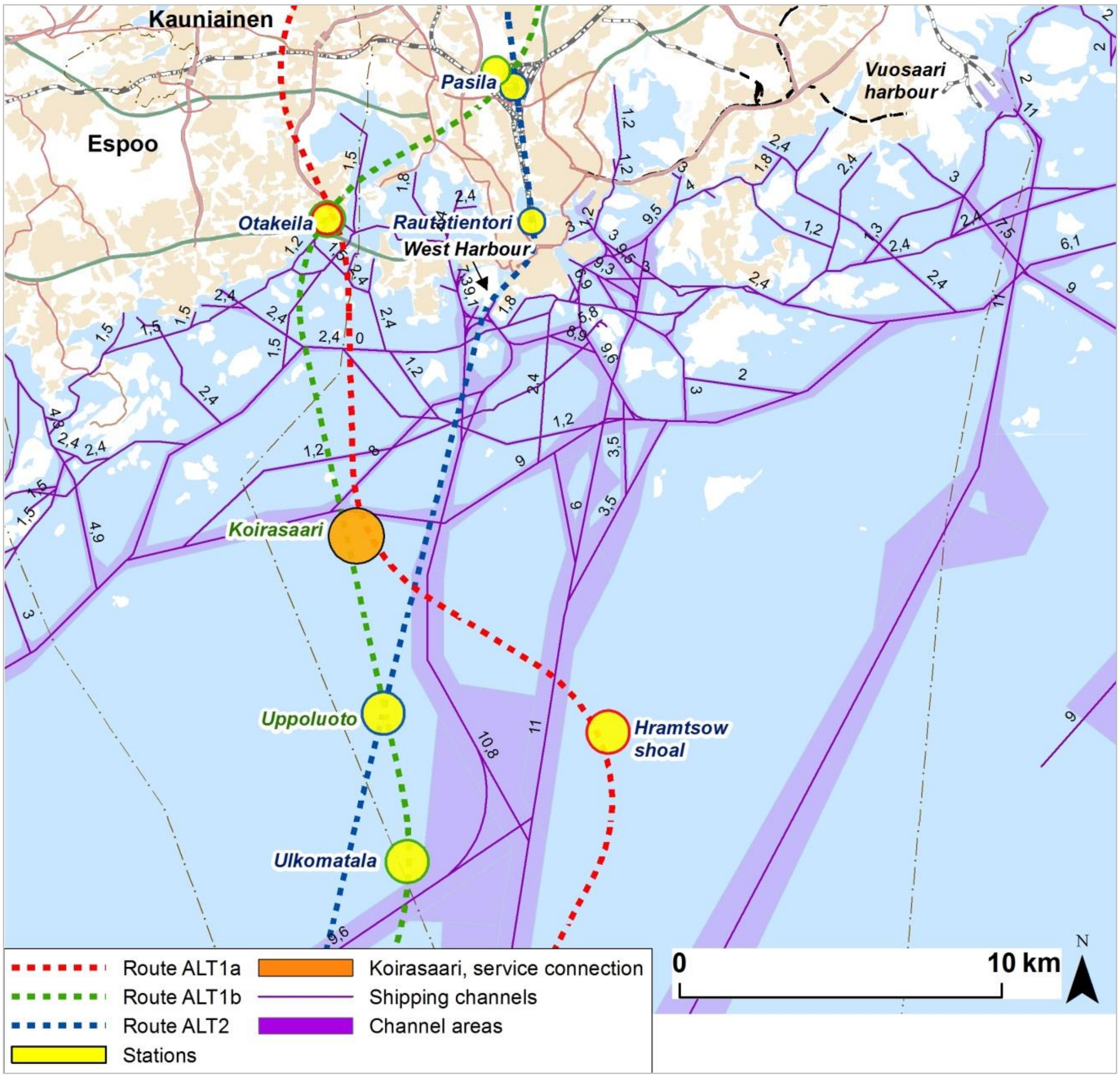


Figure 2-3. Shipping lanes in the sea area and the largest ports in the vicinity of the project area.

A large number of ships operate on the Gulf of Finland each year. Shipping lanes with regular traffic cross each other near the alternative locations for the artificial islands to be constructed for the purposes of the project at a minimum distance of some 500 metres. Most of the commercial traffic in the Gulf of Finland follows the Traffic Separation Scheme (TSS). Marine traffic in the Gulf of Finland is supervised by the marine traffic centres in Helsinki, Tallinn and St Petersburg as part of the mandatory ship reporting system for the Gulf of Finland (GOFREP). All ships with a gross tonnage (GT) above 300 are required to follow the system.

Analysing the data from the Automatic Identification System (AIS) provides more detailed information on the ship traffic crossing the Gulf of Finland. AIS is used for information exchange between ships as well as between ships and land stations. The AIS system allows ships to see the positions, routes and speeds of other ships as well as the risks of collision.

The International Maritime Organisation (IMO) has decided that all ships with a gross tonnage (GT) above 300 must be equipped with class A AIS transmitters by the end of 2004. However, military ships are the exception and the system is not required for them. In recent years, the completely voluntary AIS class B transmitters have become more common in smaller ships (less than 300 GT). (*Ramboll 2013*)

The density of ship traffic on the nearest lanes will be analysed and the detailed information will be presented in the environmental impact assessment report. The below figure (Figure 2-4) presents, by way of example, a map of the Gulf of Finland created in connection with the Balticconnector natural gas pipeline project in 2013, based on data from 2012 (*Ramboll 2013*).

The areas indicated in yellow have a low ship density, whereas in the green areas, the annual number of ships exceeds 1,500. The figure shows that the most part of ship traffic follows the Traffic Separation Scheme when arriving in or departing the Gulf of Finland. Ship traffic density is also high to the east of the planned Balticconnector gas pipeline, which would also be the location of the artificial islands planned in this project.

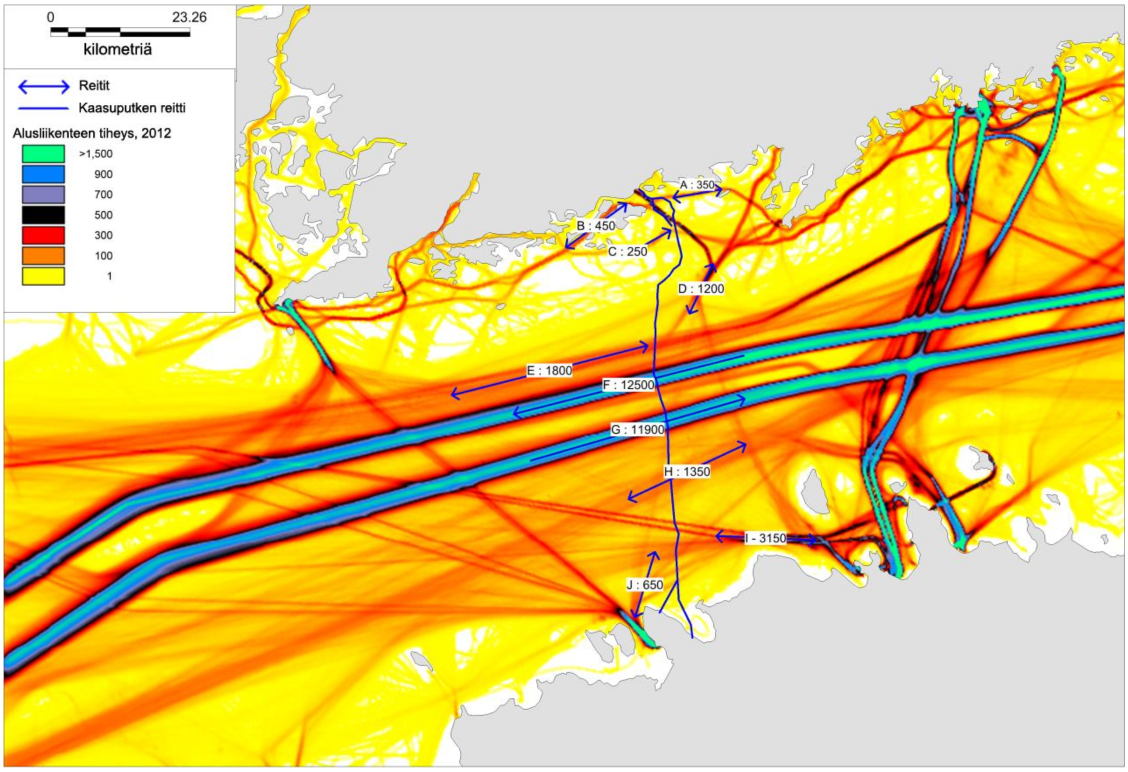


Figure 2-4. Ship traffic density figure from the Gulf of Finland. The model was created during the EIA procedure for the Balticconnector natural gas pipeline. The figure shows the route of the Balticconnector natural gas pipeline. The railway tunnel route for this project is located some 30 km to the east. The source is the AIS system data from 2012. Source: *Ramboll 2013*

2.4 Interfaces with other projects

The project is related to the FinEst Link project that analysed the feasibility of constructing a tunnel between Helsinki and Tallinn. The railway tunnel route of the FinEst Link project is included in this EIA procedure as project alternative ALT2. As regards the FinEst Link project, no additional design work or analyses have been undertaken for purposes the EIA programme; instead, the existing design documentation has been utilised as is.

According to the calculations of the FinEst Link project, 13 million people would use the tunnel for travel each year, alongside 11 million people using ferries. The amount of transported goods is also forecast to grow substantially. According to the calculations made by the FinEst Link project, by 2050, both the tunnel and ferries would carry 4.2 million tonnes of freight each year, both ways, amounting to 8.4 million tonnes in total. In 2017, the amount of freight carried by sea amounted to some 3.8 million tonnes in total (2 million tonnes from Finland and 1.8 million tonnes from Estonia). (*FinEst Link 2018*)

In other words, the tunnel is expected to double, even triple passenger and freight traffic over the next thirty years. Estimates indicate that ferry traffic will also increase even if the tunnel is built. However, some ferry passengers, an estimated 3.5 million people per year, will switch to using the tunnel. The number of fast ferry connections will likely decline after the tunnel is completed. The figure (Figure 2-5) presents the estimated changes in tunnel and ferry passengers in 2015–2050. (*FinEst Link 2018*)

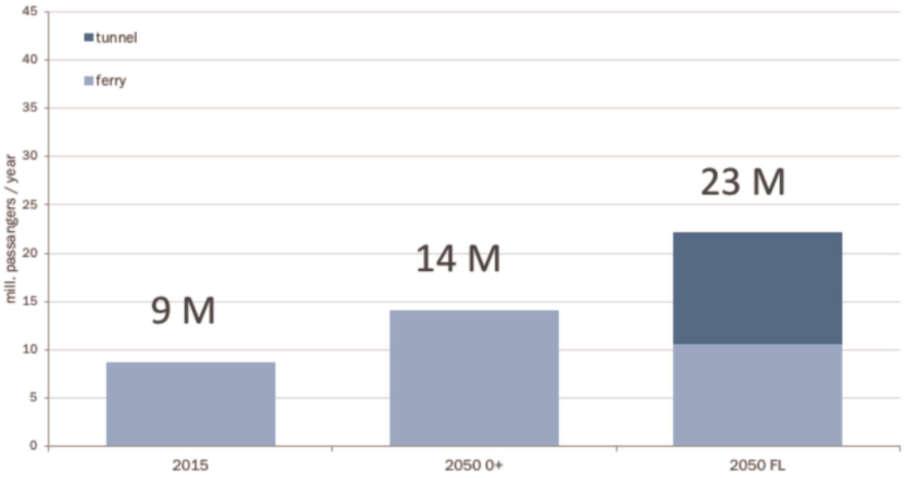


Figure 7.2 *Comparison of passenger volumes*

Figure 2-5. Estimated changes in tunnel and ferry passengers in 2015–2050, taking into account the construction of the railway tunnel. Extract from the Finest Link Feasibility Study report *(FinEst Link 2018)*

The environmental impact assessment concerning plans and programmes (SEA) of the FinEst Link project recommended a railway tunnel route that would run north of Helsinki Airport and end at Ülemiste in Estonia, where the Rail Baltica railroad from Poland will be built by 2025. The through stations on the Finnish side would be Pasila, Helsinki central railway station and Uppoluoto.

3 STARTING POINT OF THE ASSESSMENT PROGRAMME

EIA programme examines the planned railway tunnel's preliminary route from Finland to Estonia and the related route alternatives in Finland and Estonia. The Finnish EIA programme presents the railway tunnel's examined route alternatives up to Estonia. However, it does not discuss the location alternatives for the tunnel, service connection island or station in detail.

EIA programme is available online at:

www.ymparisto.fi/FinestBayAreaTallinnatunneliYVA

https://finestbayarea.online/about

3.1 Content of the EIA programme

The EIA programme presents:

- a description of the project including the project schedule and the relationship of the project with other projects;
- a description of the technical data relating to project planning, construction and operation;
- a description of the EIA procedures carried out in Finland and Estonia taking into consideration the requirements of Espoo Convention and the bilateral agreement between Finland and Estonia especially in relation to the international consultations, meaning the notification and the hearing of the affected parties' authorities and citizens;
- the licenses, permits, plans and decisions required for the project;
- the key plans and programmes relevant to the project concerning the use of natural resources and environmental protection, including national target programmes and international commitments;
- the details of the project's preliminary analysis and the alternatives examined in the EIA procedure;
- a description of the current state of the environment;
- the outset of the impact assessment carried out in the EIA report stage and scoping, significance and extent of the assessed environmental impacts in general;
- the assessment methods and details on the competence of the experts responsible for the assessments;
- a description of interaction and participation during the EIA procedure.

3.2 Impacts being assessed in the EIA procedure

Environmental impact means the direct and indirect impacts in Finland and outside its territory of a project or activity on:

a) the population, human health, living conditions and amenity;

b) the land, soil, water, air, climate, flora, organisms and biodiversity, in particular the species and habitats protected by Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora and by Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds;

c) the urban structure, tangible assets, landscape, townscape and cultural heritage;

d) the utilisation of natural resources; and

e) the interaction between the factors referred to in subparagraphs a-d.

In addition to the impacts during operation, the environmental impact assessment takes into account 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 impacts of the zero alternative (ALT0+, project not implemented) are also assessed.

The environmental impact assessment procedure assesses the environmental impacts of activities in the project area and those that extend outside of the area. Traffic related to construction and operation is an example of activities extending outside of the project area.

The impact assessments will also describe the related uncertainties, measures taken to prevent and mitigate adverse effects, and plans for the monitoring of environmental impacts and any further measures following the EIA procedure. Both environmental impact assessment reports will include a separate section discussing transboundary impacts.

The following methods, among others, will be used in the environmental impact assessment:

- analysing existing data
- examining the results of existing geotechnical and environmental studies
- geotechnical studies of the tunnel’s route alternatives (acoustoseismic sounding)
- new field studies conducted in the surroundings of the service connection island and alternative locations of artificial islands
- negotiations with authorities and other parties
- modelling the spread of environmental impacts
- expert assessment.

The Developer will determine the assessment methods for the EIA report taking into account the requirements for national assessment methods. Appropriate impact assessments for Natura 2000 areas will be conducted in connection with the EIA procedure and will be enclosed to the EIA report.

3.3 Determing the examined and affected areas in the Finnish EIA procedure

An environmental impact assessment examines the environmental impacts of the activities in the project area and the related activities extending out of the project area during construction, operation and decommissioning. Activities extending outside of the project area include, for example, the development of traffic and infrastructure near the stations and the artificial island, made possible by the railway tunnel; these are described at a general level.

In this context, the examined area means the area determined for each impact type within which the environmental impact in question is studied and assessed. The size of the examined area depends on the environmental impact being studied. For example, the impacts of noise are examined at a distance of approximately 2 kilometres, and impacts on water systems along a distance of some 10 km.

Environmental impacts are examined across a substantially larger area than the anticipated affected area. Efforts have been made to make the area so large that no significant environmental impacts can be assumed to occur outside the area. If, however, it should come to light during the assessment that an environmental impact has a broader affected area than anticipated, the sizes of the examined and affected areas will be redefined for the impact in question. As a result, the actual definition of the affected areas is done in the environmental impact assessment report based on the completed assessments. The following preliminary affected areas have been defined for environmental impacts:

- Marine environment: 10 kilometres in the neighbourhood of the artificial island and service connection island
- Bird fauna: 5 kilometres in the neighbourhood of the artificial island and service connection island
- Landscape: 15 kilometres in the neighbourhood of the artificial island and service connection island
- Urban structure: 15 kilometres in the neighbourhood of the artificial island and service connection island
- The impacts on traffic are assessed at three levels: international, national and regional.

3.4 Assessment of the significance of the impacts

The scope and significance of the environmental impacts are determined depending on the nature of the receptor. Some of the impacts only focus on the local environment, while others may affect broad national areas.

In this context, the examined area means the area determined for each impact type within which the environmental impact in question is studied and assessed. The underlying idea was to define such a large area that no significant environmental impacts can be assumed to occur outside it. The direct impacts extend to the vicinity of the railway tunnel and onshore activities.

3.5 Studies and surveys conducted during the project and other surveys employed in the assessment

3.5.1 Preliminary analysis for the location of the artificial island

The artificial island in project alternatives ALT1a and ALT1b will be located inside Finnish territorial waters, at a distance of some 15–20 km from Helsinki, in the Hramtsow or Ulkomatala shoal. In alternative ALT2, the planned location of the artificial island is on the Uppoluoto island/shoal. The location of the artificial island pursuant to ALT2 was chosen during the pre-planning stage of the FinEst Link project.

The pre-feasibility study stage that preceded the project's EIA procedure in the spring of 2018 included the selection of an optimal location for the artificial island in relation to the ALT1a and ALT1b project alternatives. Alternatives ALT1a and ALT1b looked for shoals with an average water depth of more than 10 metres. The preliminary analysis used existing documentation to survey the natural values and key fishing areas of open sea areas in Kirkkonummi, Espoo and Helsinki as well as sea birds based on bird analyses.

As regards bird fauna, the most important task was the identification of important feeding areas (shoals) for the long-tailed duck (Clangula hyemalis), eiderduck (Somateria mollissima), black guillemot (Cepphus grylle) and other waterbirds relevant in terms of protection, and to look for population data in the literature and other existing documentation. For bird fauna, on-site surveys in the form of bird counting were also carried out during the spring, summer and autumn of 2018. As regards fish populations, it was important to determine the key spawning and feeding areas in the open sea as well as important areas for fisheries based on existing information. Underwater nature locations of special value were determined based on existing information.

The purpose of the pre-feasibility study was to minimise the environmental impacts of the project and its impact on fisheries; in other words, to find a location for the artificial island that has a minimum of special natural value, taking into account fish spawning areas.

3.5.2 Separate studies

The following studies 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
- Continued bird fauna 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)
- Creation of a traffic forecast by modelling

As regards the above studies, the underwater archaeology surveys, diving surveys of the marine environment, seabed quality studies and probing, seabed fauna studies and bird fauna studies have mainly been completed in the summer and autumn of 2018. The aim has been to perform the studies across a sufficiently large area in order to avoid new requirements in relation to the water permit stage following the EIA report stage. However, further studies related to the permit stage are not ruled out for the open water season of 2019, since the authorities will only officially comment on the separate studiesin the statement and justified conclusion of the EIA programme and the EIA report.

3.6 Assessment of transboundary impacts

The EIA procedure also covers the assessment of the project’s possible significant adverse transboundary impacts on Estonia as well on any other potentially affected party. The EIA report contains a separate chapter on transboundary impacts (including impacts on ship traffic). The assessment describes the likely significant transboundary impacts.

The impact assessment will utilise the EU guide "*Guidance on the Application of the Environmental Impact Assessment Procedure for Large-scale Transboundary Projects*" (http://ec.europa.eu/environment/eia/pdf/Transboundry%20EIA%20Guide.pdf). This guide will be used in the assessment of the project's total transboundary, direct and indirect impacts. 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 possible transboundary impacts of the project may include the following, among others:

- Direct and indirect impacts related to dredging and rock material piling caused by the construction of the artificial island (increase in water cloudiness, solid matter and nutrient content)
- Possible impacts on ship traffic, shipping lanes, sea currents and ice conditions during the use of the artificial island
- The impact of the artificial island as a possible artificial reef and, thereby, the possible increase in biodiversity in the open sea area
- Impacts caused by crossing infrastructure (land and sea cables, main water lines, sewage lines and two NordStream gas pipelines)
- The traffic assessment will model the impacts on transboundary passenger and goods streams in rail, sea and air traffic using a traffic forecast model.Disposal of any unexploded historical ordnance which may be found in surveys.

The scope and significance of the environmental impacts varies depending on their nature and the environmental conditions. Direct impacts are caused in the neighbourhood of the artificial island due to, among other things, the destruction of zoobenthos caused by dredging and rock material placement. Direct seabed modification work is focused on the area of the artificial island, which has a planned area of some 1–3 km^2 and, possibly, the area where the pier is built on the service connection island. Indirect impacts, such as temporary water cloudiness, will spread across a wider area depending on the location of the dredging, the quality of the seabed and the flow of water, among other things. The dispersion of the solid matter rising to the surface due to dredging depends, in particular, on the particle size of the sediment; finer material will more easily float with the water and spread wider, whereas coarser material will settle more quickly in the area surrounding the worksite.

Loads during construction are caused by the resuspension of the seabed sediment due to the construction work and, possibly, the suspension of the fine-grained material contained in the rock used for construction. The construction material may also have soluble substances, such as nitrogen left over from explosives. The artificial island is constructed from broken rock as well as rock and soil accumulated during the digging of the railway tunnel or transported from elsewhere. The material used for construction is likely to be neutral, which means that decomposition will be slow and no significant amounts of harmful substances or nutrients will dissolve into the water from the rock.

Dredging will cause the resuspension of the seabed sediment and result in sediment loads. The sediment may contain phosphorus, nutrients and oxygen-consuming material as well as organic and inorganic harmful substances.

Water quality modelling will be used to assess the resuspension of the sediment and the dispersion of fine-grain material and nitrogen during construction. The loads caused by dredging, piling, embankment and filling are assessed on the basis of the volume being dredged, the quality of the seabed and the working methods employed, after which migration modelling will be used to mathematically assess the migration of the materials. The modelling will be performed similarly to flow modelling, either for static situations or a unified calculation period.

The dredged amounts, dredging methods, concentrations of nutrients and harmful substances in the sediment and piling locations needed for the modelling will be analysed further at the EIA report stage.

Typically, in connection with seafloor dredging operations, the effects of water cloudiness and the dispersion of solid matter have been observed up to 1 to 5 km from the project site. 10 NTU is generally considered as the limit for water cloudiness visible to the naked eye, which is usually observed at approx. 100 m from the site. Mild water cloudiness is observed up to 1 to 2 km around the site and water cloudiness that is difficult to observe occurs up to 3 to 5 km around the site. (Lindfors & Kiirikki 2007, Kiirikki & Lindfors, Inkala 2008).

On the Finnish coast, the construction of the artificial island is planned at a location where the cross-section of the Gulf of Finland is fairly large compared to the smallest cross-section across the entire bay, which means that constructing an artificial island along the straight cross-section south from Otaniemi is not likely to limit water flow across the entire bay. Therefore, the impacts on currents caused by the island will most likely be local, in which case clear changes in flow rates or directions will extend to some 5 km from the island's shore.

The changes in currents caused by the artificial island are assessed by modelling the currents in the island's neighbourhood in the current situation and following the construction of the artificial island. The model needs to include a larger water area, such as the Gulf of Finland to the east of Hanko, and the changes in water height caused by the Baltic Sea's main basin must also be taken into account. The resolution of the calculation model in the island's nearby areas should be some 100–200 m or better. A 3D model that takes into account the layered salinity and temperatures should be used for the modelling. The model calculations are made without the artificial island and with the island in place; calculating the difference between the values provides an estimate of the changes caused by the island. The estimates are prepared either for static scenarios, including both summer and winter, or by using a simulation period covering at least one year, which is then used to output the changes as monthly averages or as an average of periods representing suitable typical conditions.

Depending on the location, the thermocline may extend to a depth of up to 20 metres in the Gulf of Finland. The halocline is typically at a depth of 50–60 m. The target area has a maximum depth of approx. 30 m, which is clearly above the halocline. Therefore, no impact on the halocline is expected. As regards the thermocline, the island may cause the mixing of the temperature layers in the water. Any changes to the layers of salinity and temperatures can be determined from the results of the flow calculations by comparing the results of the current and planned scenarios.

The flow change may cause some mixing of the water layers, in which case the concentrations in the different layers are mixed and the water with a higher nutrient content from the deeper layers may become partially mixed with the surface water. However, the changes in water quality caused by the flow changes are likely to be relatively minor.

A water quality model is used to assess the magnitude of the water quality changes caused by the flow changes in terms of overall nutrient concentrations. For the purposes of the modelling, it is important that the calculation results and measurement results for the nutrient concentration levels at different depths correspond to each other. The model takes into account the most important point loads and rivers in the nearby areas, while nutrient concentrations arriving from further away are assessed as background concentrations. Water quality is calculated for the current and planned scenarios. The change in water quality can be determined by comparing the calculation results from the present scenario to the results that include the artificial island.

The impact of the artificial island on the ice situation is likely to be relatively small. Most likely, the impact of an individual island will be seen as a slight extension to the ice coverage period in the area near the island's shore, as the island ties the ice field together and reduces the impact of waves on the edge of the ice.

Changes to the ice situation are assessed by selecting an existing island on the Gulf of Finland that is as similar to the artificial island as possible and assessing the impact of this island on the ice situation by using ice information measured from satellite images. By assuming that the impact on the ice situation of the artificial island and the existing island is similar, the likely impact of the artificial island can be assessed by using the data for the selected island. Ice data based on satellite images is available at a resolution of 500 x 500 metres, which means that minor changes in the ice situation cannot be assessed by means of this method.

The impacts on the ice situation can also be assessed by using a combination of the flow model and ice model. When using the model, its functionality must be ensured by comparing the calculation results to the ice situation measured from the satellite images.

The biodiversity in the area consists of aquatic plant species, the zones formed by them and the invertebrate zoobenthos occurring within these zones. The impacts during the construction and operation of the project are examined as expert assessments by looking at those changes in environmental factors that are the most important in determining the biodiversity in the area. The examination considers both the shore zone in the artificial island and service connection island and the deeper waters of the open sea near the water system work related to the project area.

The impacts of the project on the sea area's fauna and flora are assessed, in terms of any transboundary impacts, on the basis of the project's load data and water system impact estimate as well as experience from other similar projects. The examination and assessment of the project's impacts is focused on perennial colonies which are considered important in terms of natural values and diversity.

Species information is corrected from the nearby areas of the artificial islands and service connection island by surveying the fauna and flora of the hard and soft seabed areas. The surveys are performed using applicable methods, such as scuba diving and zoobenthos sampling in soft seabed areas. The field surveys use experienced research divers and certified samplers.

Geological sounding, low-frequency sounding, sediment sampling and benthos sampling will be conducted in alternative locations of the artificial island in order to obtain an overview of the seafloor quality, depths and zoobenthos in each area.

Any possible transboundary impacts during operation will also be assessed (such as ship traffic, shipping lanes and the ice situation). The changes in currents caused by the artificial island and any resulting indirect impacts on lanes are assessed by modelling the currents in the island's vicinity in the current situation and following the construction of the artificial island. The traffic assessment will model the impacts on transboundary passenger and goods streams in rail, sea and air traffic using a traffic forecast model.

Construction-time impacts on traffic are examined by estimating the volume of transport generated by the construction of the tunnel (such as the volume of broken rock and transport of materials) and the routes used for the transport. The impact assessment takes into account the possible different forms of transport (road, railway and ship transport). As regards road traffic, the increased traffic towards the railway tunnel construction sites, as both personnel traffic and heavy traffic, is taken into account. The impacts on the operation of the main roads, the Ring Rail Line and the airport are observed in particular. The proportion of any possible railway or ship transport during construction is assessed based on the information received from technical design. The assessment of traffic impacts during construction also includes an assessment of the impacts of increased traffic on marine traffic during the different stages of the work. The impacts on traffic safety and traffic flow during construction are also taken into account. Special attention is paid to any possible sensitive locations along the transport routes, such as housing, day-care centres and recreational areas. Furthermore, the assessment takes into account any indirect impacts on human comfort (such as noise, air pollution and traffic safety). If necessary, a separate analysis may be drawn up regarding the placement/guidance of traffic during construction and the mitigation of the traffic's impacts.

Impacts after project completion are assessed based on the transport system changes included 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 are assessed at three levels: the international, national and regional. At the international level, the project's impacts on passenger and goods streams crossing Finnish borders in rail, sea and flight traffic are assessed. At the national level, the impacts on national passenger and goods streams in road, rail and flight traffic are assessed. At the regional level, impacts are assessed on the passenger and goods steams in road and rail traffic and, as regards passenger traffic, in pedestrian and bicycle traffic due to feeder traffic and changes in methods of mobility. The actual impacts (time and costs impacts, other traffic impacts and external impacts, traffic safety, emissions, noise and space requirements) are assessed on the basis of the traffic demand estimates. At all levels, the convergence of the network and the sufficiency of the capacity are assessed following the changes in means of transport and routes caused by the project. The actions required on the rest of the transport network following the project in order to ensure the necessary level of service and to control the negative external impacts are assessed at the same time.

All railway routes cross with the Nord Stream 1 and 2 gas pipelines. The railway tunnel route runs at a depth of 100 metres in the sea area and the Nord Stream gas pipelines run at the bottom of the sea; therefore, these functions are located at different depths. Furthermore, the railway tunnel routes cross with several earth and subsea cables, trunk water pipelines and sewage lines. The crossing points will be defined in more detail as technical design advances, and the specified information will be presented in the environmental impact assessment report.

3.7 Mitigating adverse effects and monitoring of impacts

The assessment will include identifying the opportunities for preventing and restricting the adverse effects from the project through design and implementation. An account of the mitigating measures is presented in the environmental impact assessment report.

According to the Environmental Protection Act, the operator must be aware of the environmental impacts of its operations. In connection with the process for examining the impacts, a proposal for the environmental impact monitoring programme will be included in the environmental impact assessment report. The purpose of monitoring is to:

- provide information on the project’s impacts
- determine which changes will result from implementation of the project
- determine how the impact assessment results compare to the reality
- determine how successful the mitigation of adverse effects has been
- trigger the necessary measures in case of significant unforeseen adverse effects.

A more detailed environmental impact monitoring programme will be presented later in connection with the water permit application.

4 EIA PROCEDURE

4.1 Transboundary EIA procedure

The undersea railway tunnel enables railway traffic between Finland and Estonia. The need for an EIA procedure is based in Finland on the Act on Environmental Impact Assessment Procedure (hereinafter referred to as the "EIA Act"). Because the Finest Bay Area tunnel project has an international dimension, there are two primary international procedures to be followed:

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

4.1.1 Espoo Convention

Environmental impact assessment in a transboundary context is covered by the Espoo Convention (*Convention on Environmental Impact Assessment in a Transboundary Context*). Finland ratified this general convention of the UN Economic Commission for Europe in 1995. The convention entered into force in 1997. In Finland, the obligations of the convention have been enacted by means of the EIA Act and the Decree on the enactment of the General Convention on Environmental Impact Assessment in a Transboundary Context.

The parties to the convention are entitled to participate in an environmental impact assessment procedure being carried out in another country if the adverse environmental impacts of the project being assessed may affect the country in question (hereinafter referred to as the "Affected Party"). The Finest Bay Area tunnel project is included in the activities of Appendix I, section 7a of the Espoo Convention (construction of lines for long-distance railway traffic), wherein international hearing is necessary if the project is likely to have significant, adverse transboundary environmental impacts.

The environmental authorities of the project's country of location (Party of Origin) notify the environmental authorities of the Affected Parties of the starting of the EIA procedure for the project and enquire about their willingness to participate in the EIA procedure. If an Affected Party decides to participate in the procedure, it makes the project documentation submitted by the Party of Origin available for public viewing in order to gather opinions. The environmental authority of the Affected Party collects the opinions and submits them to the Party of Origin.

The competent Finnish authority in the international consultation in compliance with the Espoo Convention is the Ministry of the Environment. The environmental authority submits the received opinions from the Affected Parties to the national EIA competent authority for the EIA procedure, which will then take the provided opinions into account in its statement.

4.1.2 Bilateral agreement on EIA between Finland and Estonia

In addition to the Espoo Convention, Finland and Estonia have a bilateral agreement concerning environmental impact assessment in a transboundary context. The agreement was signed on 21 February 2002 in order to improve bilateral cooperation during environmental impact assessment. The bilateral agreement between the Government of the Republic of Finland and the Government of the Republic of Estonia on Environmental Impact Assessment in a Transboundary Context entered into force on 6 June 2002.

The obligations in the EIA agreement between Finland and Estonia concerning the environmental impact assessment for projects are largely similar to those in the Espoo Convention. Furthermore, the agreement contains a provision on the establishing of an environmental impact assessment commission (EIA Commission). Both parties have appointed six members for the committee. The EIA Commission convenes at least once per year. The EIA Commission has an advisory role and acts as a forum for information exchange and dispute settlement. More detailed tasks are described in Article 6 of the Agreement.

By virtue of Article 14 of the Convention, the competent authorities of the Parties are entitled to agree to carry out a joint environmental impact assessment (Joint EIA) within the framework of their national legislation. The Finest Bay Area tunnel project proposes separate documents for Finland and Estonia that assess the transboundary impacts for both countries. However, the aim is to perform environmental impact assessment simultaneously and in cooperation between EIA experts in both countries, whenever possible.

In August 2018, the EIA Commission for Finland and Estonia decided to establish a dedicated workgroup for the Finest Bay Area tunnel project, known as the Ad hoc working group. Ad hoc group is an advisory body for the project with a mandate to oversee and follow up the transboundary EIA and SEA of the Finest Bay Area tunnel. The working group will convene approximately once per month during the project's EIA and land use planning procedures.

4.2 EIA procedure in Finland

4.2.1 Goal and contents of the EIA procedure

The environmental impact assessment procedure (EIA procedure) is stipulated by law. In Finland, it is regulated by the EIA Act and Decree. The legislation regarding the environmental impact assessment procedure was renewed in May 2017. The EIA procedure is applied to projects and changes to projects that are likely to have significant environmental impacts (EIA Act, Appendix 1).

The goal of the EIA Act is to promote environmental impact assessment and the consistent consideration of the assessment during design and decision-making. Similarly, the goal is to improve access to information and participation opportunities for all 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. Authorities may not give permission to execute the project or make any comparable decisions before the assessment is complete. The EIA procedure does not involve decisions concerning the project; its goal is to provide information to support decision-making.

The key stages of the EIA procedure are presented in 4-1.

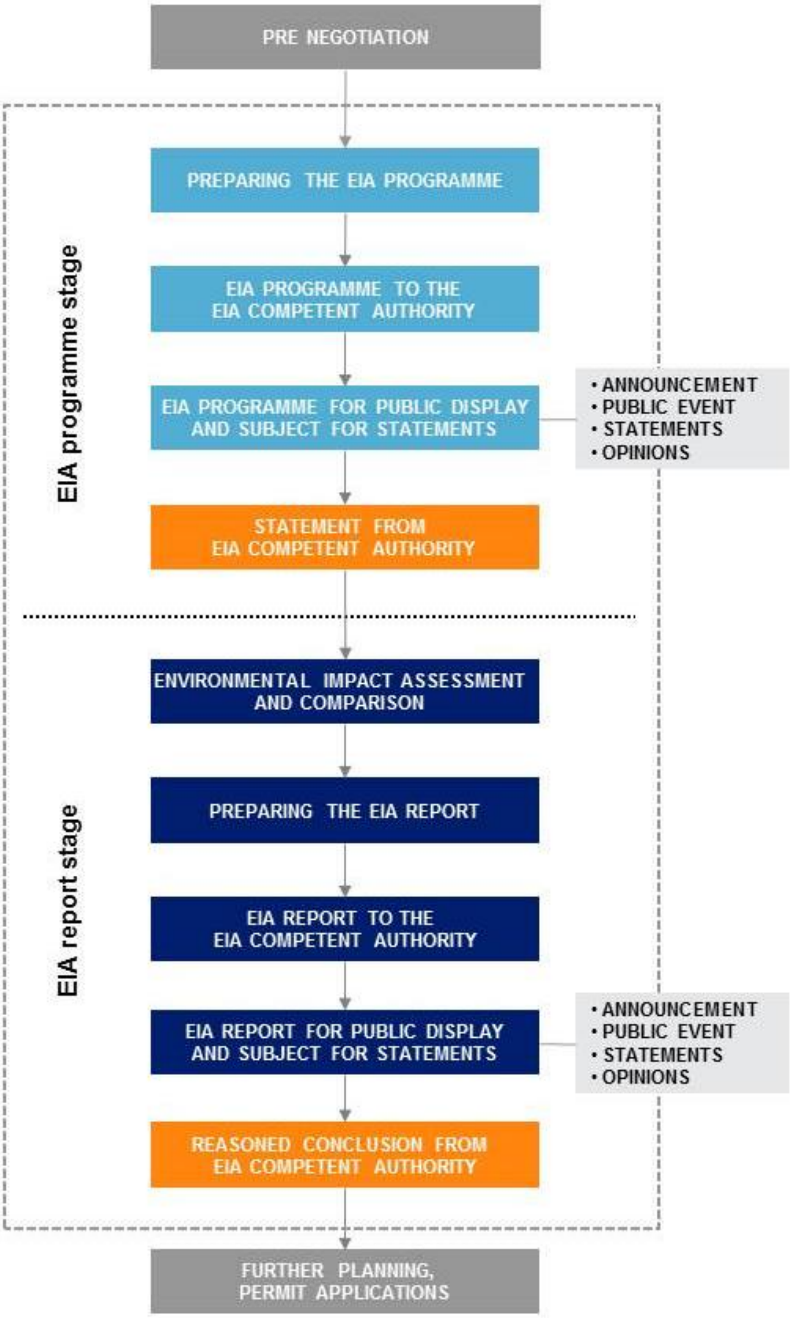


Figure 4-1. Stages of the EIA procedure.

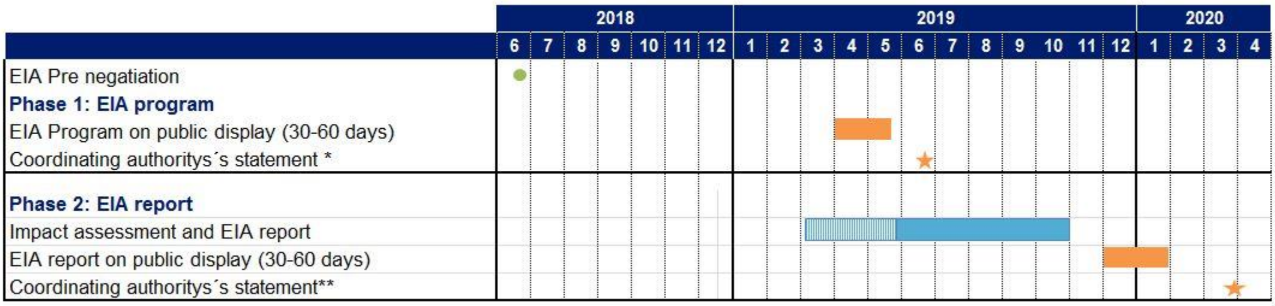
Participation in the EIA procedure refers to interaction within the field of environmental impact assessment between the Developer, in Finland the EIA competent authority, other authorities and those whose conditions or interests may be affected by the project as well as corporations and foundations whose fields of operation the impacts of the project may concern. One of the key goals of the participation is compiling the views of the different parties.

In Finland, the EIA competent authority will announce on its website when the EIA programme is publicly available for viewing. The announcement will indicate where in the municipality the EIA programme is available for viewing and by which time the statements and opinions concerning the programme must be submitted. During the period of public availability, the nearby communities, residents and other affected parties may submit their opinion concerning, for example, the need for analysis in the project's impact assessment and whether the information and plans presented in the EIA programme are sufficient.

The EIA report describes the participation during the EIA procedure and presents how the opinions and statements received during the participation period have been taken into account in the performed analyses.

At a later stage of the EIA procedure, the environmental impact assessment report will also be available for public viewing and open to statements and opinions in a similar manner.

The key stages and planned schedule of the EIA procedure are shown in the figure below (Figure 4-2).



* EIA Act: the liason authority shall issue a statement on the EIA programme within 1 month of the end of the period allowed for providing statements.

** EIA Act: the liason authority shall issue a justified conclusion within 2 months of the end of the period allowed for providing statements.

Figure 4-2. Planned schedule for the EIA procedure in Finland.

4.2.2 Participants in the EIA procedure

The figure (Figure 4-3) presents the parties taking part in the EIA procedure for the project. The Developer for the project is Finest Bay Area Development Oy and the EIA competent authority in Finland is the Centre for Economic Development, Transport and the Environment in Uusimaa. The international hearing procedure is coordinated in Finland by the Ministry of the Environment.

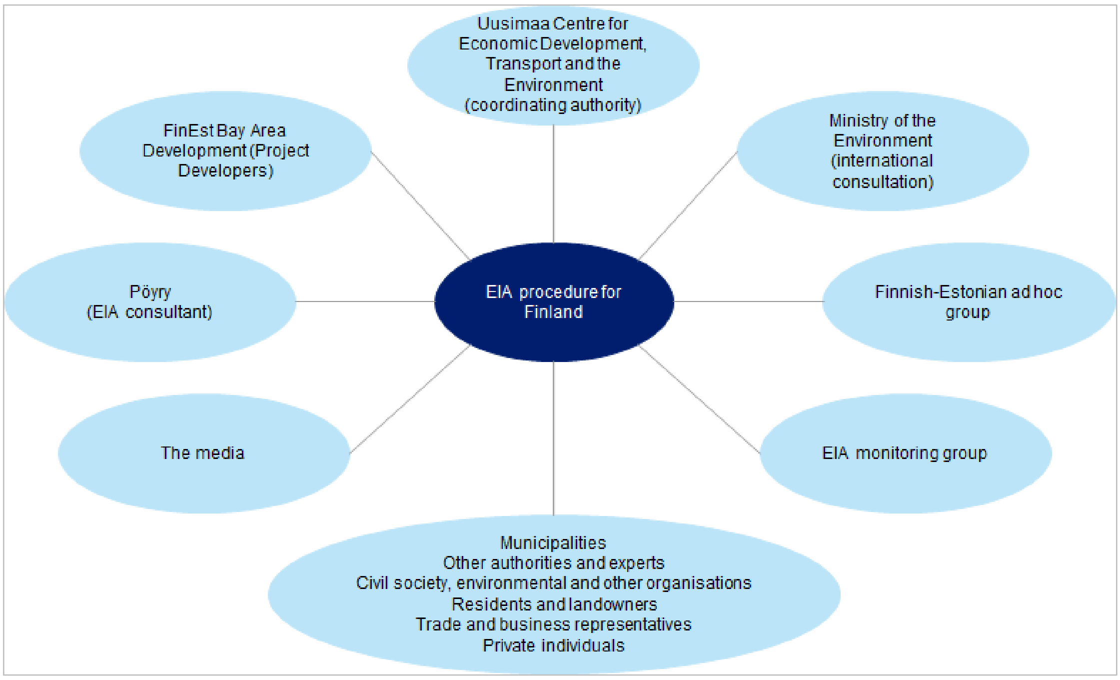


Figure 4-3. Parties to the EIA procedure in Finland. Note: Finnish–Estonian Ad hoc group = committee pursuant to bilateral agreement between Finland and Estonia.

This environmental impact assessment programme regarding the Finnish part of the project has been drawn up by Pöyry Finland Oy as consultant. In addition to Pöyry, A-Insinöörit Oy and Fira Oy have been involved in the technical pre-planning supporting the project's EIA programme.

4.3 Project design stage and schedule

The Developer has completed a pre-feasibility study of the Finnish project area in 2018 in relation to surveying a location for the artificial island to be constructed. The pre-feasibility study used existing documentation to survey the natural values of open sea areas in Kirkkonummi, Espoo and Helsinki, and key fishing areas. Sea bird fauna and important sea bird areas were also surveyed. The purpose of the preliminary analysis is to aim at minimising the environmental impacts of the project and its impact on fisheries; in other words, to find a location for the artificial island that has a minimum of natural value, taking into account fish spawning areas.

A pre-planning stage supporting the environmental impact assessment was launched alongside the EIA procedure in the spring of 2018. Technical design produces information at a level of precision commensurate with the level of detail used in the EIA procedure, and the information specified as technical design advances will be presented in the environmental impact assessment report.

The drafting of the project's environmental impact assessment programme was started in May 2018 and it was submitted to the EIA competent authority in December 2018. Following this, the EIA report stage and the actual environmental impact assessment will begin. The goal is to complete the EIA procedure during 2019.

The project also requires separate land use planning procedures; their duration depends on which land use planning levels the project requires at different points of the railway tunnel route.

The project requires a water permit pursuant to the Water Act (587/2011). The permit may only be issued after the completion of the EIA procedure. Once the licensing process is complete, the construction of the project may begin at the earliest in the summer of 2020, depending on the duration of the permit procedure. However, the duration of the land use planning procedures will also affect this.

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. The daily progress will, for its part, depend on the future development of tunnel boring equipment. The tunnel will be constructed simultaneously from several different starting points.

4.4 Consolidation of the different procedures in Finland and Estonia

The aim of the Developer is to organise the hearings included in the EIA and land use planning procedures as simultaneously as possible such that the materials for the EIA procedure are available at the same time. The figures (Figure 4-4 and Figure 4-5) present the main consolidation principles. However, due to different procedures in Finland and Estonia, the procedures cannot be synchronized. In Estonia the land use planning procedure required for the project may be completed by means of a national designated spatial plan (NDSP), riigi eriplaneering in Estonian. A decision from the government is required to commence the procedure and the schedule for making such decision cannot be controlled by the Developer. The schedule is thus preliminary and it will be specified and amended during the procedures. The Developer proposes to consolidate procedures in both countries. However, this will be affected by when the processing by authorities starts in each country, which the Developer cannot fully control.

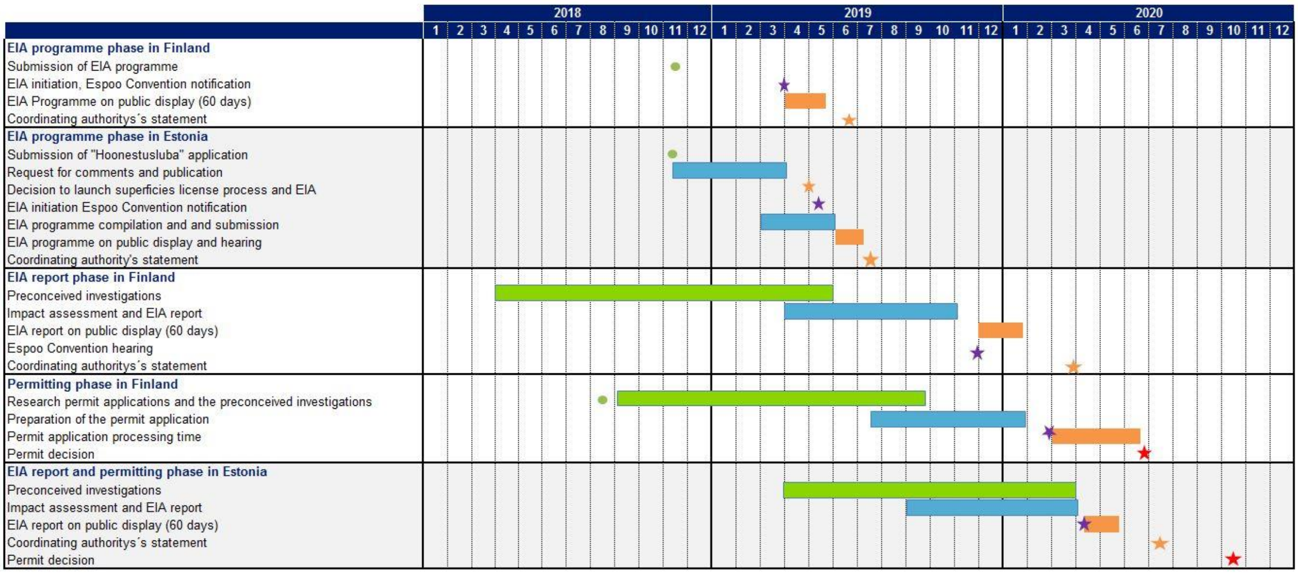


Figure 4-4. Consolidation of the EIA and permit procedures in Finland and Estonia.

The main principles for the consolidation of the EIA and land use planning procedures in Finland and Estonia are presented in figure (Figure 4-5).

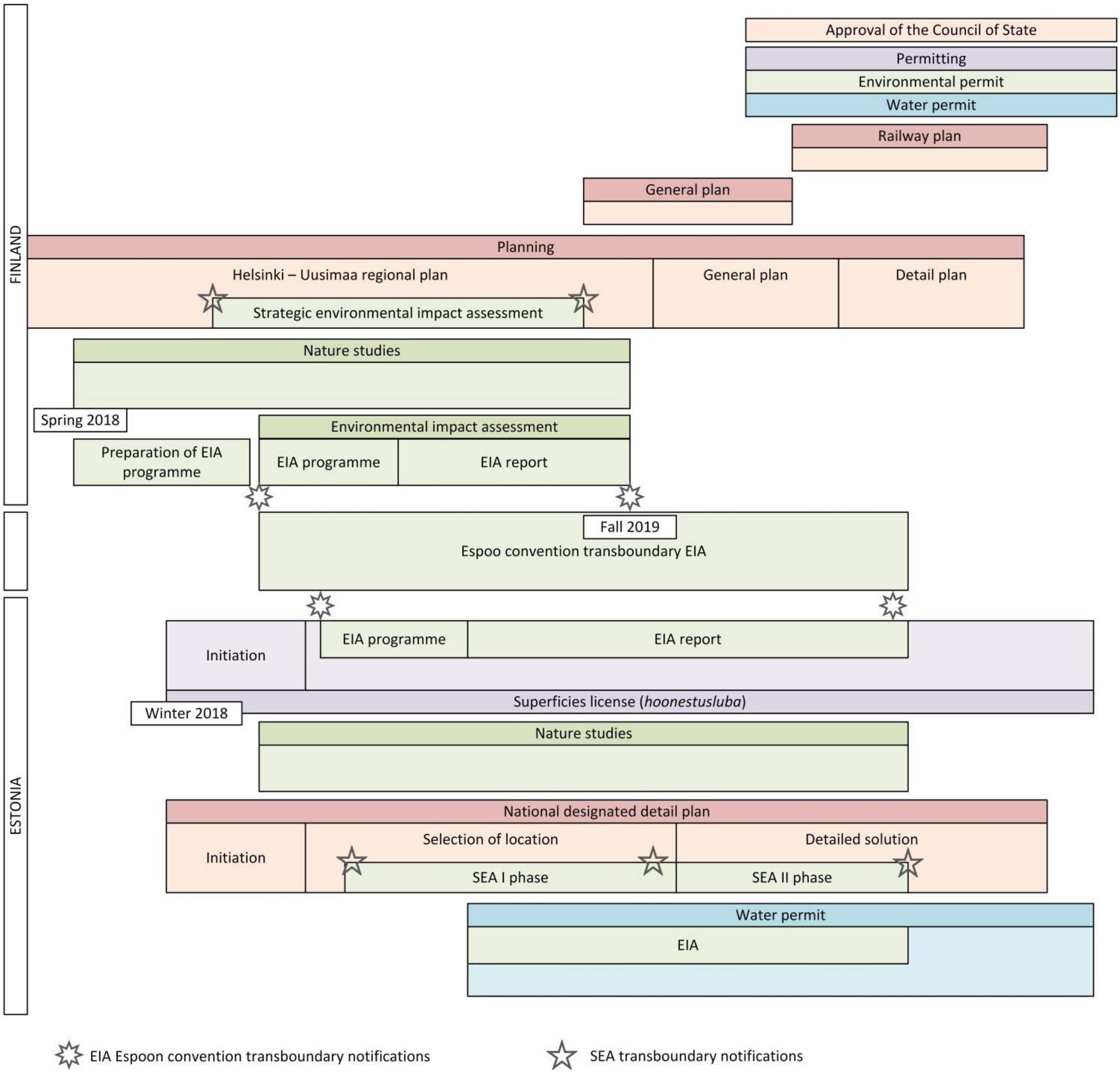


Figure 4-5. Consolidation of the EIA, permit and land use planning procedures in Finland and Estonia.

5 TECHNICAL DESCRIPTION

The following describes the technical characteristics of the railway tunnel to be constructed in the project. The EIA procedure examines two technical solutions, Finest Bay Area (ALT1a and ALT1b) and FinEst Link (ALT2), which differ in terms of the railway tunnel routing, number and location of the stations as well as technical solutions used in the tunnel (tunnel size and number of tracks). The construction will mainly use TBM (Tunnel Boring Machine) technology. The following technical description is based on, among other things, the preliminary design documentation of the FinEst Link alternative (*FinEst Link 2018*) and the preliminary design of the Finest Bay Area alternative.

The technical design of both project alternatives is at a preliminary stage and it will be refined as the design progresses. The specified technical details will be presented in the environmental impact assessment report.

5.1 Design basis

5.1.1 Description of the TBM method

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 metamorphosed sedimentary rock, but the use of machines designed for hard rock is increasing continuously. 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 (**Figure 5-1**, Figure 5-2). TBM drills 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 then 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. (*Nenonen & Ikävalko 2012, Lach et al. 2000*)

Existing TBM equipment can advance 10–70 metres per day per tunnel, depending on the bedrock conditions and the tunnel diameter. The tunnelling progress will also depend on the future development of tunnel boring equipment. In a large-diameter railway tunnel, progress will be significantly slower than the maximum value presented above. On the other hand, it should be taken into account that there are methods and devices in development that allow for clearly better progress than the one referred to above.

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. The tunnel will be constructed simultaneously from several different starting points.

TBM equipment will be built separately for each project, according to the conditions and the tunnel dimensions.

A tunnel created into crystalline, hard bedrock using full-profile boring is safer than a tunnel created with traditional drilling and blasting, since not as many 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.

Figure 5-1. Full-profile machine (Robbins TBM) excavating a tunnel in Chicago, IL, USA. The cutter heads seen in the picture have broken through to the main tunnel created with the TBM method. Source: *Lach et al. 2000*

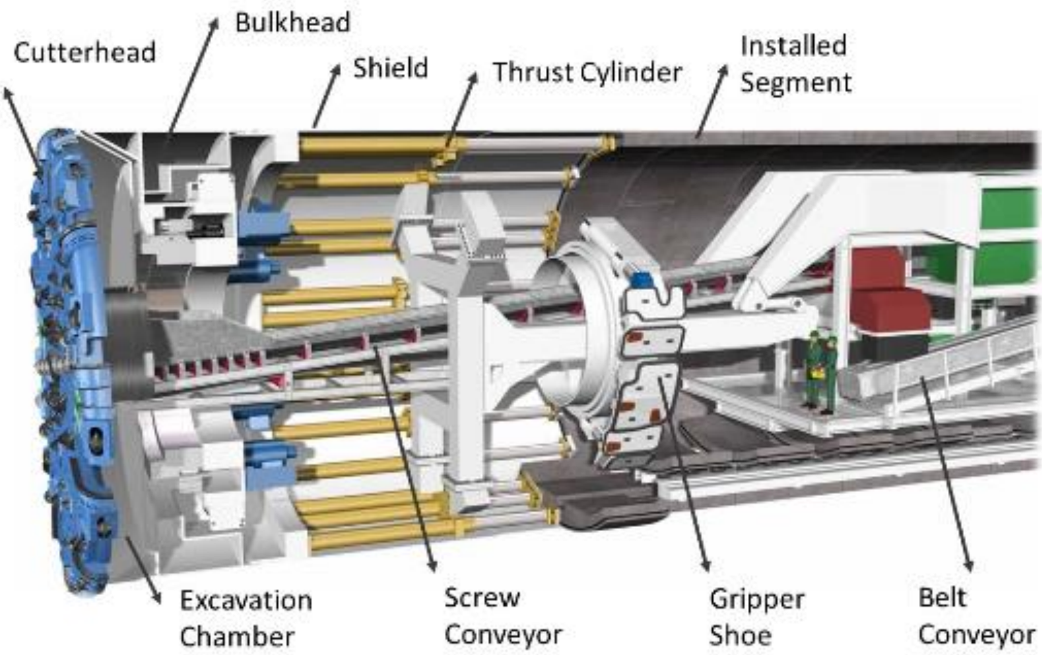


Figure 5-2. Basic diagram of the operation of a TBM full profile boring system Source: Modified from source [http://www.railsystem.net/tunnel-boring-machine-tbm/].

5.1.2 Tunnel excavation

In addition to the TBM method, the tunnel construction will use the traditional drilling and blasting method e.g. for the construction of stations, driving tunnels and shafts.

Regionally defined vibration limits will be followed in the sections created with the drilling and blasting method. Separate limits caused by the operation of the metro, Ring Rail Line and the airport will also be followed within their areas of impact. Environmental analyses and risk analyses will be performed for the excavation in order to determine the areas sensitive to vibration and their different limit values.

The vibration effect for the tunnel sections built with the TBM method will be substantially smaller than for those built with the drilling and blasting method.

The vast majority of the excavation is performed using electrically operated TBM equipment that chips the rock mechanically and does not generate a substantial amount of local emissions or waste. The drilling creates fine-grain broken rock that can be utilised in construction.

TBM tunnels can be reinforced using sprayed concrete, cast concrete or concrete elements. The connecting tunnels are also reinforced with sprayed concrete. Reinforcing the tunnel and connecting tunnels creates waste sprayed concrete. Technical solutions and design decisions will be used to prevent its entry into the environment and the sea.

Ordinary blasting and drilling generates local machine exhaust gases, blasting cable residue and explosive agent residue that cause nitrogen loads on the environment. When filling in water systems, a floating boom can be built around the area to be filled that prevents the carry-over of floating waste and allows for the collection of blasting cable residue and other floating waste.

The TBM equipment will be constructed for this project and it will not be used for other projects after completion. After the drilling of the tunnels is complete, the TBM equipment will likely be left inside the tunnels in tunnel sections separately constructed and reserved for it.

5.2 Tunnel routes

ALT1a and ALT1b

The railway tunnels of the Finest Bay Area alternatives (ALT1a and ALT1b) will be constructed as two tunnel pipes from Helsinki Airport via a station (Otakeila) constructed in the Otaniemi–Keilaniemi region to an artificial island and further into Tallinn via the Tallinn shoal (Tallinnamadal) or Uusmadal shoal. The railway tunnel's route from the airport to Otaniemi runs along either ALT1a or ALT1b. Route ALT1a runs from the airport to the artificial island via Otakeila. Route ALT1b runs from the airport to the artificial island via Ilmala and Otakeila. In the route planning, the aim has been to avoid densely populated residential areas in order to make it easier to find locations for the above-ground shaft buildings. In alternative ALT1a, the artificial island is located in the Hramtsow shoal, and in ALT1b, it is located in the Ulkomatala shoal.

ALT2

The route following the FinEst Link alternative (ALT2) runs from the airport via Pasila and the centre of Helsinki (central railway station). This alternative has three adjacent parallel tunnels.

The artificial island used as a service connection for the tunnel route in alternative ALT2 is located at Uppoluoto. Alternative ALT2 does not include the construction of a habitable artificial island. The service connection would be built in the Uppoluoto region, where the existing islet would be expanded as necessary.

5.2.1 Railway tunnels

ALT1a and ALT1b

The railway tunnels of the Finest Bay Area alternatives will be constructed as two tunnel pipes with a diameter of approx. 17.4 metres. The first tunnel has two sets of tracks, separated by a sectioning wall, and technical rooms, rescue space and maintenance space below them. The second tunnel is reserved for freight train traffic and for use in maintenance and rescue operations. The design information will be specified as the project progresses, and the specified designs and related information will be described in the environmental impact assessment report.

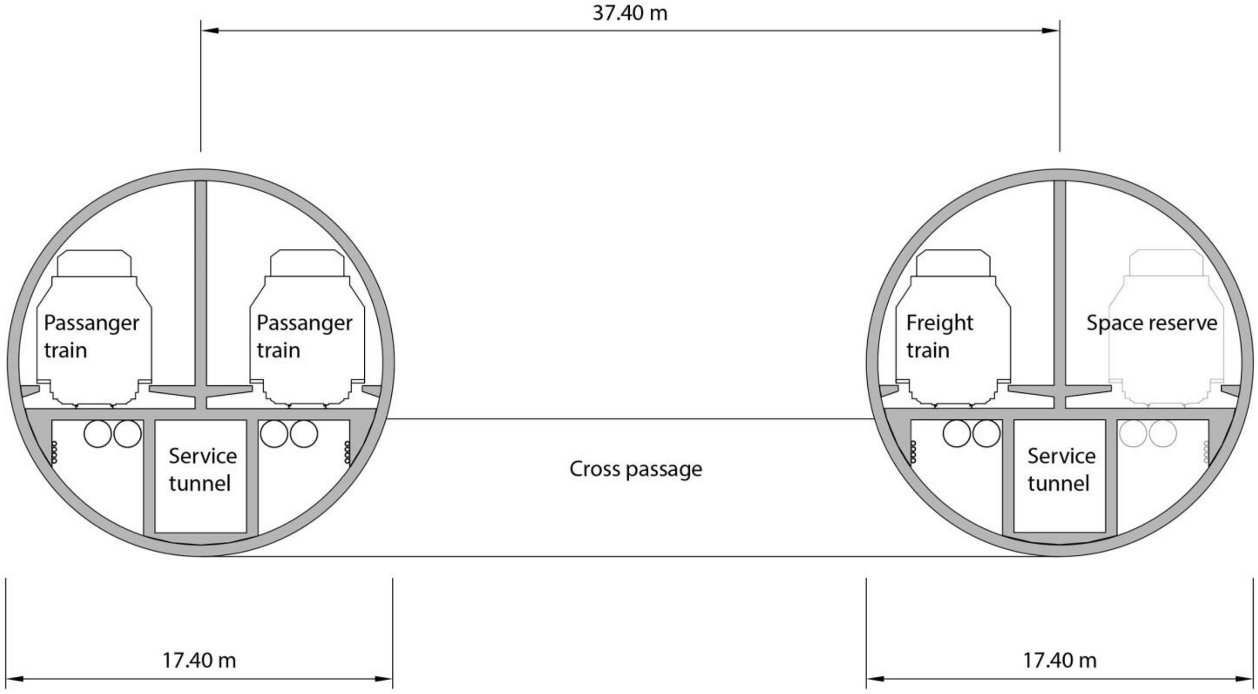


Figure 5-3. Cross-section of the railway tunnel in the Finest Bay Area alternatives.

ALT2

The solution pursuant to the FinEst Link alternative has three tunnels, two of which are reserved for rail traffic and one of 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 (Figure 5-4).

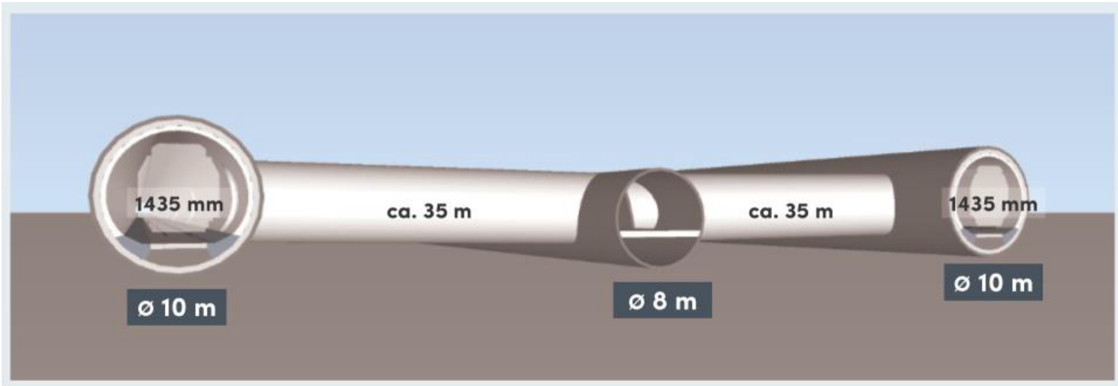


Figure 5-4. Illustrative image of the railway tunnel in the FinEst Link alternative. Source: *FinEst Link 2018*.

5.2.2 Station solutions

ALT1a and ALT1b

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 (Figure 5-5). This separates the different sides of the station, preventing, for example, the spread of smoke on the stations and facilitating safe rescue operations.

Escalators and/or lifts are used for ascending to the ground level and, in Otaniemi, also to the nearby metro station that has existing connections to the ground level. The new station planned for Ilmala would be located below the current Ilmala train station. 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.

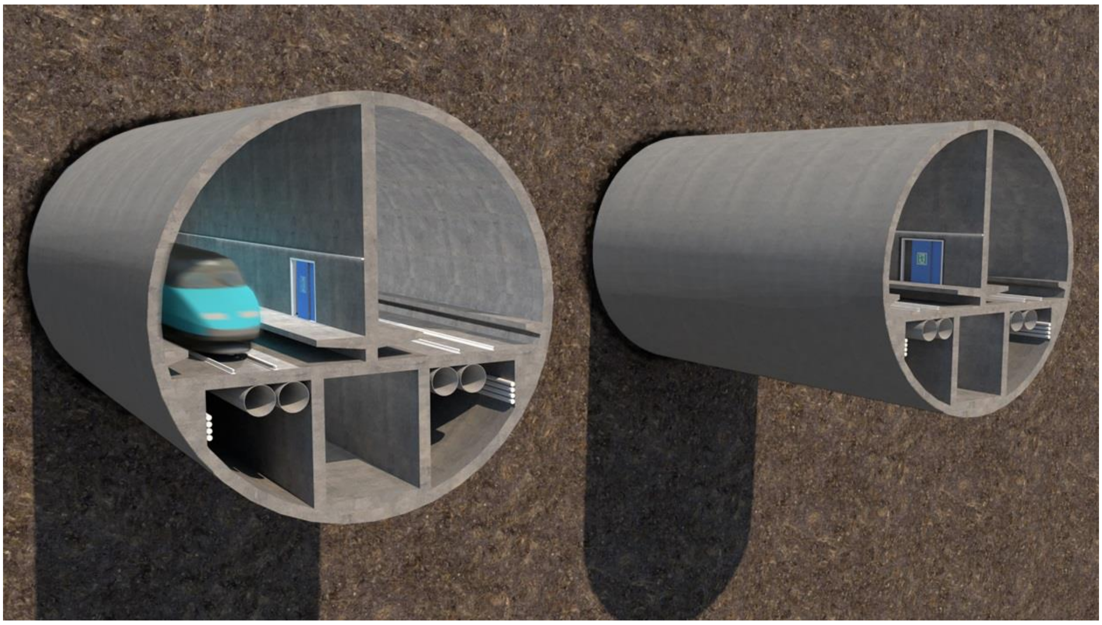


Figure 5-5. Illustrative image of the station profiles in the Finest Bay Area alternatives.

ALT2

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 would run under the Helsinki central railway station at the Helsinki Centre station and under the current Pasila railway station at the Pasila station. The new stations will be linked with the existing stations using escalators and/or lifts.

5.2.3 Gauge

ALT1a and ALT1b

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.

ALT2

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.

5.2.4 Rescue safety

The safety requirements for railway tunnels are determined by the Finnish Transport Safety Agency's safety regulations and project guidelines as well as safety-related publications, such as the Report by the channel tunnel inter-governmental commission on safety in the channel tunnel 2009–2015, Gotthard Basetunnel Risk Management During Construction of the Gotthard Base Tunnel 2003.

ALT1a and ALT1b

In the Finest Bay Area alternatives, emergency exit from the railway tunnel occurs into the maintenance and rescue tube below which can also be accessed from the second tunnel.

The Finest Bay Area alternatives have connecting tunnels between the pipes at a distance of approx. 1 km from each other. Emergency exit is also possible via the second railway tunnel. The railway tunnels are separated across their entire length, also at the stations.

Smoke ventilation is carried out as longitudinal ventilation along the railway tunnel between the shafts that rise to the surface. There are ducts for smoke ventilation on both sides of the stations. Work safety is based on the construction of two tunnels at a time and combining them in a manner that allows for smoke compartmentation across their entire distance.

A driving tunnel and service connection to the railway tunnel will be built on Koirasaari, off the coast of Helsinki; during construction, it will be used for transporting quarry material, and during use, as a smoke removal path and a possible evacuation and maintenance route.

ALT2

In the FinEst Link alternative, rescues will take place as a "train helping train" solution where trains will be used for emergency assistance and passenger evacuation. In the FinEst Link alternative, a separate service and rescue tunnel is used for emergency exit purposes.

There are rescue stations for passengers at least every 20 kilometres. In addition to the above, four rescue stations will be built in the undersea section. These stations are on average 450 metres long with platforms placed every 50 metres (Figure 5-6). The rescue stations have connecting pathways between the main tunnel and service tunnel. The rescue system also involves fresh air ducts, lighting, communications equipment and smoke ventilation and/or fire extinguisher systems. If the freight trains cannot exit the tunnel, they will utilise the rescue stations described above.

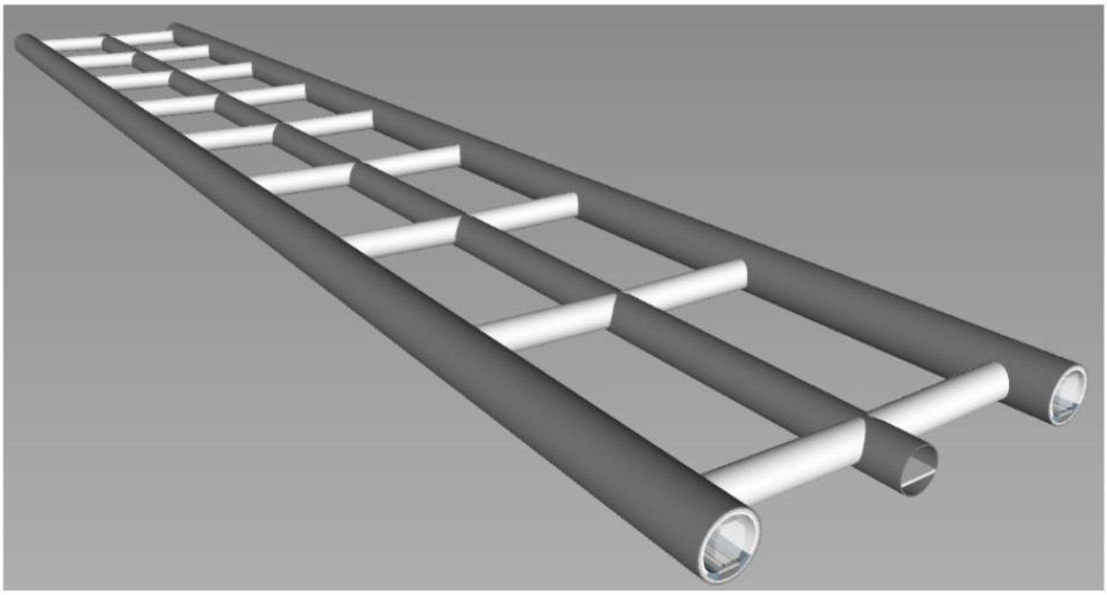


Figure 5-6. Illustrative image of the rescue station. They have a length of 450 metres and have connecting pathways every 50 metres. Source: *FinEst Link 2018*.

The equipment used consists of electrically operated machinery and devices.

5.3 Preparatory work

The preparatory work carried out before the construction of the railway tunnel includes the following, among others:

- 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 on existing islands (Koirasaari or Uppoluoto, depending on alternative)

5.3.1 Removal of unexploded ordnances

Unexploded ordnances (UXO) can be divided into conventional and chemical munitions. Munitions were dumped in the Baltic Sea during the First and Second World War and all the way until the 1970s. Any possible unidentified objects, such as munitions and remains thereof, on the surveyed route of the railway tunnel are analysed and removed before construction begins. Munition surveys have been completed earlier in the Balticconnector and Nord Stream gas pipeline projects, for example. The documentation from the Nord Stream project is utilised where applicable in areas where the routes cross. New surveys are also performed whenever necessary.

In order to clear the munitions or their remnants, an ordnance clearance plan will be developed in cooperation with relevant national authorities. The clearance plan will include clear risk assessment procedures for the technical performance of the work together with the mitigation measures to be taken to minimise impacts on marine flora and fauna. The clearance methods used will be safe, proven and similar to those previously employed to dispose of munitions in the Baltic Sea.

The disposal of unexploded ordnances (mines) will be performed in several steps, starting with an as-found survey, implementation of mitigation measures to minimise the impact on marine life, placement of the demolition charge, demolition and an as-left survey.

Throughout the activities, the authorities will be kept informed of the status, and any marine traffic in the area will be warned to avoid the location.

5.4 Project logistics

On the mainland, 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 with the traditional drilling and blasting method is transported out of the tunnel with rock trucks.

Transport routes on the mainland (Otakeila, Airport, Pasila, Centre of Helsinki/Rautatientori) will mainly be planned to reach Vuosaari harbour via Kehä I and Kehä III. The possibility for using other applicable harbours in the Helsinki region will also be analysed, if necessary.

The broken rock from the construction tunnel and shaft located in the sea area will be loaded directly onto barges or used in the construction of an artificial island (see chapter 5.6).

Several shipping lanes managed by the Finnish Transport Agency run in the sea area near Koirasaari, Uppoluoto and the Ulkomatala and Hramtsow shoals. The existing lanes with sufficient depth will be utilised in the rock material transport and, if necessary, new lanes will be built between the construction-time harbours in the artificial islands and Koirasaari and the existing lanes.

5.5 Track construction

The track will be built as a slab track. The larger tunnel has two sets of rails separated with a sectioning wall and the smaller tunnel has one set of rails.

A fixed contact line will be used for the power supply.

The track will be constructed by installing the rails and the power and safety equipment on the track foundation built in the tunnel.

5.6 Utilisation of crushed stone

The aim is to use the existing service tunnels to transport the crushed and blasted stone to the construction site of the artificial island, for example. In addition to the existing service tunnels located on the continent, the intention is to use the island of Koirasaari, located some 10 km southwest of Helsinki, for building a construction tunnel. Koirasaari is an uninhabited rock island with a length of approximately 250 metres. The island will be used for building a harbour and excavating a driving tunnel towards the actual railway tunnel line. Depending on the route, the length of the driving tunnel starting from Koirasaari will be approximately 1–2 kilometres. After the construction stage, the driving tunnel and harbour in Koirasaari will remain in place as permanent service connections to the railway tunnel. If necessary, the tunnels in Koirasaari can also be used for smoke extraction during construction and operation.

The construction of the tunnels will create a substantial amount of broken rock, some 70–80 million m^3 in total, of which most will be used in the construction of a new island. Other uses for the broken rock include an island located off the coast of Tallinn and 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 (such as road foundation).

Overall (including the construction tunnels and stations), the volume excavated using the drilling and blasting will be some 1,500,000 m^3.

5.7 Construction of the artificial island

ALT1a and ALT1b

When the average water depth is approximately 15 metres, the surface area of the island constructed from broken rock will be a minimum of approx. 1 km^2 and a maximum of 2–3 km^2. The system will consist of a main island and smaller shoals and islets that, when completed, will support the living conditions of the marine environment and bird fauna in the region. The island's shore areas will be shaped in adherence with the principles of natural shore construction and the aim is to add diversity in an otherwise barren open sea region. In accordance with the principles of natural shore construction, the lining of the shore should mainly use natural rocks of varying sizes or material corresponding to natural rock that allows for colonisation by perennial species. The surface of the rock lining should be sufficiently smooth and steep vertical walls should be avoided. As regards the shore zone, it is essential that, in addition to structures designed for boating and recreation (quays, shore boulevards, beaches), structures typical of the nature of the archipelago are also designed, such as capes and sheltered bays of varying shapes.

At present, the areas commonly have a water depth of 5–20 metres. The soil on the seabed currently consists of mostly clay and moraine. Prior to the construction of the island, the area will be dredged to remove the soft seabed sediment and clay, some 2–5 million m^3 in total, which will be piled elsewhere in Finnish territorial waters using existing piling areas whenever possible. Dredging and piling are subject to a permit pursuant to the Water Act. Structures built on the island may also require excavation, such as in the case of inner harbours. The maximum excavated volume will be around a few hundred thousand cubic metres.

In the first stage, most of the material will be coarser blasted stone created from the drilling and blasting; its intended use is in protecting the island against erosion and forming a filter layer that reduces the puddling caused by the finer crushed stone from the TBM process.

For building a vertical tunnel shaft, a water-tight trench will be dug on the island and supported by a bored pile wall. The piles are bored into bedrock using air flushing through backfill. All the broken rock will be removed from the completed water-tight trench and the vertical shaft will be excavate downwards from the bottom of the trench to its future location.

A full-profile boring machine (TBM) will be used for most of the tunnel excavation, and the rock material generated from this will be fine with a granularity similar to crushed stone. Fine rock material is not optimal for filling waterways, since it is efficiently consumed by wave erosion and the rock material will not embed into the ground as effectively as stone with a coarser structure. Therefore, the aim is to build the main part of the shoreline during construction from coarser blasted stone from the drilling and blasting method. Erosion protection against higher waves will likely consist of riprap pitching of broken rock. Structural solutions, such as shore walls made of steel reinforced concrete or steel, may be used in parts of the island.

The island's elevations and shore structures take into account the anticipated sea level rise and wave action. At the present time, the basic level for the sea filling is +3.0 (N2000). The island's shores are steep which reduces the damping of the waves when they hit the shore.

Breakwaters will be designed around the artificial island, if necessary. In terms of profiles and materials, the outer linings of the shore and breakwaters will take into account the fact that they need to be potential living environments for the Baltic Sea's natural flora and fauna that attaches to hard surfaces.

If the puddling caused by dredging and filling could potentially have a significant detrimental impact, it will be limited by building a curtain structure around the worksite whenever possible. However, the silt curtain suitable for these conditions would need to be very substantial and it would nevertheless require constant maintenance. The alternative to the silt curtain would be a bubble curtain that would work even in rough conditions; however, its operational reliability poses a challenge. Only parts of the island will have worksites at the same time, which means that using structures to limit puddling across the entire outer edge of the artificial island at the same time would not be purposeful.

If necessary, the bored pile wall could be built directly into the water system from a raft before the small worksite island is constructed. In this case, the water system would initially have a steel structure, from where the excavation of the vertical tunnel and the construction of an artificial island around the structure would begin.

The preparatory construction of the island enables its purposeful future use. The preparatory construction activities are determined by the future use. Insofar as buildings will be constructed on the backfill, the structure can be compacted using dynamic deep stabilisation and a static preloading terrace. Following this, lower multi-storey buildings can be constructed on natural foundation beds; bored pile foundations are used for taller buildings.

ALT2

In project alternative ALT2, an artificial island will be built in the current Uppoluoto region. The island will have a clearly smaller surface area than in project alternatives ALT1a and ALT1b. In project alternative ALT2, the artificial island mainly works as a permanent service connection and no residential buildings will be built on it. A small harbour is built on the island to facilitate construction and service during operation. Coarse broken rock will be used for protecting the shore area against erosion, similarly to alternatives ALT1a and ALT1b. In project alternative ALT2, the rock material from the excavation of the tunnel cannot be fully utilised in the construction of the island; when necessary, the broken rock is transported elsewhere to be used in construction.

5.8 Infrastructure crossings

The railway tunnel routes cross with several earth and subsea cables, trunk water pipelines, sewage lines and two Nord Stream gas pipelines. The crossing points will be defined in more detail as technical design advances, and the specified information will be presented in the environmental impact assessment report. The majority of the existing service lines are telecommunications cables or wires.

The railway tunnel is located at a depth of 60–200 metres, which means that it will cross existing infrastructure clearly below it and, therefore, is not likely to cause substantial changes or disturbances to existing infrastructure. Agreements will be signed with the owners of any potential crossing structures that define the obligations and processes for the crossing.

5.9 Commissioning

As regards technical systems, the project uses subsystems that can be tested and installed as separate parts and joined together upon installation into the tunnel. These include different safety and control systems that ensure the operability and safe operation of the tunnel from the beginning.

Commissioning will take place in stages as the subsystems are completed, under the guidance of and according to the regulations of the safety authorities.

The testing of the systems and equipment will be performed in stages and parts. The final integration and testing of the systems will take place at the end.

5.10 Reference projects

A similar project completed in Europe, the 57-kilometre Gotthard Base Tunnel between Switzerland and Italy, was opened in 2016.

The construction of the tunnel that runs through the Alps started with the building of the first vertical shafts in February 1999, and the commercial operation of the tunnel started on 11 December 2016. Locating the tunnel below the Alps meant that work had to be carried out under significant soil pressure. TBM drilling started in 2003. The first of the two tunnels was completed in 2007 and the second in 2011.

5.11 Service life

The tunnel structures have a service life of 100 years. Technical systems are built to be as easy to renew as possible. Once the technical service life is reached, the tunnel can be utilised to connect the infrastructure between the countries and, possibly, for geothermal heat production among other things.

6 PERMITS, PLANS AND DECISIONS REQUIRED FOR THE PROJECT IN FINLAND

Following the environmental impact assessment procedure, the project will advance to the permit stages. The Developer will decide, based on the EIA procedure results and other further research and reports, whether the project will move to the permit stage. The EIA report and the related justified conclusion by the EIA competent authority will be appended to the permit applications. The following chapters briefly describe which permits and decisions the project may require in Finland.

6.1 Water permit

The Water Act (587/2011) applies in Finnish territorial waters and the Finnish exclusive economic zone. The activities according to Chapter 3 (Sections 2 and 3) of the Water Act require a water permit. The application of the act, rights and permit requirements are set forth in detail in Chapters 1 (Sections 4 and 5), 2 (Section 12) and 3 (Section 16).

The application must include the required reports as well as sufficient plans concerning the activities and intended construction projects. Furthermore, the application must include information on the project's environmental effects. The provisions of the Nature Conservation Act (1096/96) and Antiquities Act (295/63) and the planning status of the activity area must also be considered. A river basin management plan and marine strategy in accordance with the Act on the Organisation of River Basin Management and the Marine Strategy (1299/2004) will also be considered in the consideration of the permit.

The Regional State Administrative Agency for Southern Finland is the permit authority. The permit authority will issue a water permit if the benefit from the project outweighs the adverse impacts, the project is justified and complies with the legal requirements. Furthermore, the environmental impact assessment procedure must be completed before a permit can be issued.

6.2 Consent by the Finnish Government

Carrying out the project in the Finnish exclusive economic zone is subject to consent by the Finnish Government in accordance with the Act on the Finnish Exclusive Economic Zone (1058/2004), Government Rules of Procedure (262/2003, Section 4(7)) and the United Nations Convention on the Law of the Sea (UNCLOS, Article 79(24)). According to the Act on the Finnish Exclusive Economic Zone, Section 6, the Finnish Government may, based on an application, give consent to practising operations in the exclusive economic zone whose purpose is economic utilisation of the zone (utilisation right). The content of the application is specified in the Government Decree (1073/2004), Section 2.

6.3 Land use planning

Above-ground and underground buildings and structures require permits pursuant to the Land Use and Building Act (Sections 125, 126 and 128). The implementation of the project requires plan changes in the current zoned areas as well as land use planning in areas that do not have a city plan. The plan change needs are reviewed in more detail at the EIA report stage.

Efforts will be made to complete the land use planning procedures and environmental impact assessment procedure required by the project such that it will support the consolidation targets, where applicable. The EIA procedure will include numerous separate reports whose documentation will also serve the planning needs. This consolidation will support the principle of consolidating the environmental analyses (Act on Environmental Impact Assessment Procedure, Section 3).

6.4 Procedures pursuant to the Tracks Act (general plan and track plan)

The project is subject to procedures pursuant to the Tracks Act (110/2007, amendment 567/2016). The Tracks Act contains provisions regarding the rail network, railway track maintenance and the dismantling of a railway track, as well as the rights and obligations of a railway track owner and the legal status of property owners and other stakeholders in matters pertaining to railway track maintenance and private tracks, within the limitations set forth in subsections 2 and 3.

According to the Tracks Act: *"The general plan and track plan for building a railway track must be based on a legally effective master plan pursuant to the Land Use and Building Act where the location of the railway area and relations to spatial land use are settled."* Therefore, land use planning is required along the entire railway tunnel route.

6.5 Building or action permit

A building permit or action permit in accordance with the Land Use and Building Act (132/1999) is required for all above-ground buildings or structures. The permit is applied for from the local building permit authority. Prior to issuing the permit, the authority will verify that the plan complies with the approved city plan and building regulations. A building permit is required before starting the construction work. The environmental impact assessment must be completed before the building plan can be issued. Any earthworks and excavation operations in the project area are subject to a permit for landscape work or action permit in accordance with the Land Use and Building Act.

6.6 Other permits

Abnormal transport permit

A transport will require a special transport permit if it exceeds the dimensions or weights allowed in normal road traffic. An abnormal transport permit is applied for in writing by submitting a permit application or free-form application to the Pirkanmaa ELY Centre. The Pirkanmaa ELY Centre issues all the abnormal transport permits in Finland, excluding Åland.

Agreement according to the Railway Act

The maintenance of a private siding must be agreed with the Finnish Transport Agency. In accordance with Section 36 of the Railway Act, the agreement shall apply to interconnected railway networks and specify the organisation of traffic control, maintenance between the railway networks and limits of ownership.

Other possible permits

The other permits that relate to environmental aspects are mainly technical permits whose primary purpose is ensuring occupational safety and preventing property damage.

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