City of Helsinki
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Rail options in the Broadcasting Room

Environmental Impact Assessment Report

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Environmental Impact Assessment Report

Helsinki City Planning Agency 2014

CONTACT DETAILS

Responsible for the project:
City of Helsinki, Agency for Urban Planning, PL 2100
00099 CITY OF HELSINKI
Geographical address: Kansa schoolkatu 3, 00100 Helsinki

Contact persons at the Helsinki City Planning Authority:
Eija Kivilaakso, no.stone valley(a)hel.fi tel. 09 310 37247

Kaarina Laakso, in arc. Valley(a)hel.fi tel. 09 310 37250

Juha-Pekka Turunen, Juha-peak.Tel. 09 310 37403

Contact point:
Centre for Economic Development, Transport and the Environment of Uusimaa
Casualty of station manager 14
00520 HELSINKI

Contact person at the Centre for Economic Development, Transport and the Environment of Uusimaa:
senior Inspector Martti Fellow fabric
tel. 0295 021 000

EIA consultant:
Sito Oy
Tuulikuja

Contact person in Sito:
Ms Sakari Grönlund, project manager, first name.surname(a)binding.fi tel.

Separate summaries of the EIA report have been drawn up in Finnish and Swedish and form part of the inspection dossier.

Opinions on this environmental impact assessment report shall be addressed in writing to the contact point during the period available to the Centre for Economic Development, Transport and the Environment of Uusimaa, the Chief Executive of Finland 14, 00520 Helsinki or by e-mail to the Registry.newmaa (a)ely centre.en

Information related to the environmental impact assessment:

www.ymparisto.fi -> dealings, permits and environmental impact assessment -> Environmental Impact Assessment -> EIA projects -> Rail transport in the Broadcasting House

http://www.ymparisto.fi/fi-FI/Asiointi_ja_luvat/Ymparistovaikutusten_arviointi/YVAhankkeet/ Large Salo_Rail traffic_Helsinki

Text: Sito Oy, LandPro Oy, Trafix Oy, Crede Consulting Oy Kansiim: From the top of the Gemma Regalis competition proposal for the Kruunu Mounu Mountains transport link, WSP Finland Oy
Photographs: Tuomas Pietinen (p. 58), Timo Huhtinen (p. 67)
Aerial photographs: City of Helsinki, Department of Urban Measurement (pp. 93, p. 101)
Baseline maps: © MML 2014

Graphic design and layout: Minna Hakola, Sito Oy
Graphical design of the publication series: Timo Kaasinen

Weight: Printer Newland, 2014

ISSN 0787-9024
ISBN 978-952-272-657-5 (so-called)
ISBN 978-952-272-658-2 (PDF)

Foreword

The purpose of the assessment of the environmental impact ofthe alternatives to rail transport in the area of large-scale transport has been to assess the environmental impact and transport performance of the alternativesfor irrigation as part of the transport system before deciding on the implementation of new public transport connections.

The contractor for the work and the person responsible for the project for the environmental impact assessment procedure are the City PlanningBoard of Helsinki.

A steering group has been invited as members of the-Authority, as well as representatives from the High Islands and Helsinki Energia. In addition, Leena Eerola and Martti Pelkki fabric from the Uusimaa ELY Centre have participated in the Steering Group meetings as expert members.

Tip of Hannu ..... HelSa
Ville Alajoki ..... HKR
Eila Safeojala ..... HKR
Jarmo Hagström ..... Helen
Eija Kivilaakso ..... KSV, pj.
Kaarina Laakso ..... KSV
Riitta Jalkanen ..... KSV
Ulla Kuitunen ..... KSV
Jouni Heinänen ..... KSV
Juha-Pekka Turunen ..... KSV
Heikki Hälvä ..... KSV
Markku Granholm ..... KSV
Petri Blomqvist ..... KSV
Sanna Ranki ..... KSV
Mikko Ahola ..... City Chancellery
Kari Pudas ..... City Chancellery
Eeva Pitkänen ..... CMK
Maija Matikka ..... Museo Agency
SARI Saresto ..... City Museum
Timo Arponen ..... Helen
Pekka Sirviö ..... HKL
Eija Tuomonen ..... HKL
Lauri Ratty ..... HSL

The environmental impact assessment has been carried outby FM Sakari Grönlund as project manager and Rina ins project coordinator. Amk Anne Määt Sito GmbH, DI Tore Granskog LandPro GmbH and DI Matti Keränen Trafix GmbH. Antti Lind forsluodeConsulting AG has been involved in the assessmentof water effects. Experts from Sitosta have been Päivi Castrén (Road construction), Reijo Kukkonen (constructioncosts), Jenni Lautso and Juhana Rautiainen (landuse and town and country planning), Meril's Pienimäki (water effects), Reijo Pitkäranta (geology), Lauri Erävuo (nature), Mirka Härkönen (impact on humans), Mika Tuomi nen(transport performance reviews), Siru Parviainen (we lug), Veli-Markku Uski (maize) and Miko Rikala (Cityimaging).

Minna Hakola Sitosta has been responsible for the assessment report (vi) forthe verbal manifestation and skill

The consultancy work has been guided by the urban planning agency project team DI Eija Kivilaakso, DI Kaarina Laakso, DI Heikki Hälvä, DI Petri Blomqvist and DI Markku Granholm.

The urban planning agency has commissioned an environmental impact—
in the course of the award evaluation process, several of the planning areas:
studies related to the current state or impacts of the environment;
referred to and used in the evaluation. Work I—
chicken expert and focus group meetings it—
and the discussion on the different options for the project has been:
fruitful and necessary quality and completeness of the evaluation
to ensure.

Content

Summary

Purpose of the project

The aim is to organise future public transport connections inLaajasalo in a way that is appropriate to the proper functioning of thetransport system, while at the same time promoting a number of transport conditions and providing smooth and convenient traffic connections between the KruunuMountain-Bayard and the congener city.

The implementation shall be in line with existing legal and general formulae and technically feasible without causing very significant adverse effects that render the option unfeasible from thestandpoint of performance.

Project description and options

In the situation of 2035, the following options have been considered in the EIA:

Ve 0 Carriage buses for Herttoniemi metro station

Ve 1 Rail and light traffic link on bridges from the Kruund to the Kruunu Mountain

Ve 2 Rail and light traffic concrete concrete and bridge link from the Kruund to the Kruunu Mountain

Ve 3 Metro Kamppi-Laajasalo; rock and concrete tunnel and the bridge over the Kruunu Mountain

Ve 4 Metro Kamppi-Laajasalo; rock and concrete tunnels

Ve 5 Metro Kamppi-Laajasalo; rock tunnel

Ve 6 Water traffic from Crounu Mountainside — Central

Ve 7 cableways Hakaniemi-Kruunu Mountain

Ve 8 Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain

Options VE 7 and VE 8 were taken into consideration on the basisof feedback from the evaluation exercise.

Environmental Impact Assessment (EIA) procedure

The assessment procedure is based on the Act on the Environmental Impact Assessment Procedure. On 24 June 2009, the Centre forEconomic Development, Transport and the Environment, acting as the contact point, adopted a decision on the application of the EIA to the project. The environmental impact assessment process started with the preparation of the environmentalimpact assessment programme. The evaluation programme of26 August 2010 presented the project with its implementation options and a plan on how to assessthe overall impact of the work and how toorganise participation. Not only did the commentators, but also individuals, organisations and other stakeholders, had the opportunity to present their views on theEIA during the period between 3 September and 12 November 2010. The contact point issued its own opinion on 3 December 2010.

The EIA report has been drawn up on the basis of the EIA programme andits opinion thereon. The EIA reports contain the results of the environmental impact assessment and the information provided in the EIA programme, where appropriate. An essential part of the report is a comparison of the impacts of the options considered, possible mitigation measures and an initial presentation of the monitoringof environmental impacts.

A public presentation on the evaluation programme was organised on 28 September 2010. During the period during which the EIA report is available in May-June 2014, the second public hearing of theprocedure will be the second environmental impact assessment. During the preparation of the EIA programme, a project monitoring group, made up of representatives of resident organisations and other associations, was convened. During the EIA screening phase, the Monitoring Group was invitedto attend a public event and they were invited to speak at the public event on 21 October 2013 on the options to be considered. On 11 March 2014, I also held a presentation and discussion aboutthe essential content of the evaluation report.

Opinions and opinions on an EIA report may be issued during thestay in a similar way to the EIA programme. The contact point gathers opinions and opinionsand then issues its own opinion where the EIA procedure ends.

Impact

Ve 0 Carriage buses for Herttoniemi metro station

In 2035, public transport will operate on the same basis as today. This option has not been compared with any permanent significant adverse effects on the circumference- other than the transformation ofthe western edge of the Herttoniemi map park from a built cultural environment to abusiness area. The effects of the construction of the tunnel on traffic andnearby windfalls are significant. This option is not in line with the objectives set in land-use planning.

The public transport users go to Herttonie tothe metro station and switch to the metro station. During the morning peak, the Herttonie Strait bridge crosses just under 3 600 passengers. Over 13 700 passengers travel on the metro to the centre.

Ve 1 Rail and light traffic link on bridges from the Kruund to the Kruunu Mountain

The railway and light traffic link on the bridges from the Kruununha to the Kruunu Mountain is well-functioning. It promotesthe use of public transport and lightweight transport and improves accessibility between Laajasalo and the city of origin and is therefore also in line with the objectives of town and country planning. Bridges are transforming the landscape and urban image to a great extent andothers can be seen as negative. Changes in the landscape are significant. The transport of fuel at the Hanasaari B power plant poses a risk to the completion of the Sompasaari-Kruunhaka bridge.

The handicaps to engine and sail boating are moderateand significant for racing activities, including during construction. The effect of the underwater structures of the bridges in reducing the water exchange rate may be detrimental to their fish stocks, in particular in the Isle of Sompa Islands. Bridges and beach structures must be designed in such a way as to ensure water turnover and the functioning of the Vantaajoki fishing ladder. The risk of collision to birds caused by Pylon and parent-parentsshall be taken into account in further planning.

The metro and tram options will reduce the number of morning peakhours between 2 100 and 2 300 morning peak hours. In the case of the Kruu doll, the number of passengers is between 3 300 and 3 500 on metro and trams.

The options for tramways will reduce the number of cars running congested on the Kulosa-Bridge over 150 aa-hour hours. The bridge between the ladder and Herttoniemi is reduced by 330 vehicles. Some carusers have switched to public transport.

Ve 2 Rail and light traffic concrete concrete and bridge link from the Kruund to the Kruunu Mountain

The rail and light traffic link in the rock and concrete tunnel and the bridge with the Kruunu Mountain is well connected, but its comfort is clearly belowoption 1 for light traffic. It promotes the use of public transport and light traffic and improves accessibility between the Broadsaloand the Pung, and is therefore in line withits objectives, but it is not foreseen in land-use planning in the Kruunu Mountain. The transportof fuel at the island B power plantposes a risk to the implementation of the Sompasaari-Kruunhaka bridge.

The concrete tunnel to be immersed in the Kruunu Mountains has a large-scale construction project, the effects of which are very significant in the course of work. During operation, the tunnel reduces ve-changeability and increases harmful sedimentation very significantly. The water exchange effect of underwater structures in the Westhead bridges can be detrimental to the fish population in the Isle of Sompa Islands. Bridges and beach structures must be designed in such a way as to ensure water turnover and the functioning of the Vantaajoki fishing ladder.

The metro and tram options will reduce the number of morning peakhours between 2 100 and 2 300 morning peak hours. In the case of the Kruu doll, the number of passengers is between 3 300 and 3 500 on metro and trams.

The options for tramways will reduce the number of cars running congested on the Kulosa-Bridge over 150 aa-hour hours. The bridge between the ladder and Herttoniemi is reduced by 330 vehicles. Some carusers have switched to public transport.

Ve 3 Metro Kamppi-Laajasalo; rock and concrete tunnel and the bridge over the Kruunu Mountain

The metro link with the Kruunu Mountain is an efficient public transport system in line with the objectives set out in general planning, promotes the use of public transport and, in part, light traffic, and improves accessibility between Laajasalo and the city of origin. The changes in the landscape can be seen as negative. Changes in the landscape are significant.

The section in the rock tunnel from Kamp to Katajanoka is a technically demanding construction project. Undershooting of the strait from Katajanokatothe Isle of Kor requires the construction of a immersible concrete tunnel, which has very significant adverse effects on water exchange and sedimentation, as well as significant effects on water bodies and damage to navigationand boatingduring construction. The bridge from the High Island to the Kruunuvuo-Rhink bank has a light traffic connection alongside the metro, but its availability is an option of 1less long. The link from the bridge to the Kruunu Mountain is no longer possible within-the framework of approved urban development plans.

The metro and tram options will reduce the number of morning peakhours between 2 100 and 2 300 morning peak hours. In the case of the Kruu doll, the number of passengers is between 3 300 and 3 500 on metro and trams.

The metro options will reduce the number of cars running in the congested direction of the Kulosaar Bridge by more than 130 morning falls. The bridge between the ladder and Herttoniemi is reduced by 370 vehicles. Some car users have switched to public transport.

Ve 4 Metro Kamppi-Laajasalo; rock and concrete tunnels

The metro link in the rock and concrete tunnel with the Kruunu Mountains is an efficient public transport system in-line with the general planning arrangements,promotes the use of public transport and improves accessibility between the Laajasalo and the convenience city.

The section in the rock tunnel from Kamp to Katajanoka isa technologically demanding construction project. Undershooting of the Strait from Katajanoka to the High Island and from the High Island to the Kruunu Mountain Bank includes the construction of two submersible concrete tunnels. Together and separately, they have very significant adverse effects on water exchange and sedimentation, as well as very significant effects on water bodies and adverse effects on boating during construction. During the construction of a tunnel between Katajanoka and the High Island, the ship'stea is adversely affected. No wider landscape effects.

The metro and tram options will reduce the number of morning peakhours between 2 100 and 2 300 morning peak hours. In the case of the Kruu doll, the number of passengers is between 3 300 and 3 500 on metro and trams.

The metro options will reduce the number of cars running in the congested direction of the Kulosaar Bridge by more than 130 morning falls. The bridge between the ladder and Herttoniemi is reduced by 370 vehicles. Some car users have switched to public transport.

Ve 5 Metro Kamppi-Laajasalo in deep rock tunnel

The Metro rock tunnel between Kamp and Laajasalo is avery demanding construction project that includes a number of risksin terms of safety, rescuesafety and construction costs. The metro link with the Kruunu Mountain is an efficient public transport system in line with the objectives set out in general planning, promotes theuse of domestic traffic and improves accessibilitybetween Laajasalo and carrier pung. There is no provision for the construction of a substationin the Kruunu Mountain in butter.

The light traffic link is not implemented. This option has

significant safety and logistical resonances during construction. No wider landscape effects.

The metro and tram options will reduce the number of morning peakhours between 2 100 and 2 300 morning peak hours. In the case of the Kruu doll, the number of passengers is between 3 300 and 3 500 on metro and trams.

The metro options will reduce the number of cars running in the congested direction of the Kulosaar Bridge by more than 130 morning falls. The bridge between the ladder and Herttoniemi is reduced by 370 vehicles. Some car users have switched to public transport.

Ve 6 Water traffic Centre-Cruunu Mountain

The Bussifer between Lajasalo and Katajanoka opens a new public transport system alongside the existing public transport system,in particular for journeys from the Kruunu-Mountain to the Core Centre. It is difficult toorganise continually running bus works in central areas. The link does not significantly increase public transport and has little impact on the current modal split. Waterborne transport does not generate significant infrastructural or environmentalbenefits.

The bus ferry option will reduce thenumber of passengers going to the centre at Kulosaaari by about 900 morning peak hours in 2035, according to forecasts. There would be 1 100 ferry crossings.

The brush ferry option will reduce the number of cars passing through the Kulosaar Bridge in more than 10 morning peak hours. There are 60 fewer vehicles running on the bridge between the latency and Herttoniemi. The bus ferry has little influence on the traffic pattern.

Ve 7 cableways Hakaniemi-Kruunu Mountain

The cableway runs rapidly between Hakaniemi and Kruunu Mountain and offers a parallel public transport route to Sompa Islands. The integration of the system into the-structure of the city may prove problematic, as may the co--connections of the Kruunu Mountains region.

The construction of a stalk tower in ariver basin does not have significant adverse effects on the water. The landscape effects of stations and towers are significant and theurban patchwork of Hakaniemi is significant. The risk of collision to birds caused by towers and pivoters shall be taken into account in further planning.

Under the Köysway option, the numberof passengers going to the centre will be reduced by abundant 1,000 people in the metro in the morning peak hour in 2035according to roads. The Cruunu Mountain Self exceeds almost 1 500 passengers.

In the case of the Köysway option, the number of cars passing through the Kulosaaari Bridge will be reduced by more than 50 morning peak hours. The bridge between the ladder and Herttoniemi is reduced by 200 vehicles. Some car users have switched to public transport.

Ve 8 Vehicle, tramway and light traffic connection on bridges from centre to Kruunu Mountain

The connection between vehicles, tramways and light traffic at the bridges istechnically feasible, but leads to an increase in vehicle traffic in Kruunhaa and in particular tothe fishing port's submarine. Traffic congestion and the inconvenience of neighbourhoods areso significant. Car traffic is also bad in theHigh Island.

There is a well-functioning connection between the centre and the Kruunu Mountains through the tram and light transport links from the Kruununha to the Kruunu Mountain. It promotes the use of public transport and lightweight transport and improves the Broadsalo and the fleet—

city-to-city accessibility is also in line with the objectives set for landuse planning. Bridges are transforming the landscape and urban image to a great extent and some of these changes can be seen as negative. The rest ofthe landscape is significant.

This option does not include a feeling of theLinary lanterns.

The handicaps to engine and sail boating are moderateand significant for racing activities, including during construction. The effect of the underwater structures of the bridges in reducing the water exchange rate may be detrimental to their fish stocks, in particular in the Isle of Sompa Islands. Bridges and beach structures must be designed in such a way as to ensure water turnover and the functioning of the Vantaajoki fishing ladder. The risk of collision to birds caused by Pylon and parent-parentsshall be taken into account in further planning.

Under the rail-vehicle bridging option, the number of public transport passengers travellingto the centre in metro will decrease by 2 450 persons in the morning peak hour in 2035, according to forecasts. There would be more than 3 200 tram passengers on the back.

Under the rail-vehicle bridge option,the number of peak openings on the KulosaIsland bridge is about 330 morning peak hours. The bridge between the Broadband and Herttoniemi is less than 800 vehicles. There will be a decline in the number of mobile vehicleson the Rantat road between 200 and 450 vehicles in their direction. Under the option, the Sompa Island street network consists of a through-link fromthe lake Ka to Kruunhaka. According to the model, the number of vehicles in the connection increases by 700-800 vehicles in the direction of a shredder threat. The roads on the Hermanncoastline increase by 200-320 vehicles in their direction. The crown getsless than 1 200 vehicles in the direction of congestion. This option will increase traffic in the street network at Kruununha by up to 400 vehicles on themost congested lines.

Alternatives containing concrete distillates may, in

In the simulation reviews carried out, the tram-and-driving bridging option leads to significant queues in the Kalaport area. Traffic cannot be slippedthrough the Hermann coastline. Delays per direction and queues increase exponentiallythroughout the peak hours. During the morning peak hours, traffic arriving via Sompa Island loads theconnections along the Herma Nu riparian road with a very high load factor.

Synergistic effects

combination with other beach and hydraulic constructions, lead to changes in the sedimentation conditions in the-Kruunu-Bed area in an environmentally undesirable direction (VE 2, VE 3 and VE 4). The other synergistic effects arerather limited in importance.

Mitigation measures for adverse effects

Adverse effects in working time can be mitigated through-the choice of manpower and timing of work. In-use impacts will be mitigated mainlythrough further planning.

Initial monitoring programme

All options for the project require a permit inaccordance with the Water Act or permits accompanied by a monitoring programme. The scope of monitoring is likely to be the highest for options VE 1, VE 2, VE 3, VE 4 and VE 8. A separate monitoring exercise will be drawn upat the timeof construction, construction and initial operation until 2035.

Timetable for decision-making and implementation

The timing of implementation depends on the option and the timingof the project decision. The decision-making process is also accompanied bydecisions on the future of the Hanasaari power plant, which are expected to be taken at the end of 2015. The totalduration of mowing, town planning, licensing and constructionis estimated to be 7 years.

1 Presentation of the project

1.1 Project

The project deals with theorganisation of the lime to the Laajasalo area. The reference period shall be 2035. The options for the project are described in section 1.5 and the technical characteristics and construction are detailed in Chapter 8.

1.2 Objectives and justification of the project

A residential area of approximately 11 000 inhabitantsof Kruunu Mountainta is planned for the west coast of Helsinki Laajasalo, which would also host around 1 000 jobs. The environment has been rehabilitated and pre-built, and residential construction is starting in 2014. Large-scale full-scale engineering has also been designed.

The existing mass movement in the Lajasalo and the Kruunu Mountain area is operatedby connecting buses at Herttonieme metrostation le. The distance from the Kruunu Mountain isapproximately 12 km from Helsinki. The Kruunu Mountain sea area is separated from the centre by the area of the Kruunu Mountain, beyond which the connection-would considerably shorten the distance to the centre.

The planning of the Larasalo public transport systemwas initiated in 1999 in the context of the preparation of the Helsinki Spatial Plan 2002 and work continued with the residence of the Kruunu Mounreranta during the sub-national planning of thearea. The aim of the City of Helsinki has been to make the Kruunu Mountains area a strong public transport-based area from the outset. Alongside public transport, pedestrian andcycling connections are also planned.

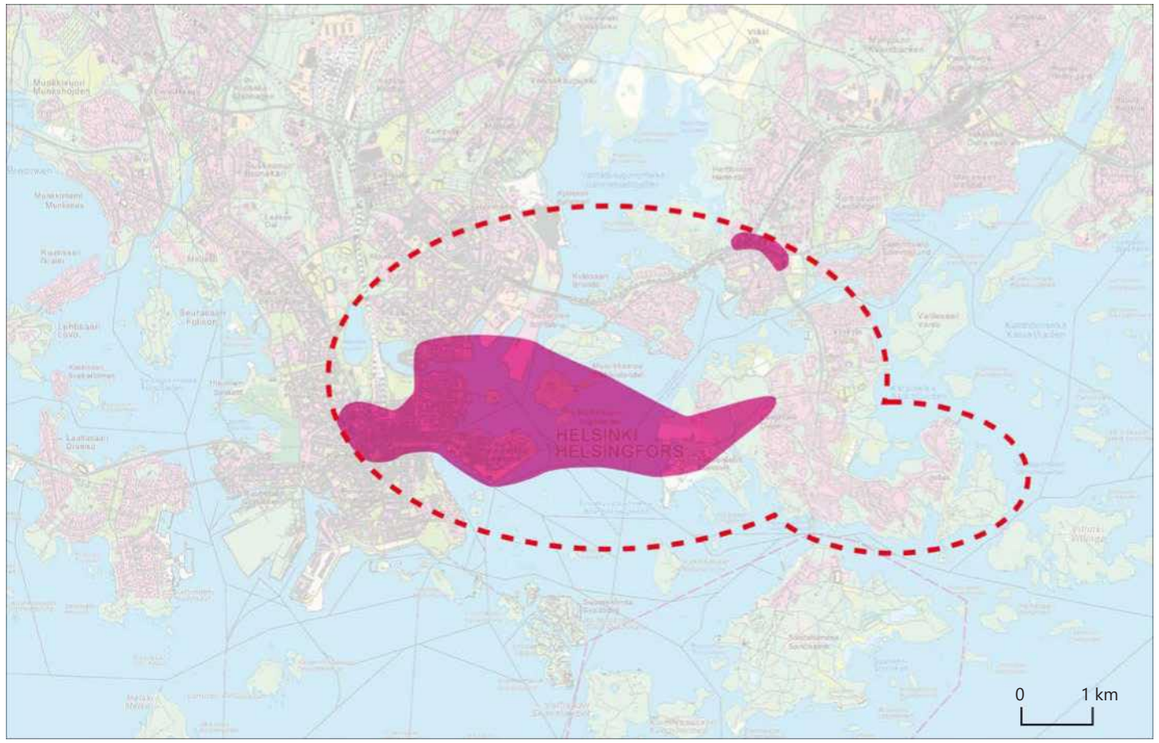


Figure 1.1. The expected direct impact area and the planning area for the different options of the project. (Source: Environmental Impact Assessment Programme 2010).

1.3 Environmental impact assessment procedure and decision-making

The environmental impact assessment procedure ensures that decision-makers and the public have accessto an image of the mobility and non-traffic characteristics of the differentterms and conditions, or ofthe declines and their significance.

The environmental impact assessment report and the resultinghousing and opinions are important pre-decision-makingmaterial. The project will then be authorised. The final construction requires decisions on financing, the decision on the project and the approval of thebuilding plans.

1.4 Location and initial catchment area of the project

The different project implementation options involve constructionin the area shown in *Figure 1.1*, an indicative area of direct effects on the right side. The impact area mapdetailed on the basis of the impact assessment is shown *in Figure 7.2*.

Project description and options

In the context of 2035, the environmental impact assessment has examined the options presented in this

Connecting buses to Herttoniemi metro station

Description of the option

Connecting buses to Herttoniemi metro station. The publictransport service in the Large Room is based on a bus connection tothe metro station of the Hertto nie. The arrangement of the Bussi Terminal at the metro station is as in the currentdirection of improvement.

Bus bridges will be increased and the distance between the lines will be increased. According to the current plans, there would be five connecting lines in the Broadcasting Area, operating between 7.5 and 12 minutes.

This option includes some additional bus stops.

This option includes, for the Herttoniemi Centre, the construction of the tunnel ofthe Linnanrakentajantie (as with the other options except option 8) on the eastern waterway and on the Linnanrakentajanki highway.

Bus connection

New tramway link

Metro line and station

Ferry line

Köysway line and station

Connection of vehicle traffic

Other bus connection

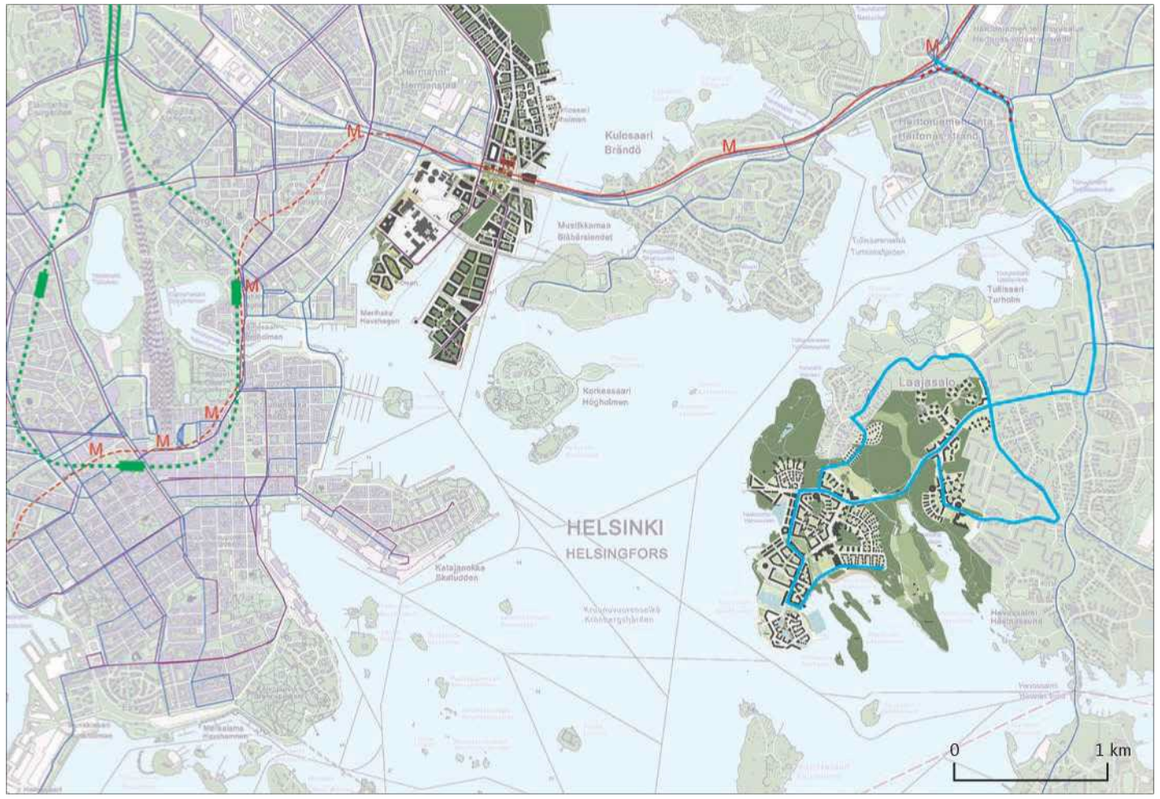
Other tramway link

Current metro

Pisararata and Station

Tunnel of the runways

Pengerfilling



VE 1

Railway and light traffic link on bridges from the Kruund to the Kruunu Mountain Railway and light traffic concrete concrete and bridge

Description of the option

Railway and light traffic link on bridges from Kruununha to Kruunu Mountain. Anetwork of three bridges and street sections for trams, cycling and walking will be built between the northern bank and the Lajasalo.

A bridge with a lifting bridge is constructed between the northern bank and Sompa Islands. In Sompa Island, the tram line is located on the planned street network and is connected by a bridge between Sompa Island and the High Island to the High Island starting with the Kruunu Mountains.

The public transport network for the large-scale hub is a tramway connection from the centre through the Kruunu Mountains to theLaajasa loon. Two tram lines have been designed in the Broadsalo, one from the Island to the Kruunu Mountain Bank and the other from the railway station to Yliskyl, according to preliminary plans. The frequency would be between 5 and 10 minutes for each line. The connection bus to the Herttoniemi metro station is maintained throughout the area of Largesalo. There is an increase in the frequency of the junction lines compared to the current situation.

In addition to tram lines, the bridges have a smooth cycle path and footpath. Bridges may be used as avehicle path between the Broadsalo and the Cities.

KSV, HKL and HSL identify possible tram routes between Sompasaari and the centre. It has been

link from the Kruund to the Kruunu Mountain Bank

Description of the option

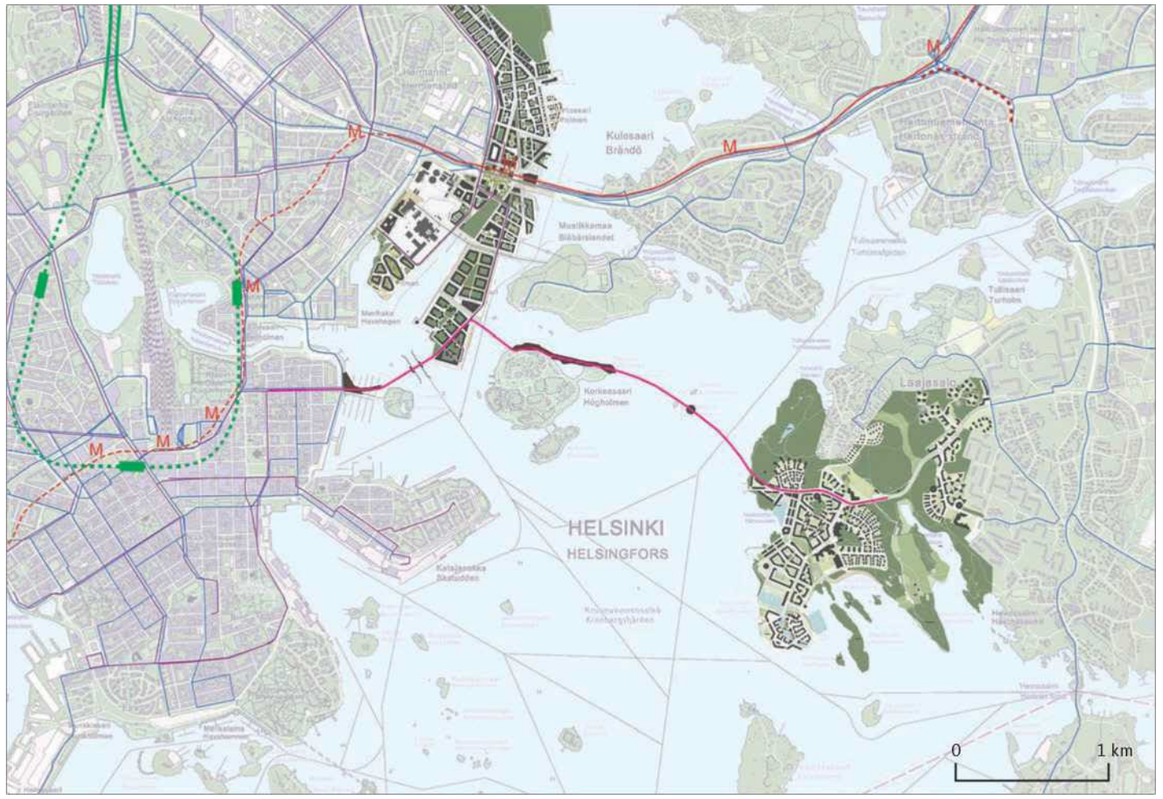
assumed in the assessment to be in line with the Tervasaari-Liisankatu route. The other options are set out below *(Figure 1.2)*.

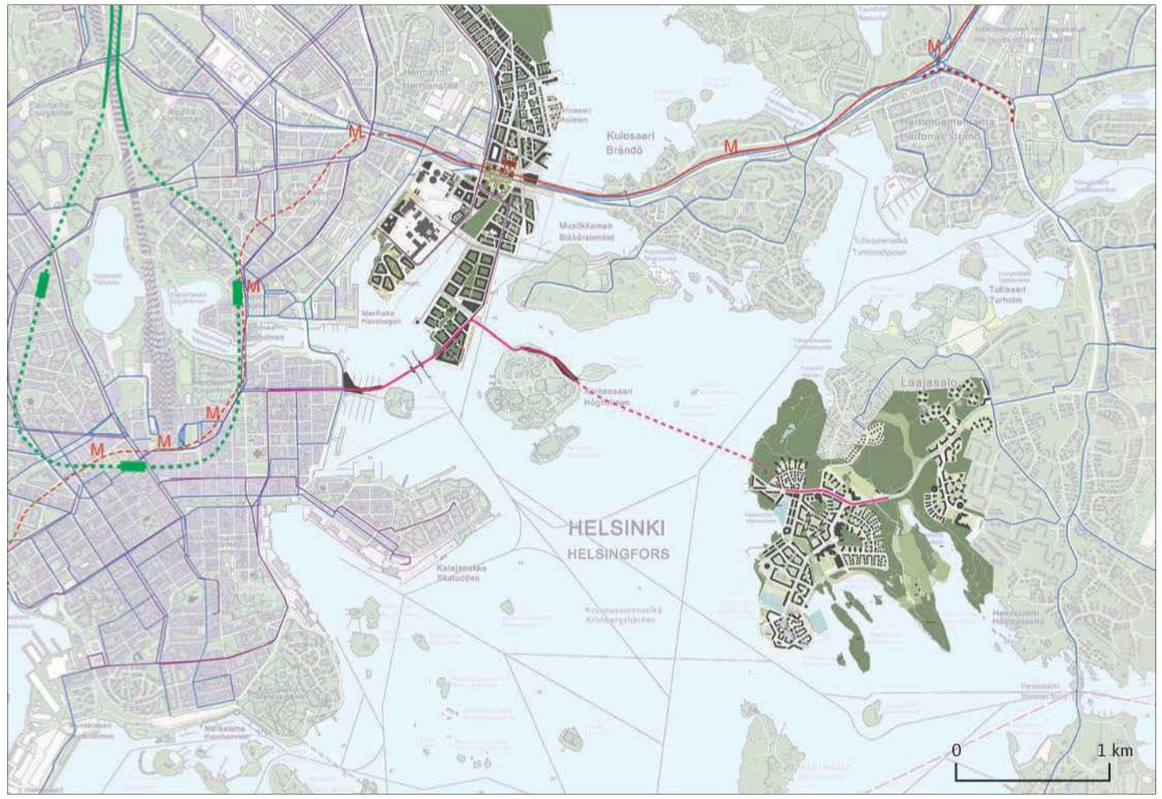
Railway and light traffic concrete concrete and bridge link from the Kruuntain to the Kruunu Mountain. The solution between Liisankatu and the High Islands is the same as in Option 1. There is a tunnel built from the High Island to the Kruunu Mountain Bank with concrete elements.

The public transport network for the large-scale hub is a tramway connection from the centre through the Kruunu Mountains to theLaajasa loon. Two tram lines have been designed in the Broadsalo, one from the Island to the Kruunu Mountain Bank and the other from the railway station to Yliskyl, according to preliminary plans. The frequency would be between 5 and 10 minutes for each line. The connection bus to the Herttoniemi metro station is maintained throughout the area of Largesalo. There is an increase in the frequency of the junction lines compared to the current situation.

In addition to tram lines, there is a cycle path and pedestrianconnection on the bridges and in the tunnel under the kernel.

The connection can be used as a route for emergency vehicles between the Broadsalo and the Cities.





VE 3

Metro Kamppi-Laajasalo; rock and concrete tunnel and the bridge over the Kruunu Mountain

Metro Kamppi-Laajasalo; rock and concrete tunnels

Description of the option

Metro Kamppi-Laajasalo; the rock and concrete tunnel and the bridge over the Kruunu Mountain. Between the tipof KAMP and Katajanoka, the line is located deep in the rock tunnel to be extracted. In the street, the tunnel starts to rise towards the ground. Undershooting of the strait involves the construction of concrete tinnel. In the western part of theHigh Island, the line rises near the ground and joins the concrete tunnel structure with the level of the bridge over the Kruunu Mountain Belt. The maximum slope of the metro track is 3.5 %.

The cross-Bridge of the Cruunu Mountain Bridge is similar in principle and is partly located in the same location as Option 1, but with a smaller gradient. In the Kruunu Mountain, the entrance of the metro is located in the 'Kallenhead', where the bridge can be connected to a tunnel built in the rock.

In Kamp, the station is located in a previously quarryed rock.

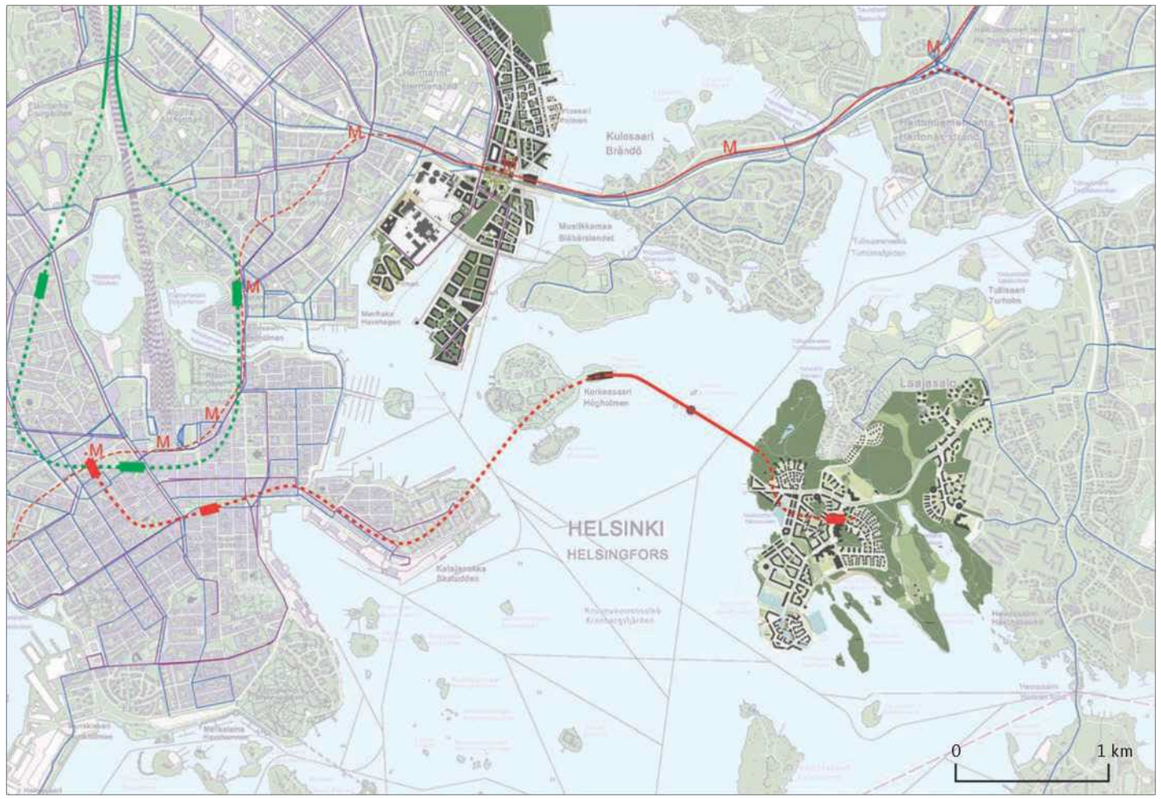
The design elements of the metro, the ground conditions and the limited degrees of freedom underground limitthe number of possible symmetrical designs in the Ermen-Esplanade area.

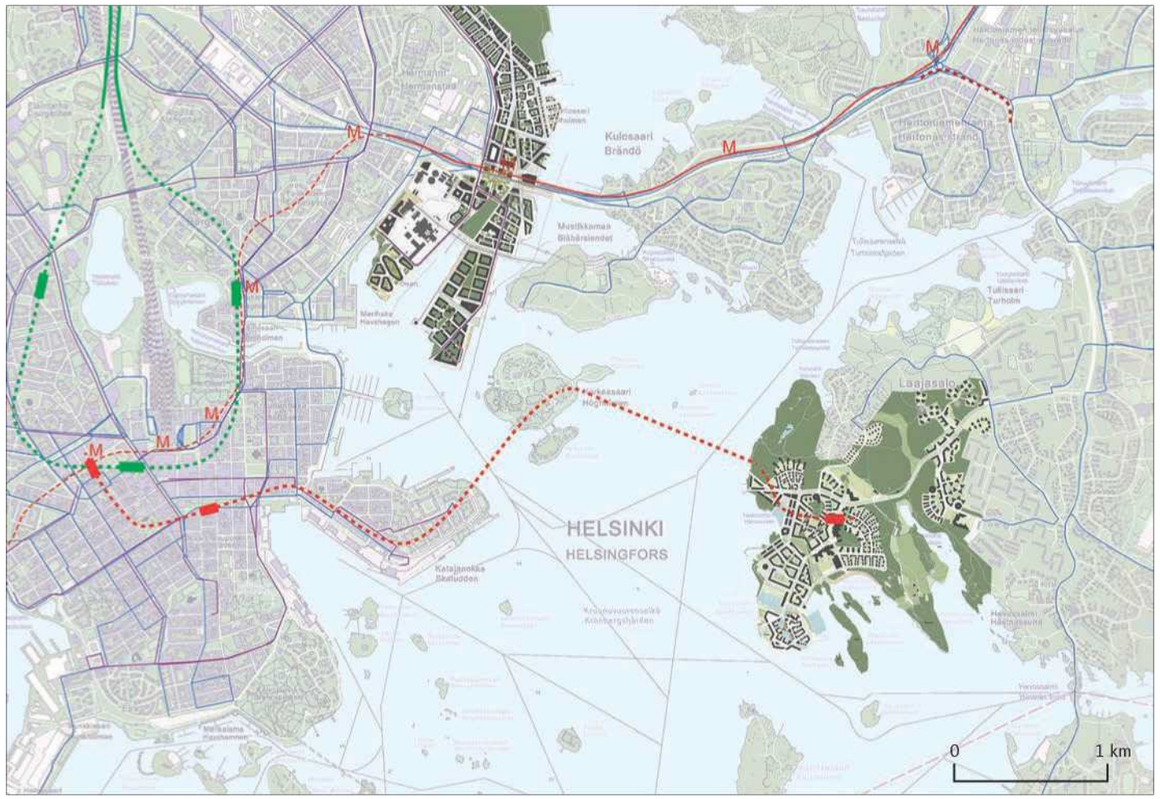
Description of the option

The metro is expected to operate on a 7.5-minute service. Five connecting lines from the Kruunuvuo-Rhine bank would be operated in the Large Room, three of which would also flow to Herttoniemi metro station. The frequency of connecting buses would be between 10 and 12 minutes according to preliminary plans.

Metro Kamppi-Laajasalo; rock and concrete tunnel. The plan is similar in other respects to option 3, but it has a concrete element tunnel in the Kruunu Mountains as described in Option 2 instead of a bridge. The plans for the concrete-installation tunnel also foresee the use of the tunnel for possible metroman traffic.

The metro is expected to operate on a 7.5-minute service. Five connecting lines from the Kruunuvuo-Rhine bank would be operated in the Large Room, three of which would also flow to Herttoniemi metro station. The frequency of connecting buses would be between 10 and 12 minutes according to preliminary plans.





Metro Kamppi-Laajasalo; rock tunnel

VE 6

Description of the option

Metro Kamppi-Laajasalo; rock tunnel. The aim has been to find as short a metro link as possible, entirely in the rock tunnel, with Laajasalo. It includes significant technical and financial risks for the Cruunuu Rosin due tozones. There is no information on the rock quality in the weakness zone, nor is the exact location of the rock surface known. In addition, the requirements of the rescue service and the management of risks can bring significant additional costs to the solution.

It is not possible to organise escape routes, ventilation shafts and working tunnels directly on the surface for a section of the sea approximately two kilometres long. Therefore, a deep tunnel connection requires a system of threetunnels.

In the triangle tunnel, a separate service tunnel also serves as an attack road for the rescue service and a separate escape route. The tunnel is deepest at a depth of 62 metres above sea level. The starting points of the exit-stages in Katajanok and the Kruunu Mountain are located around 50 metres below the ground in vertical trunks, making their use difficult. At the same level, air-to-air trunks and work tunnels would start.

The metro station of the Mountain Mountains is exceptionally deep.

Waterborne transport Cruunu Mountain Coast — Central

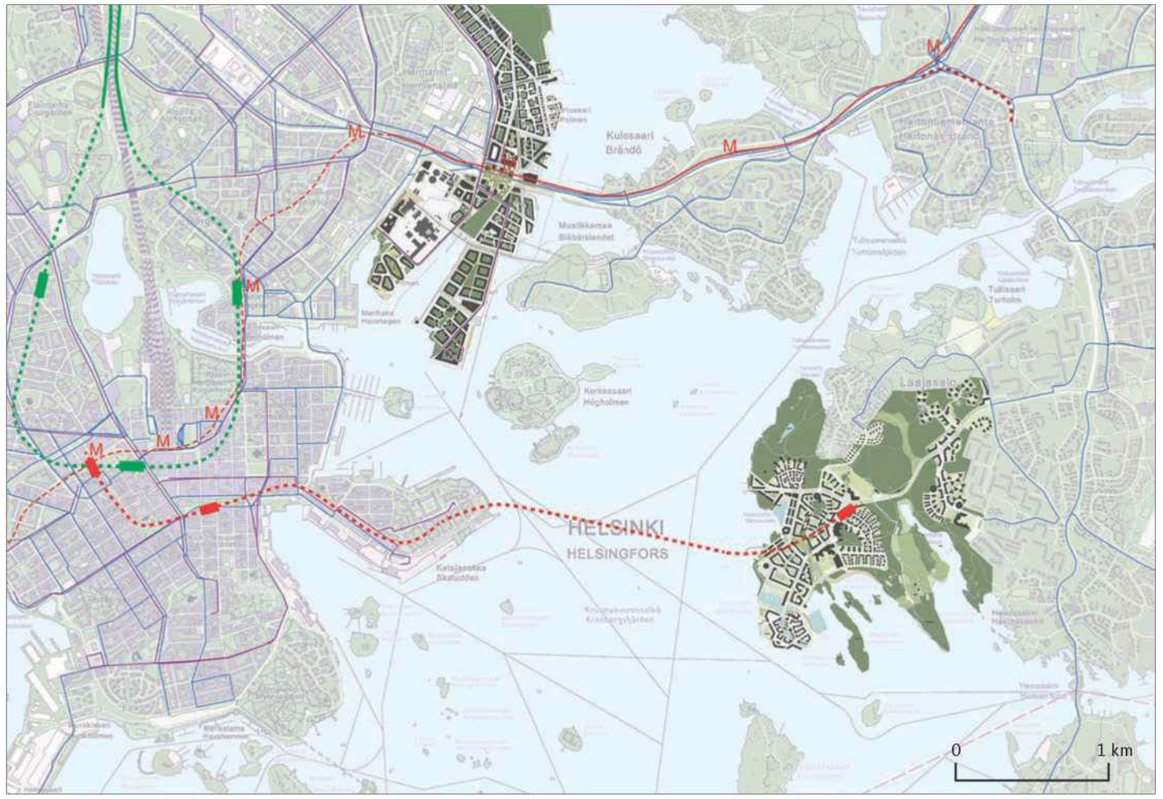
Description of the option

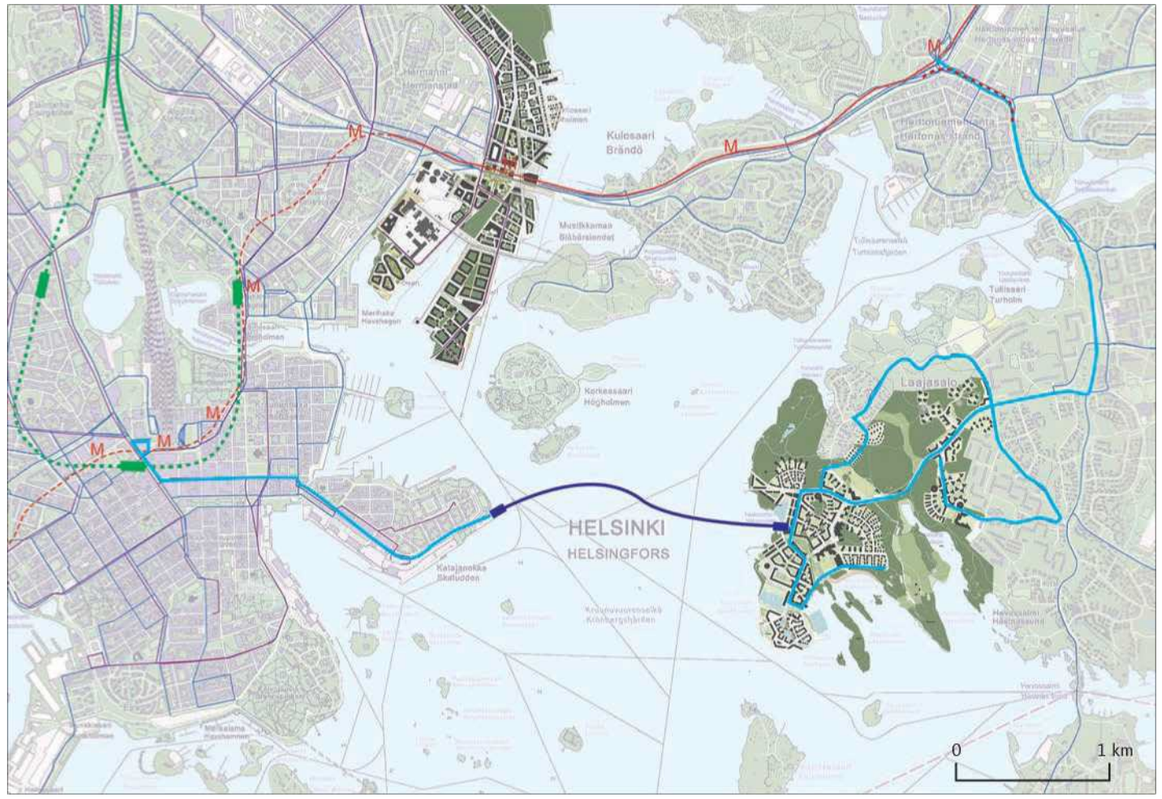
The metro is expected to operate on a 7.5-minute service. Five connecting lines from the Kruunuvuo-Rhine bank would be operated in the Large Room, three of which would also flow to Herttoniemi metro station. The frequency of connecting buses would be between 10 and 12 minutes according to preliminary plans.

Waterborne transport from the Crounu Mountain Coast-Centre. Thewater connection would operate as a bus bridge betweenLaajasalo and the city. The ferry can also be walking or wheeled. The shortest ferry connection is arranged between Katajanoka and Kruunu Mountain.

The Katajanoka tip area allows the construction of a terminal building from the other main cityhalls in a simpler way in line with the current urban picture. The necessary stops and waiting points for buses will be provided for the ferry of the Katajanoka tip. It is also possible to implement the necessary port facilities.

The frequency of the ferry is six minutes and the ferry runs three buses at a time, the fourth is onto the-ferry if necessary.





Cableway Hakaniemi-Kruunu Mountain

Description of the option

The**cableway Hakaniemi-Kruunu Mountain. The**Köysway installation requires a propulsion machinery, a turning station, a basketroom and an operating and control centre. The propulsion machinery and the basket shall be located in the position of the Kruunu Mountain beach. The position shown in the figure is indicative. It is advisable to locate the main control and controlcentre within the basket storage facility.

The option under consideration includes, in addition to terminal stations, stations in Sompa Islands and the High Island. Line approximately 4 km long and average speed with decelerations of 20 km/h (5.5 m/s) where the distance is 12 minutes/direction. The frequency is 30 seconds, i.e. a distance of approximately 170 m between the baskets. There are no more than 48 baskets carrying around 20-30 people and a reserve of 2.

The Hakaniemi and its location in front of the Hakaniemi commercial hall offer great opportunities for flexible, comprehensive and frequent exchanges.

Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain

Description of the option

The cableway of the mountains is operated for about 20 hours a day, all over the week.

The main stations are occupied by 5-10 people.

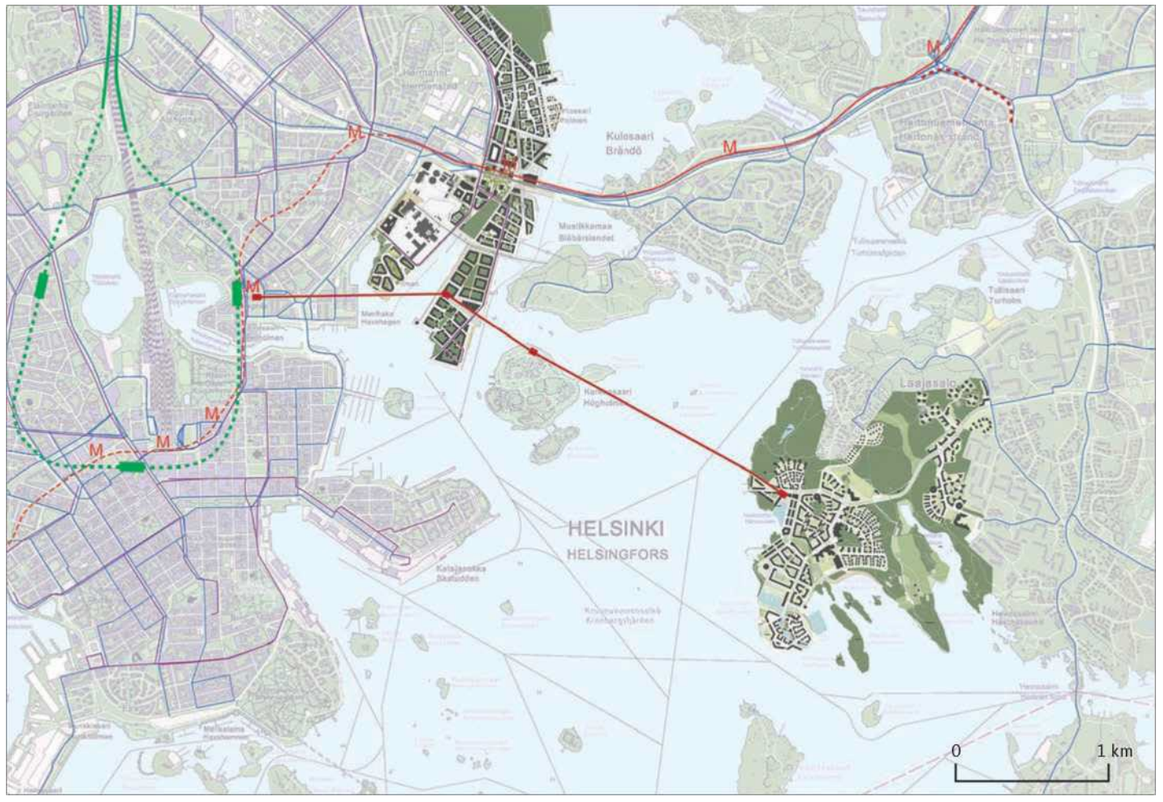
Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain. As in Option 1, but car traffic is derived from Nihdi both towards Liisankadu and the fishing port-Hakaniemi.

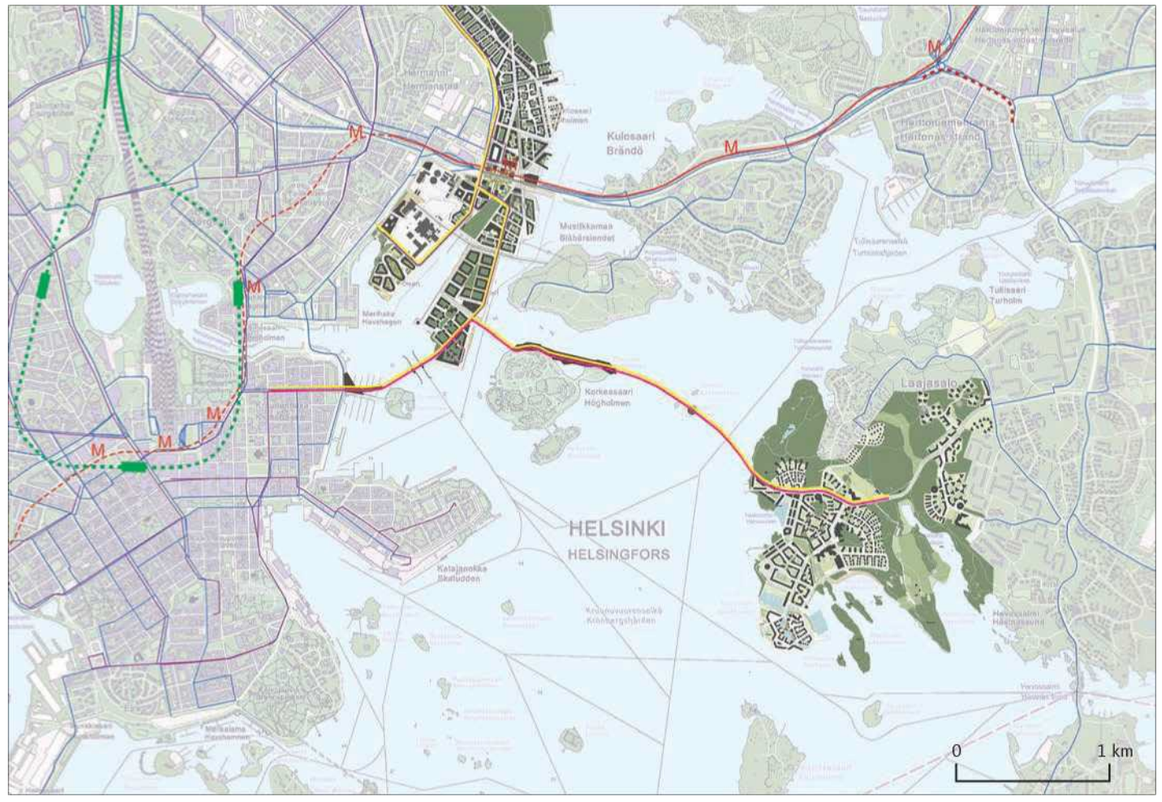
In the section of Nihdi and High Island and from the High Island Kruunu Mountainside, trams,motorway operation VOT, walking and cycling are separated from each other.

Can do so in two stages, such as VE 1. If necessary, the decks of the Kruunu Mountain bridge and other bridges shall be modified at the second stage of construction to allow lanes to be built for car traffic. This requires the structures to prepare for the widening of bridge decks in Phase 1.

Does not include the Tunnel of the Linnanrakentajankis in Herttoniemi.

Options VE 7 and VE 8 were taken into consideration on the basis of the feedback received from the evaluation programme.





Alternative tramway options VE 1 and VE 2 and vehicle option VE 8

When planning the solution for the public transport system of the Kruunu Mountains and the tram connections to the fishing port, the tramway runs from the Kruunu Mountain Bank through the High Island to Sompa Islands and then on a bridge towards Terva Islands and Kruununhaka Liisankadu. The surrogate option in this figure is Option Ve 1.

Under the option Ve 2 tramway runs from Sompa Island via Terva Island from the northern bank to Alexanterinkadu.

Under option Ve 3, the tramway from the Isle of Sompa will be taken directly from the Isle of Sompa to Meriha and from there to Hakaniemi, which already has excellent public transport connections across Helsinki and the capital region, especially after Pisararada.

Also for Ve 4a and Ve 4b tramways through Meriha and Hakaniemi: in the case of Ve 4a by land via Hanasaari and in option Ve 4b by a bridge from the Isle of Sompa.

Figure 1.2. Alternative tramway options VE 1 and VE 2 and vehicle option VE 8.

Previous plans and studies of the project

A number of planning and system reviews have been carried out since 1999 on the public transport connection of the Large Sayo. The list of studies and plans can be found in the listof sources at the end of the assessment report.

At the time of the preparation of the general plan of Helsinki for2002, the rail connection of the Laajasalon- Santahamina region became relevant when considering the possible construction of the Laajasalon- Santahamina regions.

During the drafting of the 2002 zoning plan, a study has been carried out on the alignment of the second Helsinki metro line to the Laajasalo. These exchangesare not considered in this TSI.

The way in which the Helsinki metro was aligned to Laajasalo from the current metroline was drained from the Herttoniemi metrostation during the system-checking of Laajasalo rail options (publications 2008:10 of the Helsinki City Planning Agency).

At that time, the drawbacks were found to be high. In addition,the costs of shooting would have been very costly due to poor ground conditions and technical challenge. Brewingthe MET rod from Herttoniemi requires technical and costly solutions and the demolition of buildings. The current metro line would operate a third metro line and this wouldreduce the service level of the existing metro lines, as capacity would have to be allocated to three lines. These frequencieswould have to be extended on the existing lines. The capacity of the metro on the Kulosaar Bridge wouldnot be verified. This option was not retained for further examination.

At its meeting on 2 June 2005, the Helsinki City Planning Board set out the general planning programme for the Kruunu shore: 'The traffic in the region is based on a direct public rail connection to the Helsinki membrane, which also serves the rest of the Laajasalo. The collective transport-operation will be carried out at the beginning of the construction of the area at the beginning of the 2010's, when it will support a mobile rubber culture based on public transport and will make it possible toplan the area's public transport. As alternatives to the connection, both bridge and tunnel solutions will be explored. The sub-scheme shall be reserved for the construction of a metro connection from the centre to Santahamina from the centre through the Kruunu Mountain.'

On 17 June 2008, the Helsinki City Planning Board decided to propose to the City Board that the first railway line inthe Laajasalo phase should be selected from the Laajasalo to the city centre through the High Islands, Sompasaari and Kruu nunha by wayof a tramway with a bridge.

On 12 November 2008, the City Council of Helsinki decided to approve the further preparation of the public transport solutionfor Laajasalo as the basis for the tramway and bridge option between the Laajasalo and the High Isle of Sompasaari-Kruunhaka. In its implementing decision of 17 November 2008, the City Council requested the Public Transport Board and the Municipality of Urban Planning Boards to draw up the project plans and the necessary plans so that the tram connection could be carried out in the early years of the construction of the Kruunu Mounu beach. This option is option 1of the r vibration report (VE 1).

The Environmental Impact Assessment (EIA) programme was drawn up in 2010. The evaluation programme was available between 13 September and 12 November 2010. The Joint Authoritydelivered its opinion on the evaluation programme on 3 December 2010. On the basis of opinions and opinions, a cablewayoption and a tramway with vehicle traffic were added to the options to be explained. These options are the exchange benefits of the evaluation report 7 (VE 7) and 8 (VE 8).

For tram tea, walking and cycling bridges between the Mountains and the fishing port, you planned a-snow race. The task was to plan a bridge between Kalasata manNihti and the Kruunu Mountain Bank via the High Island. In June 2013, the winner of the 11 competition proposals from 10 international teams was selected from the “Gemma Regalis”. One of the objectives of the contest was to provide the necessary material forthe assessment of environmental impacts.

Rail options for the large-scale railways, EIA report

1.7 Project integration with other plans

The project relates, inter alia, to land use planning inthe following areas:

- Crown Mountain
- Herttoniemi; Eastern Waterway and Linnanrakantajan Road
- Fishing port area
- Other development of the broad room (centre)
- Development of the High Island (Bulk IslandMaster Plan)
- Helsinki Park.

The project area is close to areas where the principles of planned land use and transport connections remain to be resolved. These include Vartiosaari and Kivi. Santahamina is assumed to remain at the service of the armed forces. However, the influence of Vartiosaaari and Santahamina ontraffic has been considered as a sensitivity analysis.

Other transport projects that are closely linked to the Larasalo rail solution are the Linnanrakåntie tunnel and the Töölö metro, Pisararata and the development of the Helsinki tram. VE 0 — VE 7 are included in therange of options VE 0 — VE 7 to be examined in the Omnibus Impact Assessment.

At its meeting on 11 March 2014, the Helsinki Urban Planning Board discussed the potential for long-term traffic shedding in the Laajasalo-Herttoniemi area.

In addition, the plans under the Helsinki Energy Development Programme to increase theuse of bio-combustion are intrinsically relevant to the project. In particular, solutions for the Hanasaari power plant are essential for the project. The maritime transport and maintenance requirements of the power plant's fuels are partly located in the same area as the different conditions of this EIAproject. Helsinki Energia has carried out an assessment of itsproject, etc., which will be available in spring 2014.

1.8 Individual reports carried out in the context of the environmental impact assessment

During the EIA procedure, the Helsinki City Planning Agency has commissioned ad hoc studies:

- A bird lying on the back of the Cruunu Mountain,
- The fish structure and nursery production,
- From subspring animals of the Crown elephant,
- The beach and aquatic vegetation of the mountains of the Crown,
- The influx of water and water from theCruunu Mountain and Sompa Islands;
- The effects of wind on the public transportconnection of the Broadsalo, and
- A number of studies on the levels ofden and nutrients in the seabed sediment.

See List of Sources.

2 Description of the current environmental status of the planning area

This chapter presents the current state of the built and natural environment throughout the planning area as a basis for assessing the impacts of the options. In addition, abbreviations of the separate nature and water studies prepared for the assessment have been made.

2.1 Land use

The Kanta kaupunki is a very densearea of mixed land use with centre functions, housing,services, offices and production facilities. Kruununhaka is mainly an area of residential and office buildings. Thereare services, "stone shops" in the ground floor of the buildings. The eastern coast of the Kruunhay, the Northern Bank, is a marina area and the Tervasaari off it is used for recreation.

Hakaniemi is a dense confluent conurbation withhousing, services and premises. The Hakanimen tower is the functional heart of the area. Merihaka, located east of-Hakaniki on the other side of the road of Sörnäis ten, is a district of residential and office buildings, including a sportscentre and a general sauna.

Hanasaari is home to the Hanasaari B power plant and its coal dams, fuel storage facilities, coal demolition platform and other energy supply activities. The area of the fishing port is a former cargo port area that is being developed as a major residential, service and job area. Parts of the area have beenmade available for residential use during 2012 and 2013, and around 2 000 people lived in this area of the Sörnäistenniemi at the beginning of 2014. On the east of Hanasaari there is Sompasaari, whose residential planning is in progress. There area number of temporary uses in the port, including interim storage of masses in the Sompa Island, and the construction of, inter alia, infra and other civil engineering works to prepare and serve new uses.

The High Island is an old national park archipelago, one of the oldest zoos in the world, founded in1889. There are numerous buildings, coffee lotions, restaurants and animal shelters and pens on the High Island. Mustikkamaa is located north of the High Island, which is an important recreational area. In Mustikkamaa there is a beach, marina- and dock, sports activities, a summer theatre, a working-house, which is now a restaurant and asales outlet of the High Island flag with its cafeteria shop.

Kulosaari, mainly used for residential purposes, is known as a pleasure forits parasite. The villas are mainly located on the island's southern and eastern shores. In the centre of the island there are houses and shopping centre built in the 1960s. Who alsohas a school and a crèche under construction. The southern side of the island, with its own house, is located inKulosaa ren Kartano, where a restaurant is currently in place.

The Kruunu Mountain, located on the west bank of the Lajasalo, is an old skirt and calving area. In the north, there-are desperated pleasures from the former German settlement of the 19thcentury. The area of the Porto Petroleum Port has been rather heavily built, but the former operations have been closed down and the structures dismantled. In the north and centre of the large-scale room-there are relatively densely detached settlements with apartments in Kaitalahti, Hevossalm, Jollas. The Cortelra Keam is largely open, in the spirit of modernism,supporting structures. The services of the district are mainly located in Yliskylä.

Santahamina, located to the south of the Laajasalo, is a militaryregion. Most of the island is in unbuilt and military exercise. The barracks are located in the north-west of the island. There are also permanent settlements on the island.

The Finnish Castle seabird, consisting of eight islands off Helsinki, is part of UNESCO's landheritage sites. It is a historic monument and one of the most popular attractions of great importance for the city of Helsinki. About 800 Hellsicians live on the island.

The waters of the planning area consist of several recreation cruise properties, which are mainly owned by the City of Helsinki. There are state-owned registered properties in Katajanoka, which are the port of icebreakers. (Real estate information service of the Land Survey, 2013).

The coastline of the metropolitan city of Helsinki has been modified, among other things, by water filling, in particular as achicken in the last 100 years.

2.2 Recovery situation

2.2.1 National spatial planning objectives

National site management targets are part of the land use planning scheme under the Land Useand Building Act. The National Council of Ministersapproved the site management targets in 2000 andtheir revision 2008 (VN 13.11.2008). According to the Land Use and Building Act, the objectives must be taken into account and their implementationpromoted in the planning of the province, in the planning of municipalities and in the activities of the State authorities.

The national objectives for territorial use state that the development of regional structures is polycentric, networked and based on goodtransport links. In southern Finland, in particular, rail connections betweenthe Hels Gi area and other urban centres need to be developed.

In different ways, national spatial planning targets recognise the need for urban integrity, the balanced-development of remote areas based on existing centres, the reduction of the need for passenger car transport, the creation of housing conditions and the need to adapt to climate change. Spatial planning must contribute to preserving the multiformity of areas that are valuable and sensitive to livingand non-viable nature, and to prevent and reduce nuisances from noise, vibrations and airpollution. The preservation of nationally important cultural and natural environments must be ensured. Transportsystems are developed as packages covering different modes of transport.

With regard to the area under review, it is noted in particular that the urban structure of the Helsinki region isbeing degraded on the basis of rail transport, climate change mitigation and housing revenuein support of the organisation of Tannon. The extension of the rail network shall take into account in particular the use of surrounding areas and the surrounding environment, the continuity of green spaces, and the expansion of the metrover retardation to the west and east. The urbanfabric is developed in such a way that services and jobs are well accessible and close to residential areas.

2.2.2 Regional plan

In the area under review there is a regional plan for Uusimaa, the 1st or local authority plan (YM 6/2010, KHO 2012) and the 3 rd phase country-municipal plan adopted by the Ministry of the Environment on 8 November 2006 (confirmed YM 2012, appeals are pending before the NA). The provincial plan *(Figure 2.1)* designates a long line of regional traffic from Katajanoka throughthe Kruunu Mountain to the Laajasalo, as part of the wider Helsinki region rail network covering the western metro and Pisarara-dan. The metro of the Laajasalo and the Kamppi-Töölö-Pasila metrotracks are presented as indicative guidelines in accordance with the plans of the Helsinki zoning plan.

Kruununhaka, Hakaniemi and Katajanokka are centred on the areaof the mints. The Crown Mountain is the areaof the urban function. From the western part of the Krounu Mountains, Laajasalo ETEalong the west of Laajasalo has indicated the need for a green connection.

The districts of the Customs Island in the north of Kruunha, Katajanoka, the High Island, Kulosaaari and Laajasalo and Stansvik in the south are important areas for the cultural environment or for thepreservation of the landscape. There is a recreation area between the Kruunu Mountain beach and the current settlement of the Larasalo, where there is a valuable dense area or other geological formation.

In Uusimaa's 1st staging plan, the country has been identified by activities that cause significant environmental disturbance to themunicipality and, in the 3 rd phase town plan, the Espoo wastewater purification distancing. These layouts do not assign any functions to the mouthmowing area.

The 2nd phase county plan for Uusimaa *(Figure 2.2) is a good* start at theProvincial Council on 20 March 2013 and must be validated by theMinistry of the Environment. 2. The staging county plangives details of the current provincial plan. The plan shows the need for transportconnections between the metropolitan and the Mountain of Kruunu, as well as areas of importance for the preservation of the cultural environment that are smaller than the current provincial plan (RKY 2009). The main elements of the Crown Mountain and the Larasalo are:

Figure 2.1. An extract from the informal combination of the provincial plans in force in

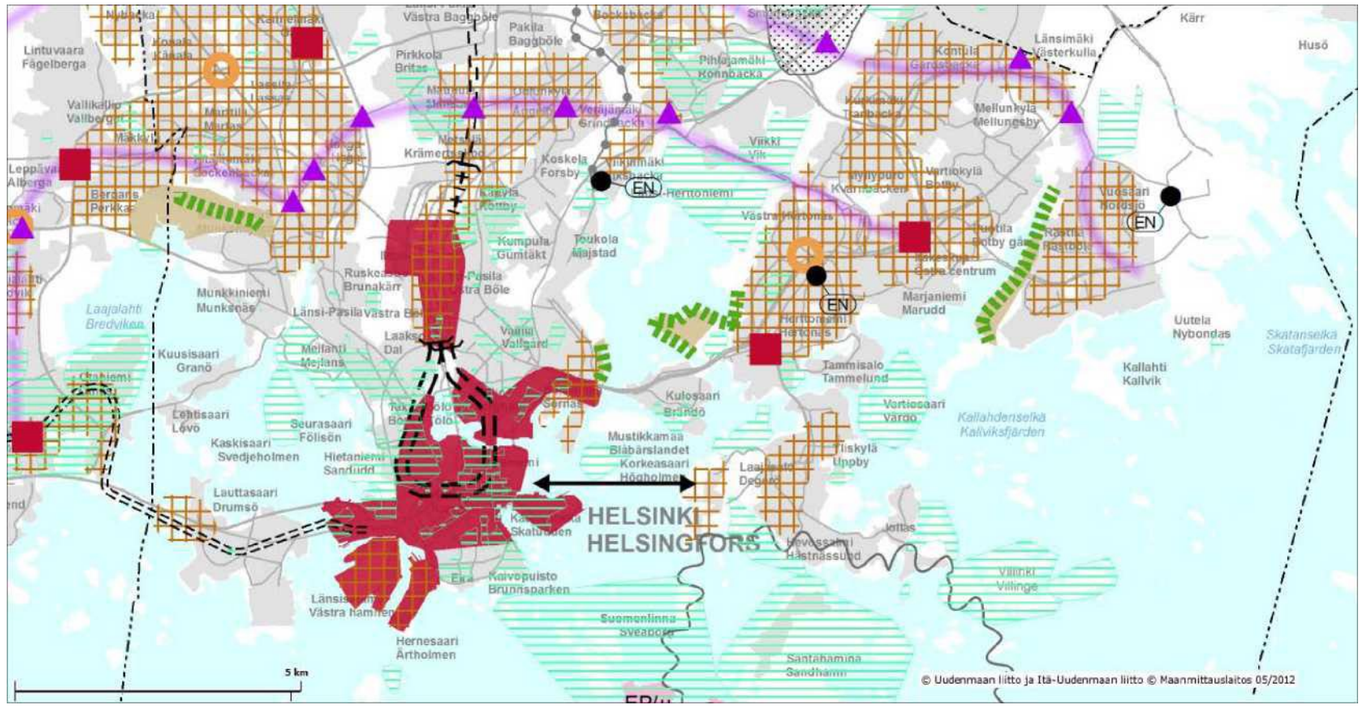


Figure 2.2. An extract from the 2nd Step Formula for Uusimaa under

designated as a condensable area. A defensive noise area has been designated around Santahamina.

The drafting of the 4th Uusimaa staging plan isvireil. The staging town plan may supplement and modify the existingmass provincial formulae. Themes to be addressed include, in particular, provincial industries and innovation, logistics, wind power, green structure and culturalworks.

Indicative regional line alignment

•HESS) Area reserved for energy or waste management

Areas of central activities

An area of importance for the preservation of the cultural environment or landscape;

Valuable area or geological formation

Formula mark Selite

Condensed area of urban operations

Waste water tunnel

Traffic tunnel

Green Connectivity Need

Transport connection need

Port

Transversal public transport link between the capital region

The Armed Forces Region

Recreation area

Area of urban operations

Rail options for the large-scale railways, EIA report

2.2.3 General layouts

Helsinki Master Plan 2002

The Helsinki Spatial Plan 2002 *(Figure 2.3)*, approved by Helsinki City Council on 26 November 2003, is in force in the area. The objectives of the zoning plan refer to the good public transport connections based on the location of new-housing, and in particular to the urban structure based on rail transport. With regard to the urban design solution, the generalformula states that "the main city rail network is part of an urban development solution in the metropolitan area, where growth is absorbed in a sustainable manner in Helsinki and the Helsinki region, strengthening the role of public transport and light transport."

The general plan map shows a metro or a railway with a seam from Katajanoka through the Kruunu Mountain backlash to the Broadsalo. KAAdoes not specify whether it is a bridge or a four-way link. The locations of the new stations are marked for the Erder, the Commerce Tower, the Katajanoka, the Kruunu Mountain and the LAA inthe nose.

The general plan report states (page 147) that "The rail solution in the area is metro, which is at the same time integrated into the wider rail network solution of theback town of the hen. 'The connection also paves the way for the potential conversion of Santahamina's military area for residential and recreational purposes, as indicated in the-master plan. The central areas of operation of the nuclear centre and of the Kruunu Mountains, Laajasalo, the Eastern Centre and the fishing port are located in the area of inspection.'

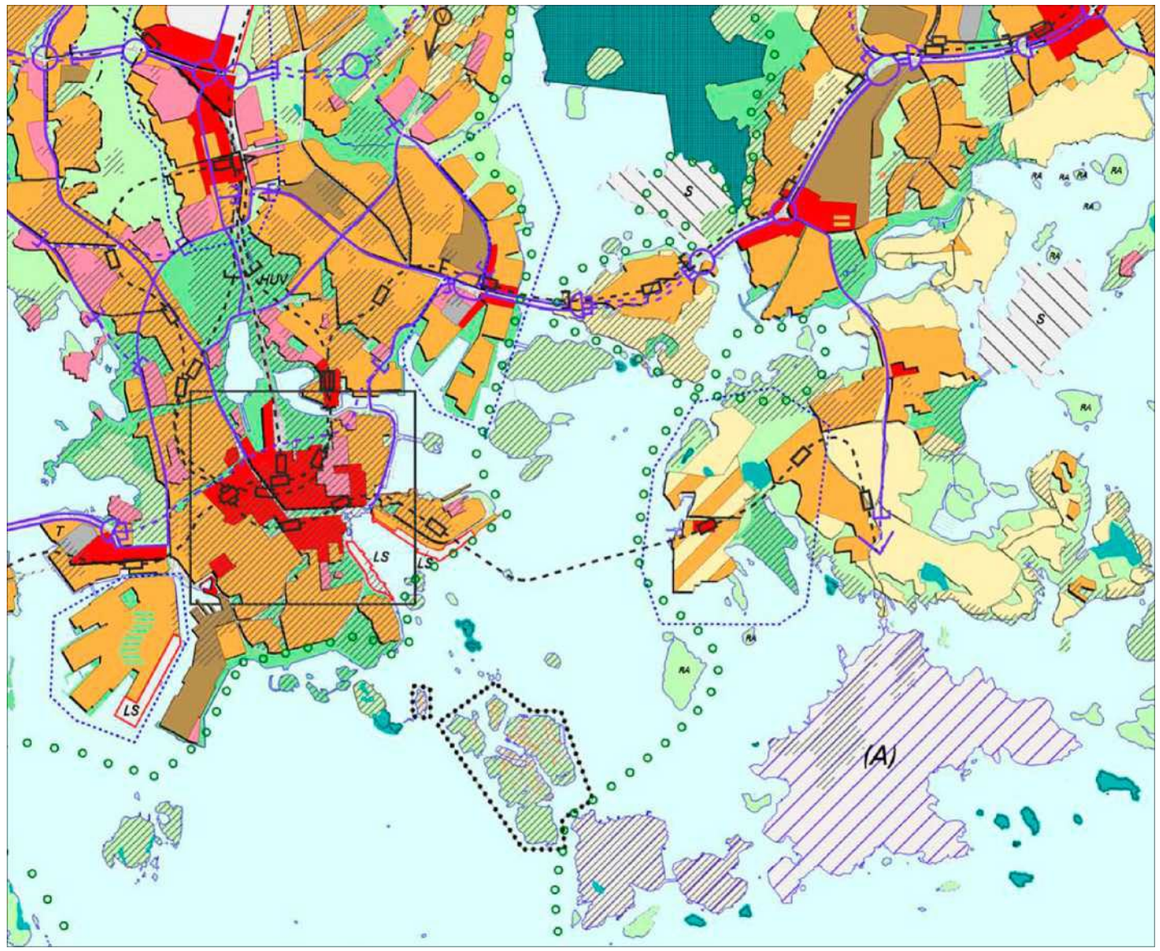


Figure 2.3. Extract from the Helsinki Master Plan 2002.

the depth of the surface is estimated to be 0 to 20 m above the ground.

The waters between Katajanoka and the fishing port and the Laajasalo and the Kruunu Mounu Mountain (Kruunu Mountain spine) form part of the Helsinki Park, whichis listed in the zoning plan, which also includes the lands ofthe High Island and Mustik KAMAa. Katajanoka and Kulosaari are marked asareas of skirts or houses with housing and premises, which is in line with their current situation. The Kalasatama is marked as a maritime area with an apartment/holding, which will form the new eastern edge of the metropolitan city. In the mountains of Cruun, there is a residential/business area with both small-scale and apartment blocks in the zoning plan. The contemporary construction of the Kruunu Mountains andthe Laajasalo leaves a recreation area and a peri-urban park. The most valuable forest areas in the Large Storage are designated as nature reserves. In addition to these, there are also important natural values in recreational areas. In the south, the islands of Finland are UNESCO's World Heritage Site. The southern parts of Kulosaaari, the Mustikkamaa, the Korkein Island and the Finnish Castle, as well as part of the Laajasalo and the metropolitan town, are areas of cultural history, architectural and landscape interest.

The description of the zoning plan states: "The spatial vision and urban design of the area's direction in the direction of the area is accompanied by the objective of making the area an efficient maritimeurban unit — this requires a direct rail connection from the region to the city centre of Helsinki."

New general plan for Helsinki

The Helsinki City Planning Agency has started to develop a new zoning plan in 2013. The vision of the zoning plan has been completed in December 2013. Vision 2050 is the long-term target for land use until 2050. The baseline for the zoning plan is that Helsinki will have around 860 000 inhabitants and 560 000 jobs in 2050. It willmean about 260 000 new inhabitants by 2050. The vision work is based on the idea of Helsinki as a rail network city with an expanding main centre of gravity — the Cities. The vision also looks at Helsinkias part of the neighbourhood and the network of European metropolitans.

Rail options for the large-scale railways, EIA report

The core message of the Vision is clear. In the future, Helsinki will be a rapidlygrowing urban rail network city with an expanding main centre and other emerginghubs. The local train and metro provide fast radial connections between the main centre and the rest of the region. The Picaraitio roads complement thetransport system as a high-quality network. In particular, the city is condensed along transversal backbone connections, in expanding centres and in existing motor-strophic areas. Urban space is designed underthe conditions of pedestrians, not passenger cars. According to the vision, in 2050, the seaside and the archipelago will be active platforms of activity, including work and residential areas, parks, cafés and general saunas, without forgetting natural landscapes suitable for silencing.

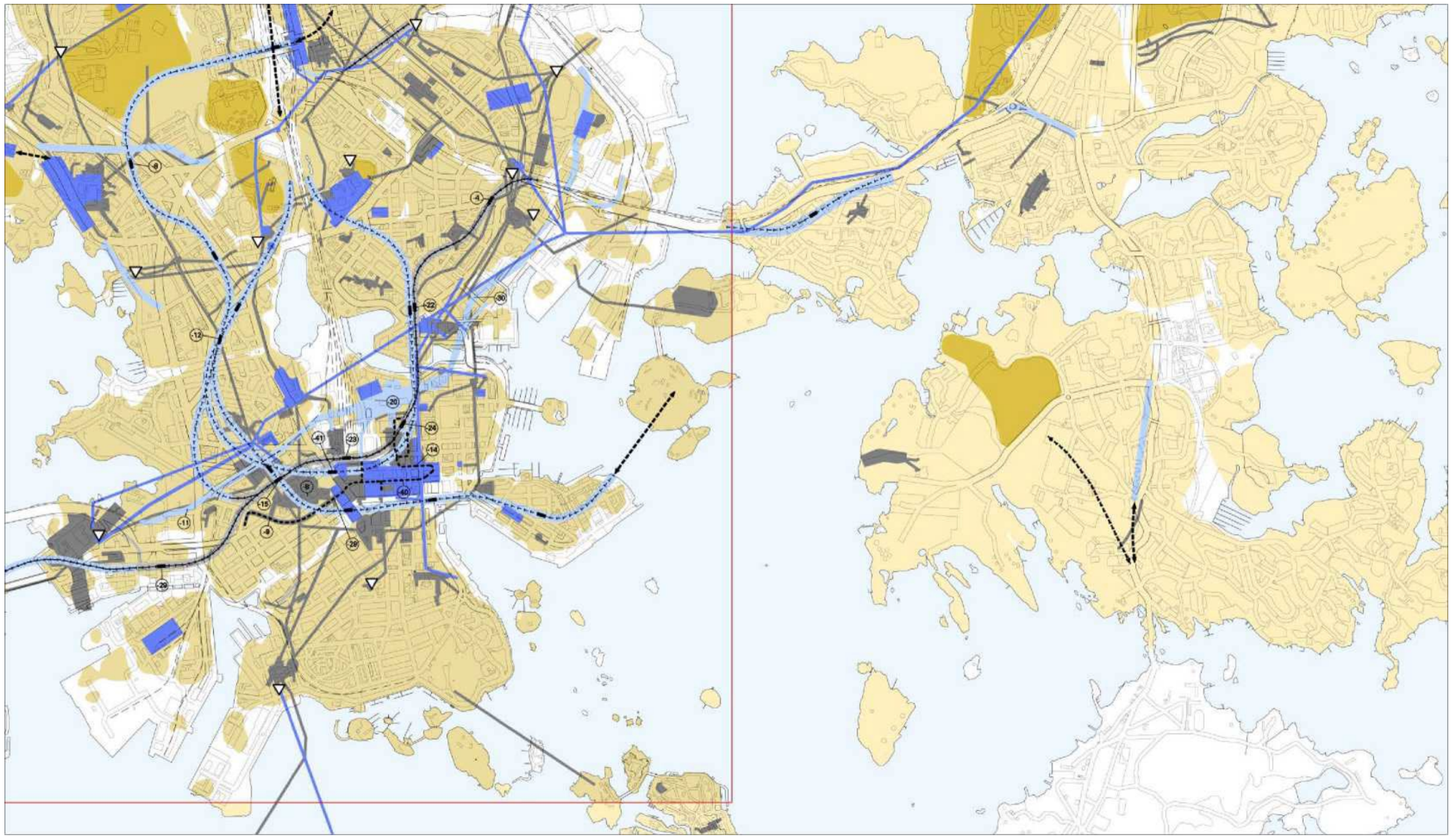
At its meeting on 3 December 2013, the UrbanPlanning Board unanimously decided to give good reason for drawing up thedraft Helsinki zoning plan, together with the annexes to the Vision 2050 zoning plan.

Helsinki underground master plan

Helsinki underground spatial plan No 11830 has entered thecountry on 18 November *2011 (Figure 2.4)*. The underground master plan guides the use and accommodation of new major underground rock farms and their coordination.

The formula shows the need for mouth and mowing of a new rail link by a dotted line marking. In the north-east of Katajanoka and the High Island, as well as between Hevossalm and Customs Island, "further planning needs/coupling ofthe connection will be refined". The current underground space is marked on the Crown Mountain.

The Katajanoka, the High Island and the Broadsalo are marked as surface-back pallets, where the depth of the rock surface is estimated at 0-20 m above ground level.



Formula mark Selite

Existing underground transport tunnels and associated facilities

Planned traffic tunnels and associated facilities

Planned underground facilities

Existing underground facilities built

Kallioresurssi suitable for the construction of underground facilities

Tunnel and main stations

Indicative alignment of the planned rail tunnel and location of stations

Need to plan a transport link from or between regions

----- Maintenance tunnel

Metropolitan berries in the metropolitan area

Suburban bedrock areas

VCurrent, particularly important access to technical maintenance to an underground space or tunnel;

Figure 2.4. Extract from the Helsinki underground spatial plan (Kvsto 8.12.2010). The formula has legal effect.

Partial general planning

The part of the fishing port (Sörnäistenrannnan-Hermanninranta) was approvedby the City Council on 30 January 2008. The plan assigns to the area of thefishing port an apartment block or apartment area with services and administrative areas (CoR), recreation (V) and near recreation areas (VL), servicesand hall non areas (P and PY) and central operations areas (C). The southerntip of the NIH di has been assigned to the street/tor and the marinama (W/LV). The west coasts of the Mustikkamaa and the High Island are marked as nearby refreshment areas. The southern seas are marked as the waters where bridges may be built.

With the exception of the Stansvikinnumme residential area (A), thezoning plan entered into force on 23 June 2011 for the part of the Kruunu Mountains and its public transport connections. Housing areas (A), apartment blocks (AK/AK1), small-houses (AP), services and hallnon (P) and recreation, park and sports activities (V/VU/VP) have been allocated to the area. The tramway link is indicated as anindicative part of the area on which a tramway (ra1).

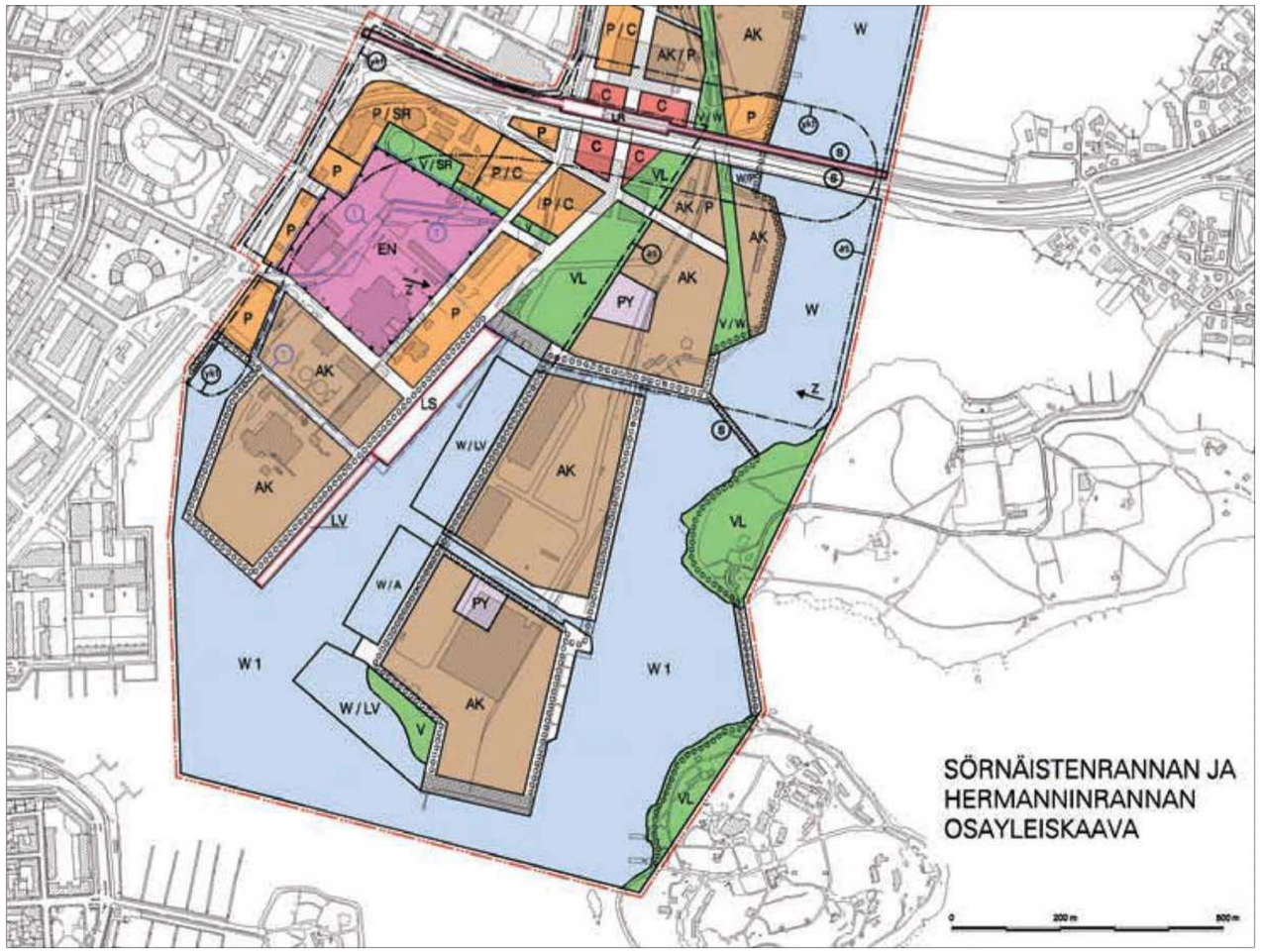


Figure 2.5. Extract from the Sörnistenranta-Hermannranta's sub-scheme (Kvsto

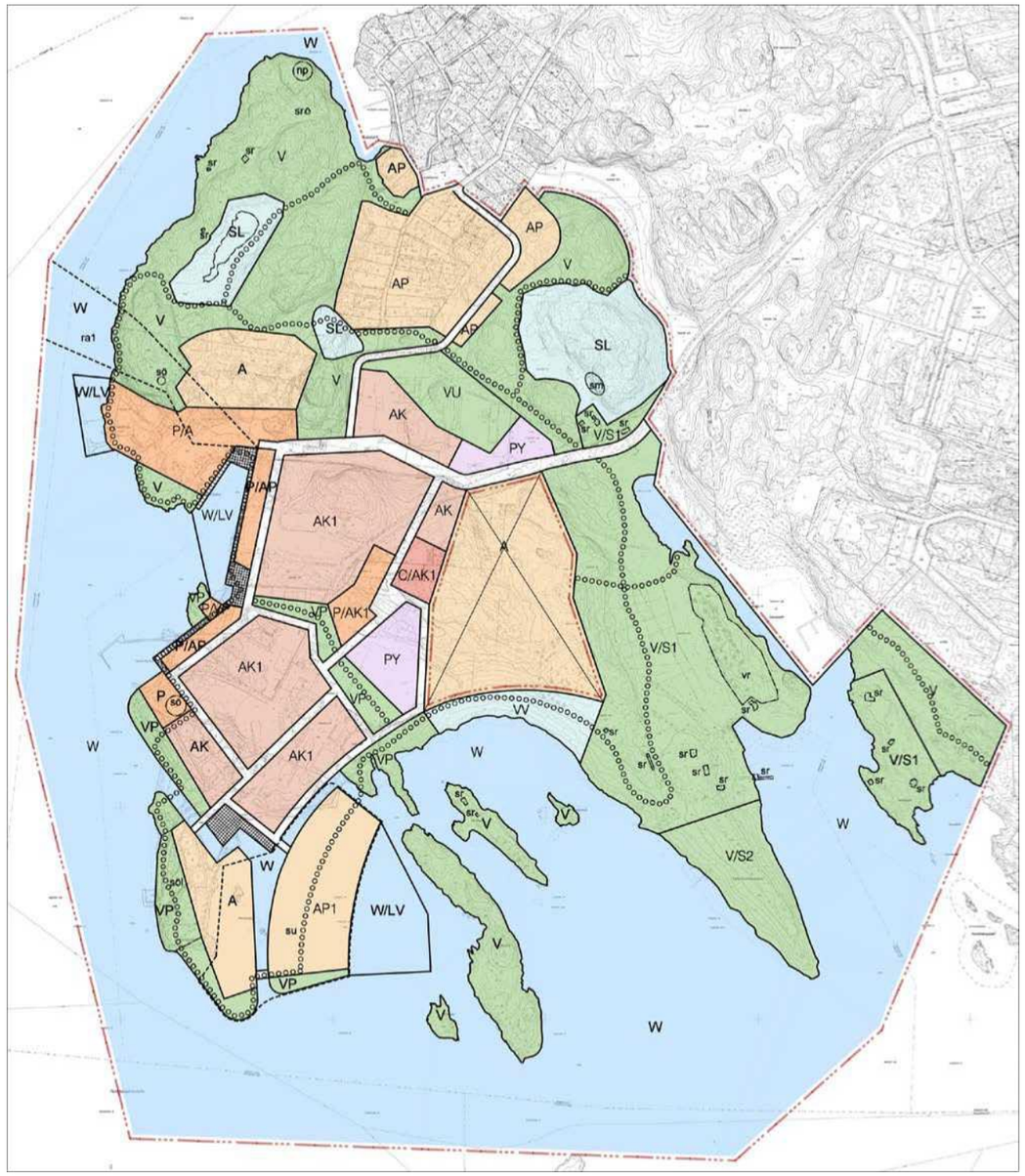


Figure 2.6. Sub-scheme of the Kuunu Mountain and its public transport connections (KKO

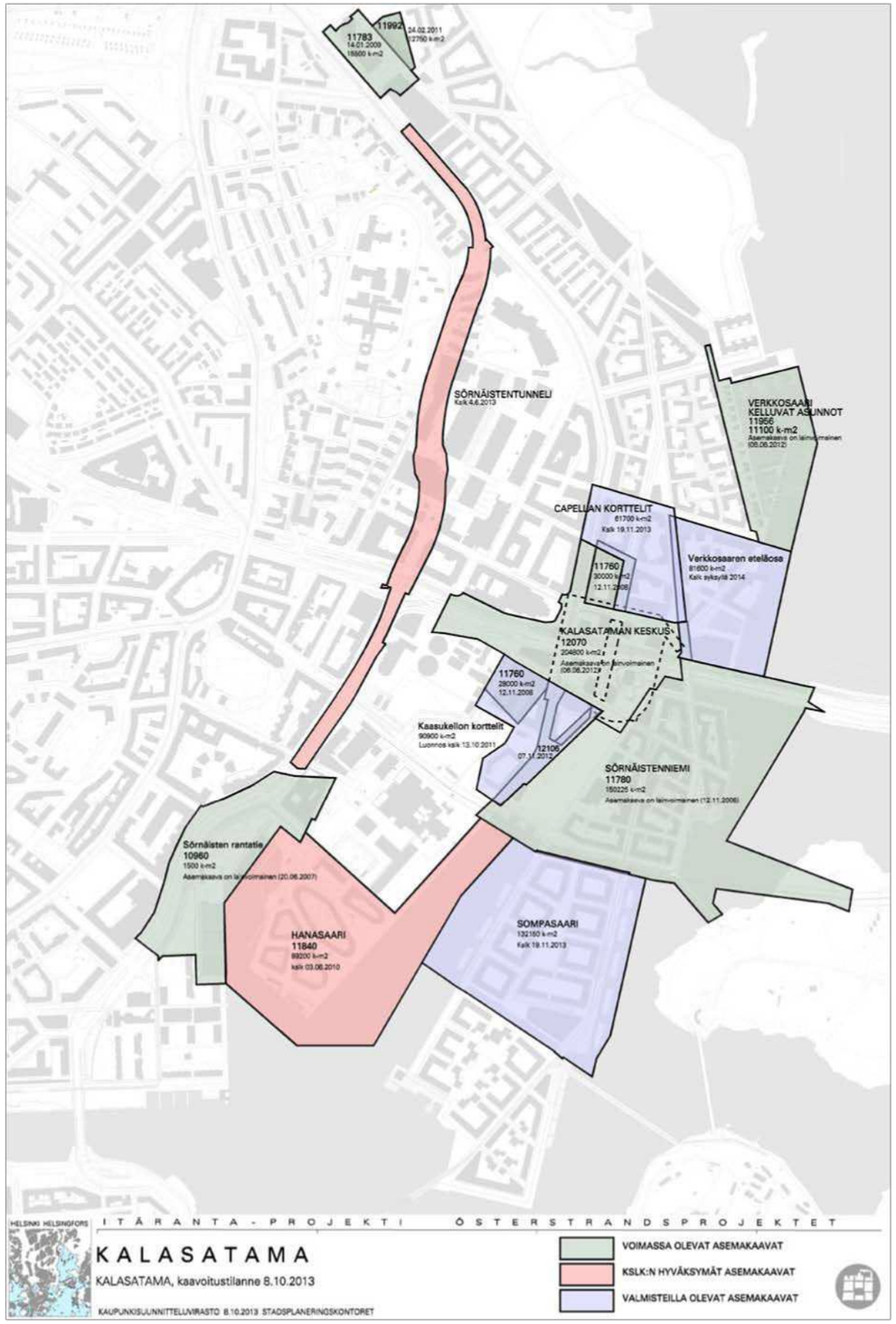


Figure 2.7. Layout status Fishing port area (KSV 10/2013). On 3 December 2013, the Urban Planning Board decided to propose to the City Council that the Sompasaari draft urban development plan be approved.

2.2.4 Station plans

The Kruunhaa, the Terva Island, Hakaniemi, Meriha, Mustikkamaa, the Horse Island and Kulosaar, and the main-part of the Broadsalo have existing station plans. There is notown plan in the area of the ferry terminal at the soot tip.

The area of the fishing port (Mermannranta-Hermanninranta)is under construction on the basis of asub-scheme plan for the decommissioned areas.

The centre of the fishing port and the Sörnäistenniemi (Sörnäistenniemi) area, which is situatedto the south of the Eastern Corridor, have the force of res judicata. In the northern part of the sub-scheme, Kyläsaari has final urban development plans.

Amendments to the Hanasaari and Sompa Island urban-development plans are pending.

The southernmost part of the fishing port, Niht, has not yet started drawing up a town plan in 2013.

In the districts of the sub-division of themountains of the Krounu Mountain and the land-use section, the development of urban plans is underway *(Figure 2.8)*. The area of Hopealakso and the south of Kaitalahti, the western part of the Islands of Koira, Gunillango, the Bay of Haakon 1 and 2 and the Kruunu Mountain beaches, the park and the service quadrant are in force. For the western part of the Kruunu Mountain, the Koi-Ranes and Stansvik, there is a development planin progress.

The station plans to be drawn up in the planning areaare set out in the table *(Table 2.1)*.

Table 2.1. The most important plans to be drawn up by the region, situation 01/2014.

Name of the urban	Street number/Dispension	Phase	Objective
Hakaniementor	KSLK 2008-1659	Draft layout	Car park and commercial space
Hanasaari region	11840 KSLK 2007-0017	Scaling-up proposal	The Hanasaari A power plant and open coal storage area shallbe converted for residential use
Sörnainen, Sompasaari	12200 HEL2013-008387	Scaling-up proposal	Design of residential districts in the former port field
Mount of Crouse, Cruunu Mountain	HEL2012-000225	Start	Conversionof the north-western part of the oil port into a residential area and arecreation
Island of Cruun Mountains, Isles of Dogs	HEL2012-000225	Draft layout	Extension of the Island of dogs by sea and the transformation of the Island intoan area of residence
Cruun Mountain, Stansvik Region	11960 HEL2011-001170	Scaling-up proposal	Protection formula

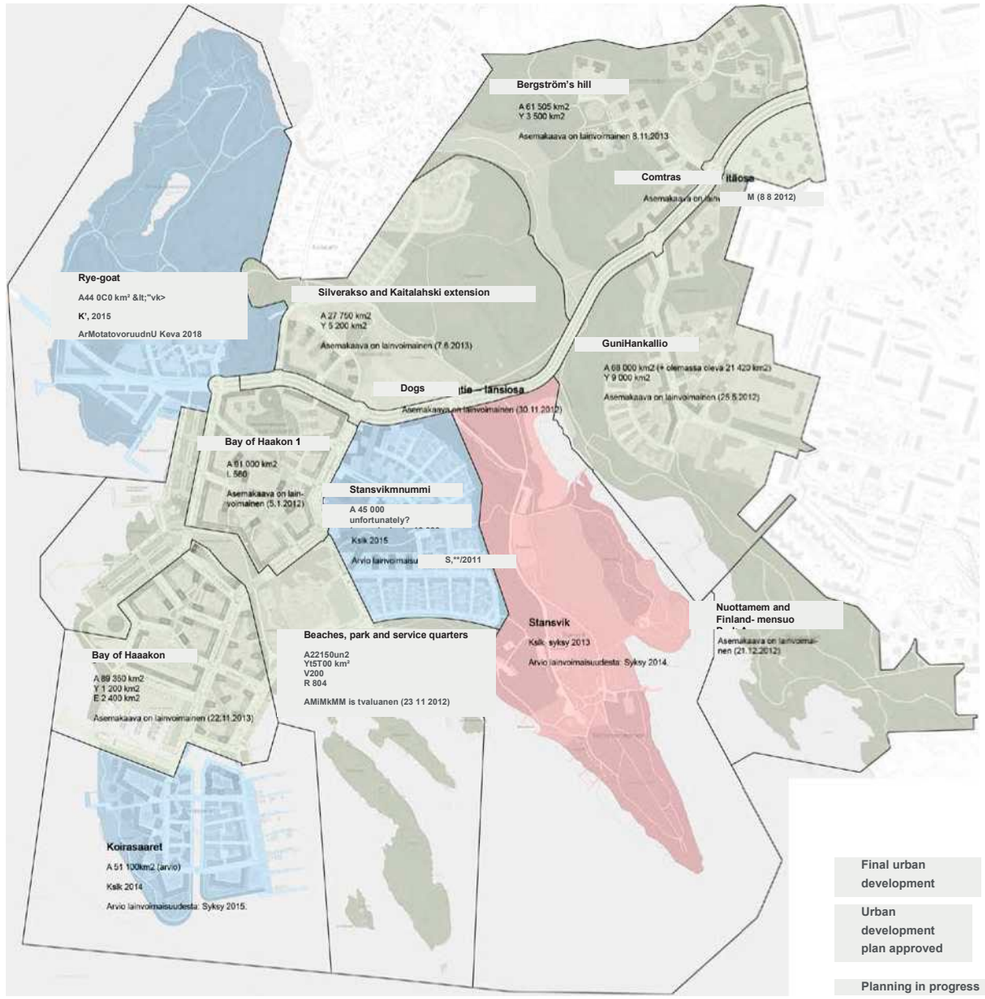


Figure 2.8. Zoning status of the Krounu liner (KSV 9.1.2014).

Transport

Part of the area of the Kruunu Mountains is currently in the process of treating contaminated land, including preparatory worksfor cruelting, and some of the site, includingnailing and street works. Traffic is mainly relatedto construction.

The main public transport connections for the large-scale hall aregenerally arranged with connection buses to the Herttoniemi metro station, from which the metro to the city centre of Helsinki and the mouth of theEastern Centre. There are currently six connecting lines and a good level of-service. Metro will stop operating at 23:00 hours, after which the direct bus lines operate from the centre to Laajasalo.

Vehicle traffic to Broadsalo passes from the eastern waterway through the Linnanra-Field Roads-Broadcasting Points. The main route of light traffic onthe main track of the eastern waterway follows the same route. In the direction of the centre, virtually all traffic passes throughthe bridges of Ku losaari.

Most of the previous shipping traffic in the Port of Sörnainen has moved to the port of Vuosaari. Shipping is still present in the fuel port of the Hanasaari power plant. Between 40and 60 coal ships and barges are visited by the port foryears. Most of the annual consumption of between 400 000 and 600 000 tonnes of coal takes place in the period October-March, with some 2/3of transport operations already taking place. The Hanasa Islandmust be able to absorb up to 100 000 tonnes of coal per month. There are currently 10-20 oil berths in the port each year. They are almost entirely in the period October-March. The fuel port is also operated by port icebreakers and tugs. Cruise ships departing from the southern port and Katajanoka to Tallinn and Sweden can also be considered as ship traffic in the project area.

In addition to shipping, the project area is characterised by a large number of connections, such as the links between Finlandlinna and theHigh Island. In addition, between May and September, there areno daily sightseeing cruises from the Trade Tower.

2.4 Cultural environment

2.4.1 Built cultural environment

In the area of impact of the project, there are not only locallyvaluable sites in the built-up cultural environment at national level. The Museovirasto has carried out an inventory of nationally valuable built cultural environments and has been collected in the RKY2009 database.

Built cultural environments of national value relevant to the project include:

- Summer entertainment of the Helsinki steam shipping routes in the northern partof Laajasa lon
- The High Island People's Park
- Old part of Katajanoka
- Horticultural city of Kulosa Island
- Herttoniemi map park
- Cooperatives & Industry Sharnainen
- Santahamina
- Finnish Castle
- Customs Island.

The Kruununhaa district forms the historic centre of Helsinki. In the middle of the 16th century, the cityof Helsinki was transferred from the mouth of the mouth of the River Van to Estonia. Several buildings in the area are among the oldest in Helsinki.

The North Bank is an important façade of culturalhistory and of the city. The Liisan Park creates an exception to the richerfaçade.

The Tervasaari was first tar, then a plate storage. In the 1970s, the island was built into a park. In the district of Kruununha, it forms its inhabitants.

The Katjakaka has evolved into a representative neighbourhood of the 19th century from a modest part of the woody town since 1890-lu. It has several architecturally high-level residential buildings in the turn ofthe century, including jugend style fields at the beginning of the 20thcentury. The coastal areas on the southern port were characterised bypassenger port activities. The northern regions are recreational marinas at Kanavarata and the stalk of the Street and ports serving icebreakers and other occupations in the eastern partof the Street.

The industrial area of Sörnainenranta, Kalaport and Suvilahti, formed the largest industrialand port area in Helsinki's metropolitan city with a history of the middle of the 19th century. Portactivities have been transferred to the port of Vuosaare. The nature of the area is changing withdisconstruction, with around 2 000 people living in the region at the beginning of 2014.

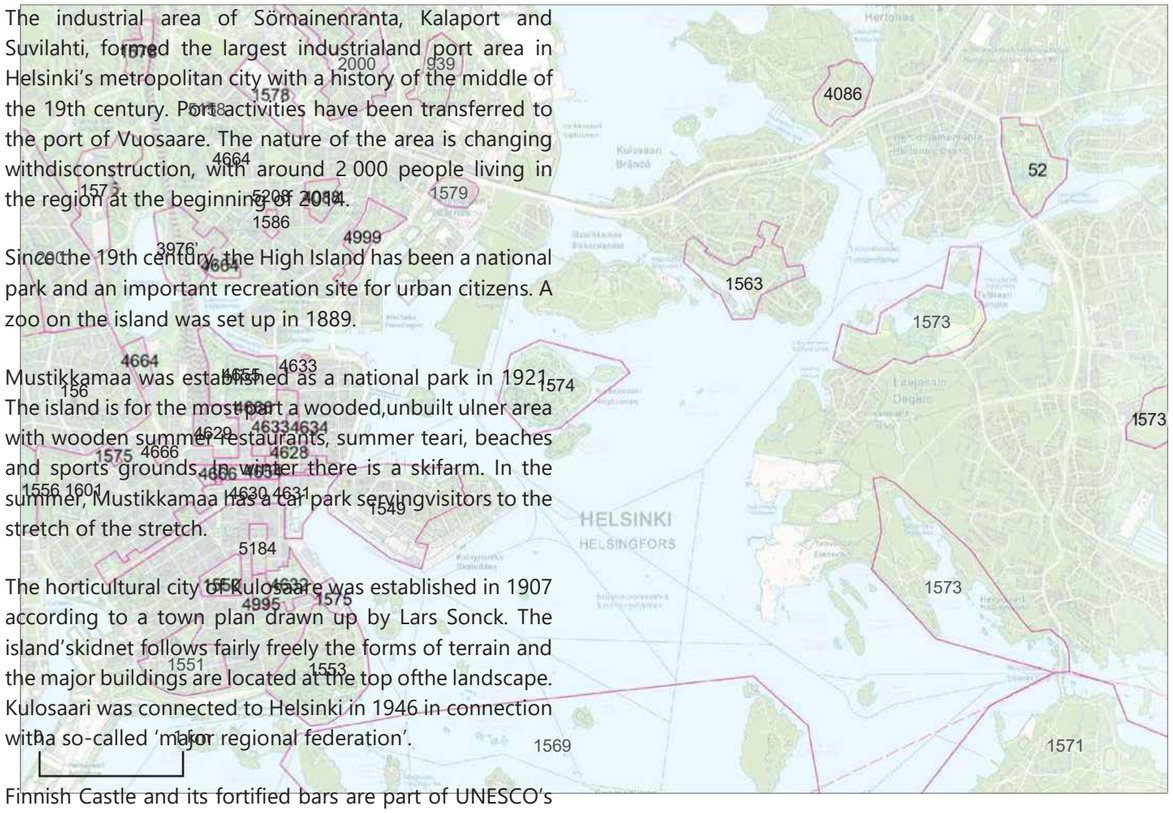
Since the 19th century, the High Island has been a national park and an important recreation site for urban citizens. A zoo on the island was set up in 1889.

Mustikkamaa was established as a national park in 1921. The island is for the most part a wooded,unbuilt ulner area with wooden summer restaurants, summer teari, beaches and sports grounds. In winter there is a skifarm. In the summer, Mustikkamaa has a car park servingvisitors to the stretch of the stretch.

The horticultural city of Kulosaare was established in 1907 according to a town plan drawn up by Lars Sonck. The island'skidnet follows fairly freely the forms of terrain and the major buildings are located at the top ofthe landscape. Kulosaari was connected to Helsinki in 1946 in connection with a so-called 'major regional federation'.

Finnish Castle and its fortified bars are part of UNESCO's World Heritage Sites and are part of the Finnishnational landscape and a built-up cultural environment of national value. Finnish Castle is one of the most popularattractions in the Valtata and the site visited,as well as an important recreation area for Hellsicians. The Finnish fortnight island group and the surrounding sea area are also defined as a nationally valuable landscape area.

In January 2011, the Museovirasto, the Finnishlinna Management Board andthe Helsinki Borough Pung Urban Planning Agency prepared their joint proposals for the new boundaries of the protection zone. The scope of the proposal is substantiallysmaller than the previous limits. The new demarcation proposal covers the neighbouring islands of Finland's maritime landscapeand activities and the maritime areas between them. The fortified plains of the Vallisa Island and the Royal Island and the island of Lanna are functionally essential elements of the history and construction of the Finnish castle. The calves island and Harakka join the Finnishlin—



1549 Old part of Katajanoka
1550 Honoured church with surroundings
1551 EIRA district, Huvilakadu district and Mikael Agricola Church
1553 Quarry park

4086 Herttoniemi and Kumpula marshalling gardens
4088 Torkkelinmäki residential area
4628 Senatetor with environments
4629 Helsinki Rautatientori
4630 Esplanade-Bulevardi
4631 Helsinki Tradetori and the buildings bordering
4632 Stahti towernmäki observatory and park
4633 Helsinki University buildings
4634 Bank of Finland, National Archives and Finishtalo
4654 Helsinki Aleksanterinkatu
4655 Kaisanieme park and botanical garden
4664 Finlandia House, City Theatre and Cultural House
4666 Insurance company Pohjan House, Lasipalatsi and Rautatalo
4995 Surgical hospital
4999 Cooperatives & Industry Sharnainen
5158 Alppila church
5184 Barracks of the archipelago
52 Map of Herttoniemi
5208 Finnish-speaking University of Helsinki
939 Mercenary prison

1556 Hietaniemi cemeteries
1561 Fore-Töölö district
1563 Horticultural city of Kulosa Island
1569 Finnish Castle
1571 Santahamina
1573 Summer entertainment of the steam shipping routes in Helsinki
1574 National Parks High Island and Subsidiary
1575 Olympic buildings
1578 Pasila locomotives, engineering and SOK industrial districts
1579 Suvilahde power plant site
1586 Rock church
1601 Helsinki synagoga
2000 Residential areas of Vallila
2001 Rear-Take apartment area
3976 Veterinary and non-profit-making establishments

Figure 2.9. Sites of the built-up cultural environment around the planning area (Museovirasto RKY 2009).

the na's marine landscape, forming a green zone on the built-up shore of the city, was ring-fenced. The protection of the world'sheritage sites and their protected zones is always a matter of national law. The proposed demarcation would have been practically identical tothe partition of the local cultural environment (RKY) in Finland (see *Figure 2.9*, subject 1569).

The proposal was not adopted and the formerdelta 1991 limit is therefore still in force. The buffer zone extends to thenorth from the Commerce Tower through the northern shore of Katajanoka to the point of Katajanoka and thence due east to the south of the Kruunu mountain (Source Museo Agency 2008).

The Broadtail is an old horticultural area for Helsians. Houses in the villa area north of the Kruunu shore have been left unrepairable. For a long time, the south-western part of the Large Room was marked by the structures of the Porto Petroleum. The remaining oil tanks to be removed in the Koi-Routh Island areawere shipped by barges in summer 2013. Two oil tanks have been left in the landmark of the Kruunuvuo-Rhine area to be built, one of which is located on the Kruunu Mountain. The Stansvik map is also located in the southern part of the island, the history of which is closely linkedto the stages of Viapor. The Recreational Areas east and north of theMountains Cruunu Mountains connect it to the customs island'spuis area. The Customs Island has built upa large landscape park established in the 19th century on two meadows along the shore. The villas of Aino Ackté and Decker remain.

Helsinki Park is an area created in Helsinki General Plan 2002 to support the cultural environment and recreation of the city'sgin, established in accordance with the criteria of other national urbanparks in the Land Use and Building Act. These include the escaping and management of valuable buildings, urban images, historicparks and environmental complexes.

2.4.2 Ancient residues

Terrestrial heritage sites

The centre of Helsinki was transferred from the mouth of the River Vantaajoki to the Estonian-Name into the surroundings of the current Senatetori *(Figure 2.10)* near better port places. Various measurements, town plan maps and lin deposition maps have been maintained in Helsinki, the oldest being 1640-lu vulta. Most of the Helsinki remnants at that time are under the current building stock. Archaeological excavations have been carried out in connection with the construction of the centre, the largest under the castle of the Government, on the land of the Main Guard andin the four to six internal yards of Snellma. The excavations have found various objects, old stones, residential foundations, cellars and wells and apparently seaside support structures, as well as the remnants of the Russian big hatred field lens. In 1808, the south-eastern part of the city, the nel-size part of the city, was destroyed by fire.

Hålvik's 'silver mine' in Lajasalo Kaitalahti is linked to the Stansvik iron mine due to its location and history. Between 1787 and 1789, five monks of Hålvik were extracted from lead and zinc ores, with a silver content of 16 grams per tonne. In 2012, 10 wells of the Hålvi mining site were also surveyed. They were discharged from filling countries in 2013. All others, with the exception of the deepest wells, are destroyed by the construction of the residential area.

The Stansvikin-Tahvo Bay mine is located in the Lajasalo, north-west of the Koi Rasaari, a couple of hundred metres from the north-west of Tahvon Gulf den. The iron ore of Stansvik was discovered in 1766 when mining began. The actual mining activities ended 1839. Since the 19th century, the ore deposit of Stansvik has been the subject of mineralogical research and hobbies. In addition to iron ore, other industrial minerals and mineralogical specialities have been found in Stansvik.

Underwater cultural heritage sites

Underwater ancient remains are those shelves and parts of-the hyly which can be expected to have been sunk for more than 100 years, as well as other human-madesubmarine fields reflecting Finnish eradication and history.

For centuries, the water catchment area of the city centre of Helsinki has been an active area for navigation and other human activities. Human activity leaves its footprint under water. However, systematic archaeological underwater inventories have been carried out in Helsinki so far only in the waters adjacent to Finnish Castle, and occasional underwater inventories have been carried out in connection with the preparation ofprojects.

The monumental reclamation register of theMuseum Office contains a different age wreck and other structure in the area of impact inspection *(Figure 2.9)*. Some data are from the dense inventory of the Great Bridge between Sompa Islands andMustikkamaa 2012. In the vicinity of the High-Island, there are seal pens and structures with imprecise location information.

'White Island' is the seal of a boat of approximately eight metres longwhose age is not determined by timing. The wreck is located in front of the former Belarus Island shipyard and was found in a Särkänsal go-through survey carried out in 1998 in connection with the planning of the fairway project. The slide basket shows that the boat body has maintained its shape.

The 'Risk Isle' is the wreck of a wooden vessel with a flat seismic length of approximately 30-40 metres. As part of the preparation of the Iron Strait Corridor project, a dendrochronology was commissioned, according to which the vessel will take place at the beginning of the19th century or at the beginning of the 19th century. The vessel had been builtsequentially in Ostrobothnia.

The 'Passenger' is the wreck of a slimic wooded boat with a length of approximately 7.5 metres. As part of the preparation of the trap of the wet salute, a dendrokronological timing was commissioned, according to which the boat is scheduled for the end of the 19th century or the beginning of the 20th century.

'Glastic soil 3' is a wooden ship's wreck of approximately 20 metres in length. The vessel has been flat. The timing is not

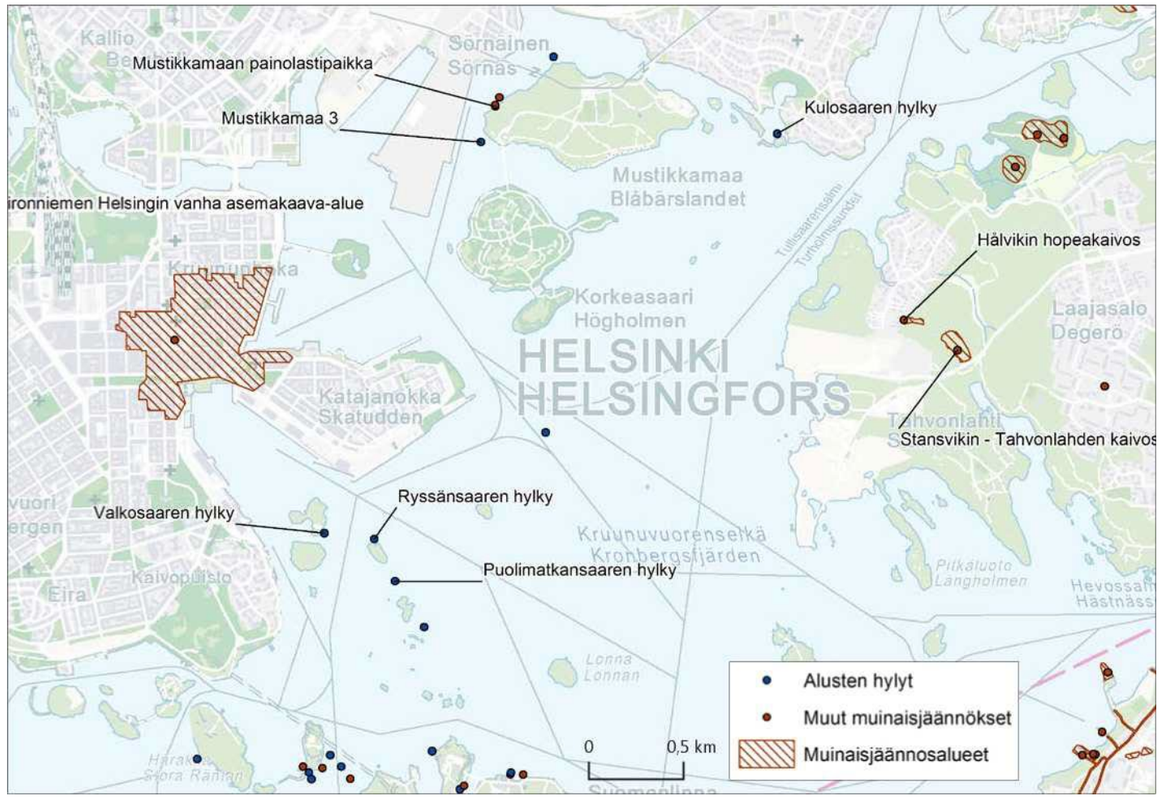


Figure 2.10. Cultural heritage sites in the area under

known. Wreck components are widely distributed.

The shore of the blue skirtland has been used as a place todrain the road from sailships. The area contains extraneous rocks such as silicon stone and ladders.

Culosary wrecking is a wooden ship's wreck which has largely been caught under the breakfast. The wreck of the-city of Helsinki is documented in 1952. The vessel has been flat with a length of approximately 30 metres. It was assumed to be built, possibly in the turn of the 17th to 18th centuries.

There may be underwater cultural heritage sites which are unknown because the area has not been studied inits entirety. The wrecks are to be examined in preparation for construction before going to the actualconstruction.

2.4.3 Landscape

The planning area represents a valuable, varied and-multitude of marine landscapes *(Figure 2.11)*. It changes from the town of Kruununha and Katajanoka through a park built inthe filling area of Ter vasaari and the narrow water bombs of the Northern Saea to the Old People's Park of the High Island and via the backbone of the southern Kulosaaari to the wooded rock to the Laajasalo.

The maritime landscape of the area also includes the maritime neighbourhood of Meriha in the 1970s, which emerges as the wall of lamel houses from a beach quay and become high-point houses,the residential area built on the Kalasata man and the Hanasaari power plant site of the port probe. The recreation area of the Sherryland, including the sandy beaches on the southern shore and its elevated forests,the Loss Island with villas and casinos, and the beaches of the Baya, including rocks, forests and villa colonies. The area of the Kruunu shore is changing.

The planning area is part of the wider landscape of the Kruunu Mountainselen and the area defined as the Finnish nationallandscape (Mertal Hel zinc).

The coastal landscape is characterised by sea leached rocks and inter-root valleys linked to the Gulf of the Sea. The eastern bank of the Helsinki peninsula, Kruununhakaand Kataja beetland have been rocky areas. During the construction ofthe Canton City, the rocks have disappeared invisible, with the exception of the park adjacent to the Cathedral of Uspensk. The hills of Kruununha and Katajanoka are former rock-harvests, but relatively low.

There are extensive filling areas on the beaches of the metropolitan city. They are low lakes a few metres above sea level. They are present on all beaches, but especially in port areas in Sörnäis, Hanasaari andSompasaares. The tip of Katajanoka and the coast on the southare large filled areas. The northern coast of Kruununha has also been significantly filled.

The area's original landscape structure is best found in the eastern partof the area in the large basin and in the archipelago of the Kruunu Mountains and the northern port. The rocks on the eastern shores of the High Island are marked by the landscape open from the North Bank. They rise asa round plate behind the northern port. The highest hills in the central parts of the island rise 25 metres above sea level.

The rootstock of the blackland landscape is formed by lountains, the southern edge of which and the flower on the southern shore of theisland are located across the centre of Helsinki, including the sand of the rimform through the Bulevard and the Church of Vanha.

The high rocky south of the western shore of the Lajasalo, the Kruunu Mountains, forms part of the long-running south-west of Herttoniemi. On the shore, the law of the sloping slopes as steep rock slopes rises 31 m above sea level. Inner, the highest berths of the Mountain Cruunu Mountain reach 42 metres.

On the west of the highest brush, the Kruunu Mountains are damed by the shoreside rock gums. To the east of the Kruunu Mountains, the Lajasalo hills have a more rich character and are levelled in the centre of Yliskylä in a sand cloth.

The area's large topography has developed over a year-on-year period under different climatic and erosion conditions. At the end of the most recent glaciation phase, a large part of the area, previous shredder valleys or larger valleys remained sea-covered. With the decoupling of the sea, the sea is slowlyretrenched and new land is discovered. The Murros valleys continue in the hinterland. They are most clearly visible in the Broadtail.

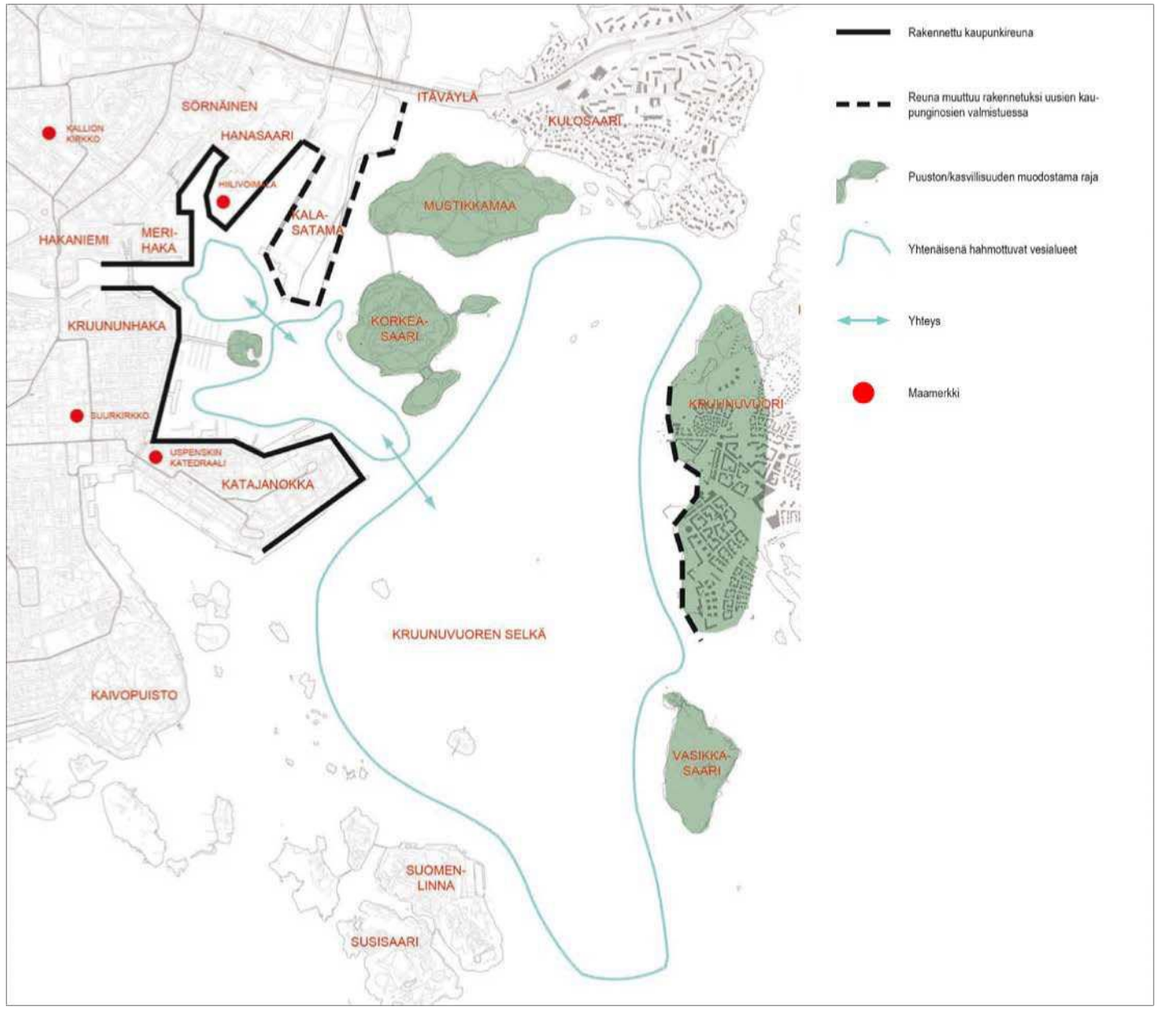


Figure 2.11. Landscape edges, boundaries and landmarks. Kruunhaka-Sompasaari, tramway and light traffic link, General Plan, (Insinengineer's Office Pontek Oy, City of Helsinki, Rakennusvirasto, street and park department,

2.5 Urban photo

The urban image of the planning area is a valuable and varied picture of the historyof urban development.

Krununhaka

Kruununhaka is the first district of Helsinki and represents the empire of a sealed-stypical structure of the style, with its straight ka-fire. In Kruununha, the houses are among the oldest in the centre. The urban structure consists ofa dense corner structure with the view to follow the streets. The direct streets are located in a varied terrain, the hills of which limit otherwise long street perspectives.

The Liisankatu is a typical Crown-Danish street that brought MII as anaxis eastwards from the Kaisaniemi Park to the North Bank. At the western end of the Liisankatu there are tramway rails which turn south into the Snellmaninkadu. From the end of the 19thcentury to the beginning of the twentieth century, the street building stock is a blanket, mainly representative of jugend and refresher styles. There are a few stickers along the street, which serve as a life-hole on the street. To the east, the street ends with the Liisan puist, wherethere are few fuel stations in the metropolitan area.

The eastern coast of the Kruununha is demarcated by the Northern Strait andthe were. The area of the northern shore is a historical port area which is currently mainly used by small boats.

Cutaneous jewellery

From the end of the 19th century, the Katajanok has a condensed bogie structure, which has been supplemented in the eastern part of the area by a built-in residential district in 1980lu. The urban picture varies sharply between two regions builtin different era. The beaches of the area are loose with extensive visibility to the sea and the surrounding urban structure.

Thervacular

The Tervasa archipelago is an island connected to the northern shore by filling in the tervascular and built into a park. There are a few buildings and a small outdoor amphiteat- Teri. Among other things, the Tervais Island is home to a protected deer, built at the beginning of the 1800 venue, as a tar warehouse.

Hakaniemi

Hakaniemi has been built over several era and the building stock is partially protected. The main commercial hub in Helsinki is the centre of the region and a structuring factor in theurban fabric as well as the functional hub. Hakanie mentorand the commercial halls located on the northern edge of Hakanie play an important role in creating the region's identity and atmosphere.

Merihaka

Merihaka has been built between 1973 and 1975 in an element block where the pedestrian has been separated from the car by liding to its own level. The buildings are basketsof 8 to 14 layers of lambs and spots, which distinguish and dominate the urban vision strongly in different directions. The Lamelli Houses and the deck structure form a wall clearly delimiting the urban structure along the periphery of the area. There are around 1 000 car parking areas under the deck. The area's south-eastern top of the region has recently been built as a cultural story.

Hana Islands

Hanasaari is one of the most importantareas of Helsinki Energia's power plant. The area is dominated by a coal-firedpower plant built in the 1970s and an adjacent coal storage facility.

Fishing port

The fishing port is an old freight port area which is being built as a major metropolitanarea. The area has been temporarily used for drainage and storage, but in the vicinity of the Eastern Corridor, the Sörnäistenniemi has already significantly transformed into a residential environment. There are broad perspectivesfrom the beaches of the region towards the rest of the metropolitan-area, the Mustic soil and the High Island. The area is home to the valuable cultural environment of the former Suvi Bay power plant.

High Island

The building stock on the High Island consists mainly of the animal fence and their buildings. The area's buildings are-identified in particular by the hive-like area of vision and by the housing of the Horse Island (natural stone, bricks and funks).

To the south of the High Island, the Hylky Islands is situated, whereone of the 19th centuries-century ventils and the New-Class Sound Class, which is visible in several directions across meren, are located.

Ink soil

Mustikkaland is a recreation area where mines are sports--producing, including a restaurant-based amusement building, a marina and a shipyard. On the southern side of the island there is a long bathing area and a service facility.

Culosary

The culosar is a horticultural city built up in the 1960s. The southern part of the island demarcates the border with Kruunuvuo. The vacation of the Honourable Kulosaar tree is a discomfort of important horns built in the jugend and later periods, which are now used for residential purposes. There is also an embassy of many countries on the island. To the south of the Kulosa Island, the island is home to the Kasino and the small boat port of Kulosaaari.

Rye mountains

Two oil tanks have been maintained from the old operation of the Port of Kruunu Mountain, one of which has been converted into a landmark with lighting works. Oil tanks and loading and quay structures communicate the history of the area as an oil port.

Broadcasting House

The Largesalo is made up of several residential areas built upin different periods. Most of the urban structure is a suburb built after the wars. The region's urban picture ranges from forest recreation areas to loose cultural landscapes, small-scale settlements and lamb-bed houses.

Finnish Castle

Finnishlinna is UNESCO World Heritage Site. The urban structure ofthe van ha fortified barracks ismade up of old barracks, built-up guns and residential buildings built in the 20th century. The most relevant landmark inthe Finnish Castle is a church tower on the north coast, where there is a sea beacon.

Outlook

A long and varied view opens across the large seabeds. The most significant colds accessible to most people at sea and-to the neighbouring islands can be found on the streets and roads along beachs, such as the North Bank, the Hakaniemi-sil lake and the Kulosaaari Bridge. The rocks of the Kruunu Mountains, the High Island and the Tuorinniemi are also-important points of view, as the high ends show a wide range ofvisions.

The beaches of the High Island, Mustikkamaa, Katajanoka and Kulosareare opening up the deeper, long-distance view across the seas and the islands. The view from the Finnish-castle north towards the planning area is important for the UNESCO World Heritage Area. The prospects across the Kruunu Mountain towards the Finnish castle are open from Mustikkamaa, Kulosaar beaches and the direction of Herttoniementa.

Over the last century, the outlook for the western part of the region has changed and seas have been shrinking due to

beaches and port filling areas and the construction of the fishing port area.

2.6 People's living conditions and comfort

2.6.1 Living and recreation

Krununhaka

Kruunhaa hosts the old empire centre of Helsinki, the Se-Nattori and around it the sentencing church, the University, the StateCouncil Castle and many other high-value public buildings of the State. Kruunhaa has around 7 000 inhabitantsand more than 7 000 jobs. Public servicesin Kruunu include kindergartens, primary and secondary schools. In addition, there are different types of brick-and-mortar services in Kruunhaa. There are fewer green spaces in Kruununhaa than in other districts. The recreation potential of the areais therefore based on the mobility environment of the sea, old buildings and services.

Cutaneous jewellery

The Katajanoka is originally a niche but is now separated from the mainland by the Katajanoka canal. There are four bridges across the Canal with the mainland ends in the area between the Commerce Tower and the eastern end of Alexanterinkadu. The Katajanoka has around 4 500 inhabitants and almost 5 500 jobs. The region has a vibrant passenger port and old Macasins, which have been converted to modern use. In addition, inKatajanoka you are served by a former prison "cree", Uspensk Cathedral,Ka tajanokan Kasino, Wanha Satama, Stora Enson, Kesko's headquarters and Ministry of Foreign Affairs. At the top of Katajanoka, a marine neighbourhood was completed in the early 1980s. Amongthe public services, Katajanoka has nurseries and primary schools. There are recreation areas along the edges of the area along the sea, but as in Kruunhaa, greening is not less than in other districts. However, the proximity of the sea and old houses are a pleasant environment for mobility.

Thervacular

The Tervasaari off the Kruununha is connected to the mainland on the long-term pen gertias of the Terva Islandsankannas. The terrace joins the northern shore of Helsinki's position inthe east of the city. The island has acquired its name from tar which was stored there in stores before the old wooden ships' tarification. In the 1970s, the-Tervaiar was renovated as a delicate park. Since the refurbishment, it has served as a park in the city of Helsinki. The Terva Island includes, among other things, a restaurant, a children's playground, a dog fencing with swimming sites, a venue of appearance and event, and a mattress quay.

Hakaniemi and Sörnainen

The Kallio-Sörnäinen-Alppiharju region has almost 40 000 inhabitants. The area is the most densely populated in Finland, with astrong one polluted and binocular. The average size of the apartment municipalities is less than 1.5 people, which is well below the cityaverage. The region has around 30 000 jobs. The region has a large number of public and commercial services. The Hakaniemi market, which has been operating since the 1890s, is a central landmark and the centre of the region. Culture is represented by the city's gintheatre and, in summer, Huvilateltta during the Helsinki festival weeks. The conversion of old industrial sites started in 1970 on Meriha and continues. Housing, jobs and cultural services have been built in the former industrial estate of the exchangers. In the former port area of the exchangers, residential and operational building is on-going. The old energy production area in Suvilah will be developed into a diverse cultural hub.

In the area of Meriha and Sörnäis there are parks and other recreation environments in the beach areas.

Exchange persons' emicycle

From the eastern waterway to the north of Sompasaari,-some 2 000 people have built up neighbourhoods. There is a shop in the grocery shop, but therest is almost completely missing. The situation will change in the comingyears as the centre of the fishing port starts to build.

Isle of Sompa Islands

Sompa Island is a former island in the Cruunu Mountains. In the1960s, it was connected to the mainland in a filling country and the port of Sörnainen expanded into its territory. Nowadays, Sompais a peninsula and part of the Sörnainen district. The port ceasedto operate in the area at the end of 2008 following their migration to the new port of Vuosaaari. In the spring of 2014, Sompa Island is not yet home or used for recreation, with the exception of pop-up facilities and the temporary walking and cycling route.

High Island

The High Island zoo, established in 1889, is one of HelSing's most popular attractions and the recreation of the island is of national importance. The High Island zoo contains paired animal species and thousand plant species. The bridge between Mustikkamaa andthe High Island, which was ready in 1972, ispurchased by ANSI for recreational purposes throughout the year.

Broadcasting House

The district of Laajasalo comprises the Hevossalmen, the Eastern Islands, Jollas, Santahamina, the Gulf of Tahvo, the Customs Island, Var tiosaaari and Villing. The district has almost 17 000 inhabitants. There are more than 2,000 jobs in the region. In the turn of the 19th and 19th centuries, summer houses and, later, houses for private houses were built in the Great House and its islands. Apartment areas have been built in the area since the 1960s.

The population density of the agglomeration is well below the city average. The average size of the dwellings is higher than the city average. The average size of housing municipalities is slightly higher than the average. The average age of the population is around 42 years.

The majority of large-scale people live in Yliskylä. Four-fifths of dwellings are in rostaries built between the 1960s and-1970s. Yliskylä is the centre of Laajasalo and the main services located there: shopping centre, schools, crèches, ter waterstations, youth houses, library, church and sports facilities. There are also nurseries,parks and primary schools in the rest of the Laajasalo region.

Jollas was a loose house area until the 1980s, but since then it has built a dense small-housearea. The area will continue to be completed. There are almost only summer settlements in Vartiosaaari and Villing. Santahamina has amunicipality and a national defence college. The Customs Island and Hevossal-mi are mainly recreation and nature areas.

The Aitta Islands, the LAA's beaches, the Customs Island-outdoor park and the Stansvik area are important recreation areas for the large arcade. The sea bays in the Stansvik map area are skiing and walking in winter. Other parts of the city will also be expatriated to the region. During the summer, boats are also transported to the area.

Herttoniemi

Herttoniemi has around 24 000 inhabitants and 11 000 jobs. Herttoniemi is one of the first neighbourhoods of Helsinki. It is an important job area and is growing both in jobs and in terms of population. The region has good public and-luxury services. The area in which Herttoniemenranta lived was builtin the place of the former oil port. The Herttoniemi area has maritime open-air routes and good sports and boating masks. The map of the Herttoniemi and its park are-areas of cruel and landscape value.

Vehicular traffic passes through Herttoniemi to the Laajasalo. The main route of the area is the Linnanrakantajan Road, which is connected to the eastern waterway via the Herttoniemi roundabout. TheLIN nanner road is busy and there aremajor changes in traffic patterns due toexisting congestion and increasing traffic.

Sensitive objects

Planning and impact assessments identify not only residential, protected and recreation areas, but also sites close to which infrastructure planning needs to take account of the site's specificities. Otherhospitals and health centres may have vibration-sensitive devices, or where elderly people or local authority restrictions are in-circulation. Schools and kindergartens are also sites where mobility, accessibility and safe mouthare important in their design. *(Figure 2.12)*

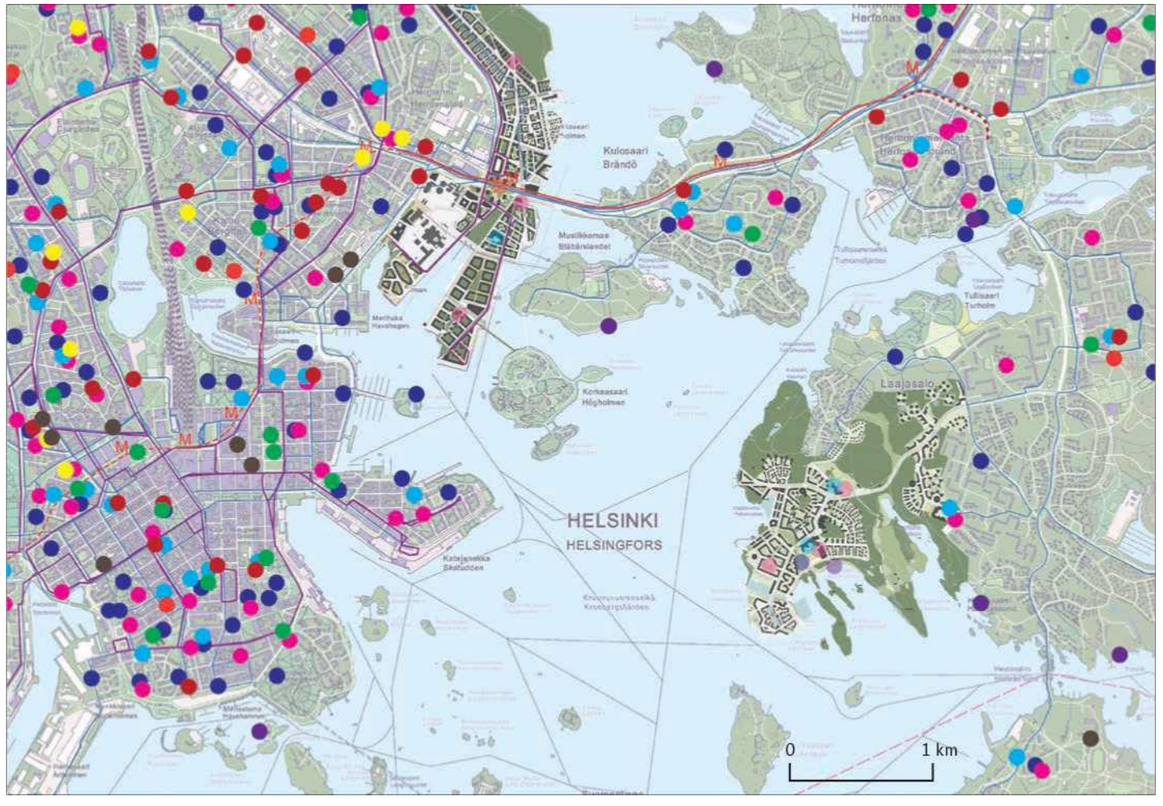
The Cruunu Mountain spine is a popular mooring area. There are a large number of sail and motor boat clubs and

2.6.3 boating

noise clubs. There is also a practice of false racingof international importance.

Some of the many small boating operations in the review area are managed by private purse clubs operating inthe region. The Cityof Helsinki has its own small boat marinas. The northern edge of Katajanoka has a marina:

1 **BS** Brändö Seglare
2 **IGC** Hakanimen Vene Clubho ry
3 **HMVK** Helsinki Moottorivene Club
4 **HNS** Helsinki Navigation Consequence
5 **SMP** Helsinki Seafarers
6 HRV**Helsinki** Construction Gamesive Engineers HRV
7 **HTPS Helsingin** Worker's press club
8 **IHPS** East Helsinki press club
9 **KNV** Katajanoka Vene Club
10 **KVK Kippari** Gulf Vene Club
11 **LPS** Lavahti purse club ry
12 **M** seafarers, Helsinki
13 **MVS** Merihaan Vene club
14 **MSVK Maritime** Port Vene Club
15 **NJK** Nyländska Jaktklubben
16 Santahamina boat club ry
17 **SaVK** Sarvaston Venekerho ry
18 **SPS** Finnish press club
19 **TLVK** Tahvo Gulf Venekerho ry
20 **YVK** Yliskylän Venekerho ry



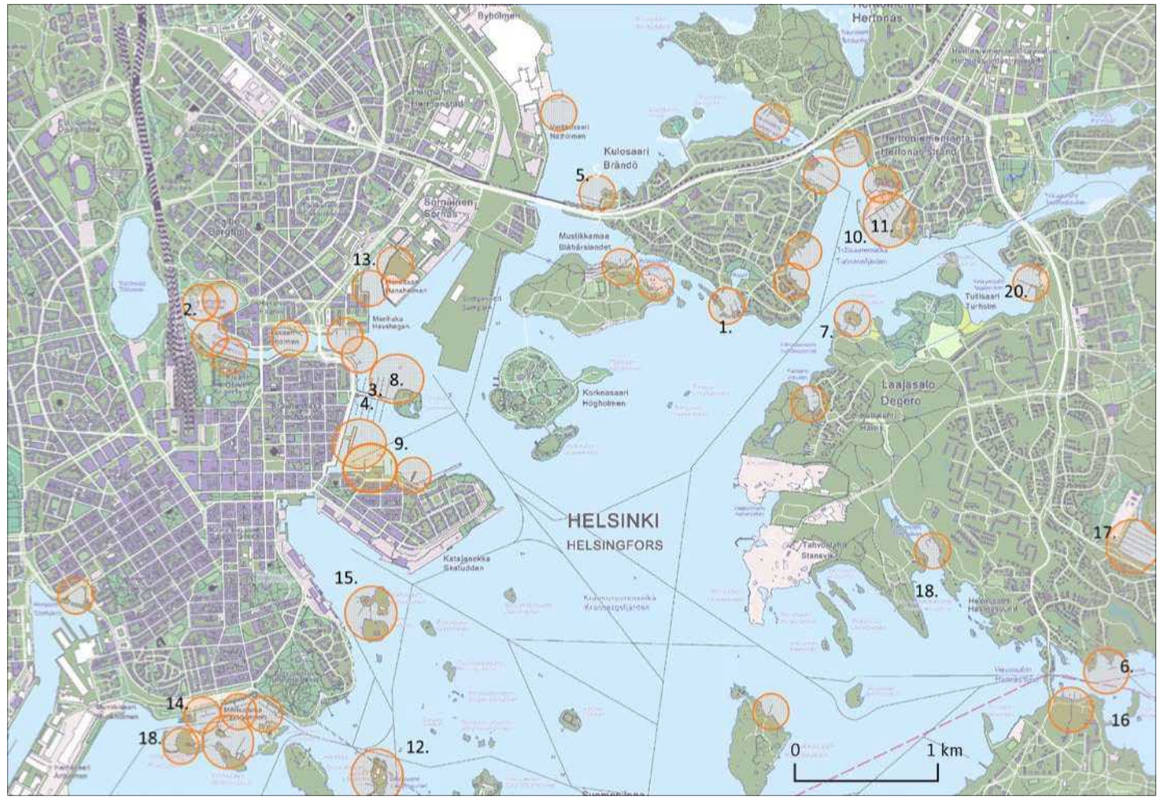


Figure 2.13. In addition to the ports of boat clubs listed on the list, the map shows ports or quays of house companies, companies and other communities with approximately 10 or more boats. The shipyard of Hopeasalme is located in the Mustikka soil. (Source: Website of the Helsinki Agency for Physical Activity, etc.).

Figure 2.12. Current and future sensitive sites in the area under review. (Source: http://www.hel.fi/palvelukartta/ and approved formulas).

is very busy during the sailing season. The figure below *(Figure 2.13)* shows small boat marinas in the project's catchment area as well as private platforms with around 10 or more berths for boats.

The Finnish Physical Activity Agency of the City of Helsinki has examined the boat number of sailboats on the north-west and north-western and north-westernrivers of the Tervasa-Rorkea Islands-Kruunu Mountain line in 2008. The survey calculates the number of sailboats on the mainland side of each season with a mast height exceeding 18 m, which was the free underpass height of the planned bridge at thetime.

Tervacular-Sompa Island (height 7 m):
151 pieces
Sompa Island — Central Island (height 7 m):
20 pieces
High Island — Large Island (height 18 m):
63 copies.

The above-mentioned information has changed as the design criteria for the bridge contest have raised the underpassheight requirement. The passing height of the winning bridge in the Kruunu Mountains is 20 m, allowing larger sailingboats to pass under the bridge. This means at least 40-46 feet, which can be submerged.

The adjacent purse clubs use the Kruunu Mountains and the waters between Herttoniemenranta Kipparlahhti and the island of Pyy as a sailing and competition area for light boats and rocks. The boundary in the south is the secure fairway area for merchant shipping (so-called "four-five barrel").

In rail races, the track is always marked separately according to the direction of the wind just before departure and a square area is required for the competition with one corner of the square with the lower mark and the upper marker at the opposite angle. Between the two, a couple of three rounds/departure are sailed. While the winds are somewhat straight along the diameter, each creative person chooses a route up to and including a square. The size of the track depends on the wind speed, but the Kruunu Mountains are mainly able to accommodate relatively short lines.

Rail contests include:

Information from monitoring group members on racing activities

- **The Anniversary Championship of Helsinki, Pursi club (HTPS), mid-June, 4 start-ups, typically at least Star, Albin Express and Popularvene, with around 20 boats last year.**
- **Musto Classic, end-August, 4 starts, a big competition organised by Brändö Seglare (BS) and showing a lot of traditional lighter classes such as cats, hot lights, quarries and folk boats, about 50 boats.**
- **BS 606 sailings on Tuesdays**
- **Baltic Ranking of BS, where competition in the classes**
- **SM champions organised by clubs in the region, e.g. during the 2014 season, HTPS will organise the Phense and Louhen SMs in August, some 30 boats, 6-9 start-ups.**
- **Intended competitions for other tracks which, due to heavy wind, are transferred to the more sheltered Kruunu Mountains. For example, departures from the Great Islands track are often transferred to 'Kruna' due to heavy wind.**

Rail races are almost impossible because the area is shrinking and, in particular, on the most common wind direction, the lower mark from the south-west would be to the north of the bridge.

There are also archipelagic or tourist sailing competitions such as HTPS's Emäsalo link (around 50 boats) in May and SuPS wood boat competition (more than 100 boats) in August. These bridges are not blocked, although after the departure of Emäsal, there may be considerable and potentially dangerous congestion for other traffic. On the other hand, they could, of course, also be conveniently followed from the bridge.

The HTPS Thirteen Show Championships (13 competitions in the bench, around 10-15 boats/competition) are intersections between rail and archipelagic competition, in which some of the pre-identified sea marks are selected as turns depending on the direction of the wind.

2.7 Environmental disturbances and risks

2.7.1 Air quality

In Finland, urban air depleting emissions include particulate matter, nitrogen oxides (NOx), ozone, sulphur dioxide (SO_2), carbon monoxide (CO), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), heavy metals and black carbon (BC). In the metropolitan area, these emissions areshaped in particular by transport exhaust gas, energy inputs and, in some cases, the use of fireplaces.

In the long term, concentrations of air pollutants in the metropolitan area have fallenunoccupied by ozone and fine particulate matter, despite an increasein population, lime and energy production.

In 2011, the annual mean of the inhalable particles (PM10) fluctuated between 12 µg/m and 24 µg/m at[3] metropolitan stations. At all stations, the concentrations were clearly below the annual limit value. The seasonal mountain concentration limit was exceeded at different measuring stations in 2-28 days in 2011, but none of the stations exceeded the permitted 35-day limit.

The annual average concentrations of fine particulate matter are also well below the annual limit value (25 µg/m^3). In addition tothe inhalable hair, only the limit value for NO2 was exceeded atsome measuring stations.

Limit values for air pollutant concentrations in the Helsinki region have been exceeded only in Helsinki. Exceedances (annual limit value for nitrogen dioxide and daily limit value for respirable particles) occurred in high-frequency high-street shafts around buildings and at the core in areaswith the highest traffic. (Helsin Energia. Increased use of biofuels for the production of Helsinkienergetic gian. Environmental Impact Assessment Programme 2013. Ramboll)

2.7.2 Noise

The City of Helsinki's 2012 noise survey has looked at low-noise levels caused by traffic and major industrial installations in the city's area at day andnight in the current situation. In the design area, road and metro traffic are mainly responsible for noise. Tramways running in the design area

In Hakaniemi and Katajanoka, the current tramway and running on the side of the design area to the junction between Snellmaninkatu and Liisankatu, where alternatives VE 1, VE 2 and VE 8 are connected to the existing network. With regard to the industry, the Hanasaari plant stack has been taken into account, but its contribution to the overall noise situation in theregion isnegligible. For the design area as a whole, road transport is by far the most important source of noise. Noise from metro traffic is relatively low.

Noise from noise sources shall be compared to the reference noise values VNp 993/92.

In the eastern part of the metropolitan city, road traffic is a majorsource of noise. The east coast of the Kruundha is entirely above the guide valuesin the area of tolerable noise. On the north coast of Katajanok,we are mostly below the guide values, as is the case in the interior of the Meriha districts where the areas in which they are located are located.

Road traffic noise is also an importantsource of noise in exchange. The majority of Hanas Islands and the northern part of the fishing port remain in the noise zone above the guide values. Metrorata comes out of the tunnel and runs the Kulosaaren Bridge adjacent to the eastern waterway. The overall noise situation in the region is not significantly affected by metro due to the high volume of car traffic in the eastern waterway. The Hanasaari power plant is also located in the area but has little impact on the overall noise situation in the region, as theimpact of the field is much more significant.

In the High Island as a whole and in Mustikkamaa,with the exception of the northernmost angle, the noise values are below the guide values. The eastern fairway and the metro increase the noise leveland the north of the island in the southern part of the island, butclearly below the guide values in the south.

Thenoise levels emitted by road in the Herttoniemi Bank and in the Large Room exceed the guide values mostoften in the vicinity of the streets and roads (in particular the eastern road, the Linabuilder's road and the Lajasalon Road), but elsewhere the noise levels are below the guide values. In particular, in the eastern part of the Laajasalo there is currently silent, with the exception of Santahamina

2.7.3 Identity

Wheelbike traffic rarely causes an intrusivetest of vibration. Rail and metro traffic, on the other hand,may cause vibration or hull noise. Vibration perceptible by movement may occur if both the track and the building are set up underground on clay soil. Hull noise transmitted through the rock may occur in the vicinity of the track in the Rock and Tunnel sections of theRakennuk.

In the current situation, there is asmall number of tramways in the design area and no vibration observations from residents are known. The metro under Hakaniemi must feel that it causes body noisevery locally.

2.8 Soil and bedrock

shooting noise (Santahamn shooting activity). Round the-can Noise Report. Akukon 2010).

The land is largely rocky and there are no landcover at all. The rock is characterised by different types of rock. Amphibolite and hornchcenis are present on the western shore of the Greater Say and partly in Kruununhaa. Quartz and granodiorite are found in the centralpart of the bay and the High Island. It is mainly reddished granite, part of a mixture, i.e. migmatite (granite and gneiss are found as complex 'tracks'). The same type of rock is also present in the Bay of Tahvon. In addition to the above, there are mica gneiss, quartz and feldspariangneis. The same rocks continue on the seabed under sediments. These rocks are normal Finnish rocks from which no harmful substances are soluble in the environment and are not radioactive.

However, the rock base of the bay contains some me-lling minerals. The 'Hålvik ho pea mine' in the Kaitalahti includes lead leaf and zinc tincture, extracted between 1787 and 1789. Ore contains small amounts of silver. The Gulf of Tahvo has iron ore extracted between 1766 and 1839. Special minerals are found in the area and are being collected by amateurs in the sector. Rocks havetoo small concentrations of lids and small deposits that they have not been further exploited and studied.

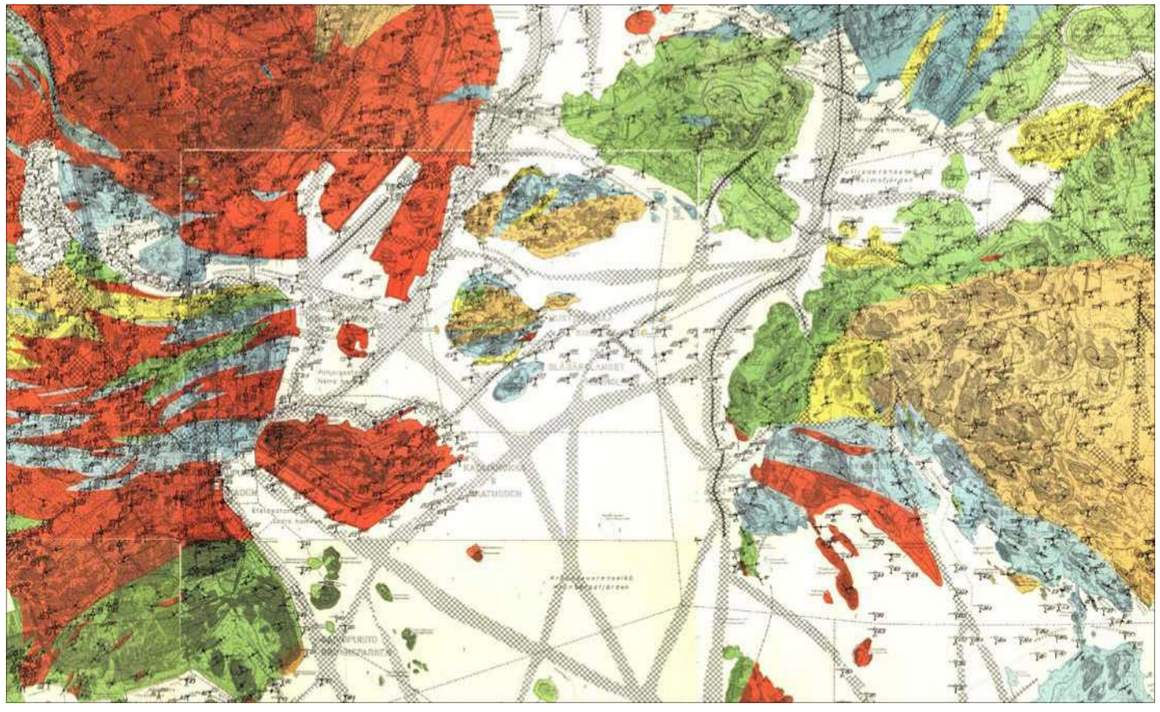
The weakness zones of the bedrock are indicated on the bedrock map. In addition, a number of hoists were-interpreted in the sea area, the most important of which is close to Laajasalo almost north-south (Vänskä & Raudasmaa, 2007).

In the large basin and in the islands of the project area, there is moreenia and clay in the rock antennas, the areas of which areproportional to its small soldiers between the rock trunks. The thicknessof the rud in the printers is from a few dozens oftimetrees to a few metres.

The project area extends to the centre of Helsinki in Kampp, where under options 3-5 tunnels would be built on metro. On the Mantere, the soil has a greater variability in thickness than in the islands and the soil is more unhomogeneous. In this area, land has been heavily built and filled. The soils of the 'Paksuimmil' plain are on the Cluv rue, where the brown rock is in some places at a depth of up to 30-40 metres. The beach of the Kruununhaa, as well asin places in Sompa Island and Katajanok, alsohas ten to 20 m^2 of soil thicknesses. The Kluv creese passes approximately on the line Commercetori-Tölön Bay and has a width of approximately 30 metres (Vänskä & Raudasmaa, 2007).

The bottom of the sea is covered by a layer of mud or clay with a maximum thickness of 5-10 metres.

There are many fillingcountries in coastal and built-up areas. The main filling areas are Katajanokalla,the Northern Bank, Terva Island and Sompa Islands.



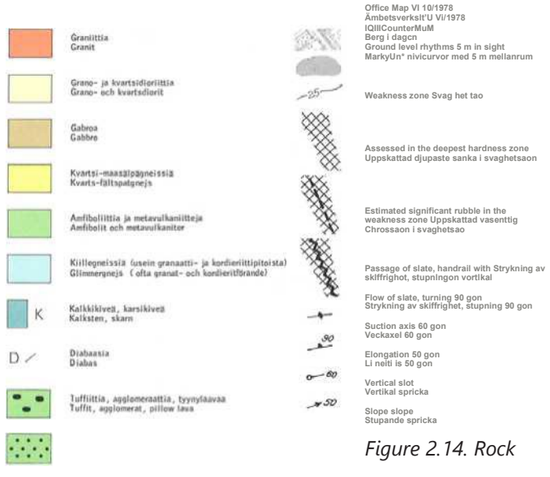


Figure 2.14. Rock

rock map of the planning area and interpreted rock fragility zones (Source: Map © City of Helsinki/Geotechnical Department).

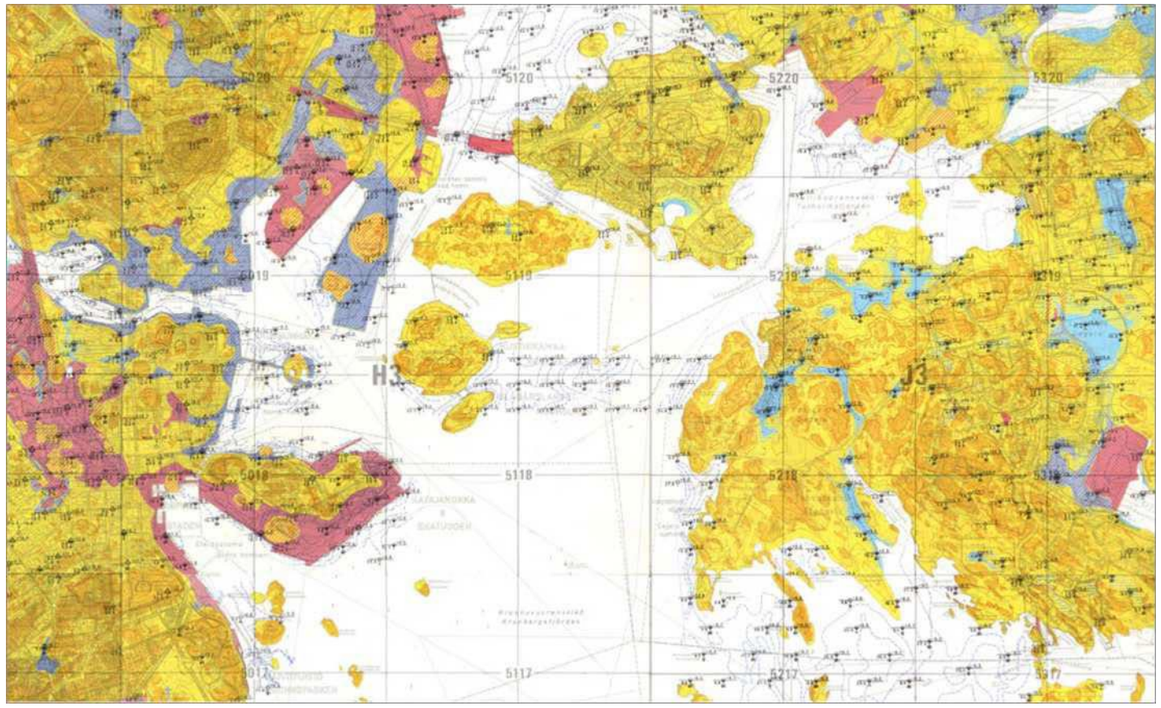


Figure 2.15. Soil map of the planning area. (Source: City of Helsinki, Department of Urban Measurement 2014).

2.9 Ground and surface water on land

2.9.1 Groundwater

Apart from the groundwater area of Santahamina, there are no groundwater areas classified for municipal usein or near the planning area. The area is most likely not to have individual domestic boats in use, except, possibly, for some real estate in the Laajasavo. All economies are in the water supply networkin RI.

Due to the rock nature of the area, the ground water in the soils under review is mainly found as rock-beds. Kalliopoh-Stail accumulates on individual screws of the bedrock, shredders and wider weakness zones and rubbles that are not necessarily linked. This is why the rock—

the presence of groundwater is irregular and an integrated-stock of large rock groundwater may not have been reached. The rock is characterised by dry or semi-dry, narrower rock blocks and the presence of scattered or scattered spots in the intersections where wateris collected. The width of the breaking points and the crushes normally varies from centimetres to even the Kluvcrowns so much.

The most significant aquifer deposit in the soil layers is in the centre of Helsinki at the Kluvcrown and infilling on the shores. The presence of groundwater is also smaller in the islands in the mountains and clay filling rocks.

2.10.2 Surface water

The river Vantaa must be marked in the state of the Kruunu Mountain oras a shrinking factor. The rich nutrient and claysame Vantaajoki flowsinto the northern part of the Gulf of Vanhankaupung, from which it discharges water through narrow straits to the Kruunu Mountains and Kipparlahhti. The largest quantities of water are discharged via the Sör. There aresmaller ditches and swimmings in the Bay of Vanhan Town, including fields and built-up areas in the catchment area. The fluxes of the Vantajoki River vary according to seasons and weather conditions, and fluctuations are high. Between 1991 and 2010, the flow rates of the Vantajoki river ranged from0.98 to 175 m^3/s with a mean flow of 15.7 $m^{3/s}$(Finland Environment Agency 2012). Flush peaks usually take place in April, when snow melting waterincreases the flow. In the autumn, there is often another peak of flow, but in most cases less than the spring flood.

Surface waters are also discharged into the Cruunu Mountains from naturaland built-up areas that directly and dormantly. Stormwater discharged from the reconstituted areasis usually contaminated with solids, nutrients, metals and other harmful substances.

2.10 Description of the sea area

2.10.1 Depth ratios and flows

The project area belongs to the estuary of the northern coast of the Gulf of Finland, which consists of the inner archipelago, the intercity and the outer archipelago. The Kruunu Mountain spine is an inner rainfall which mixes the fresh water of the Vantaajoki river through a shallow and well-closed Bay of Vanhan and the seawater of the Gulf of Finland. The water exchange between the Gulf of Vanhan Town and the back of the Kruunu Year takes place through the narrow straits between theisland and the mainland. The open part of the mountains is around 10 to 16 metres deep sea area *(Figure 2.16)*. In addition to the mainland, the water exchangeability of the Kruunu Mountain is limited by the eastern-south islands, the largest of which are Laajasalo, Santahamina, Finland's menlinna, Vallisaari and the Royal Island. Water flows are influenced not only by physical barriers such as islands and thresholds, but also by the currents of the Vantajoki River,wind conditions and sea water levels.

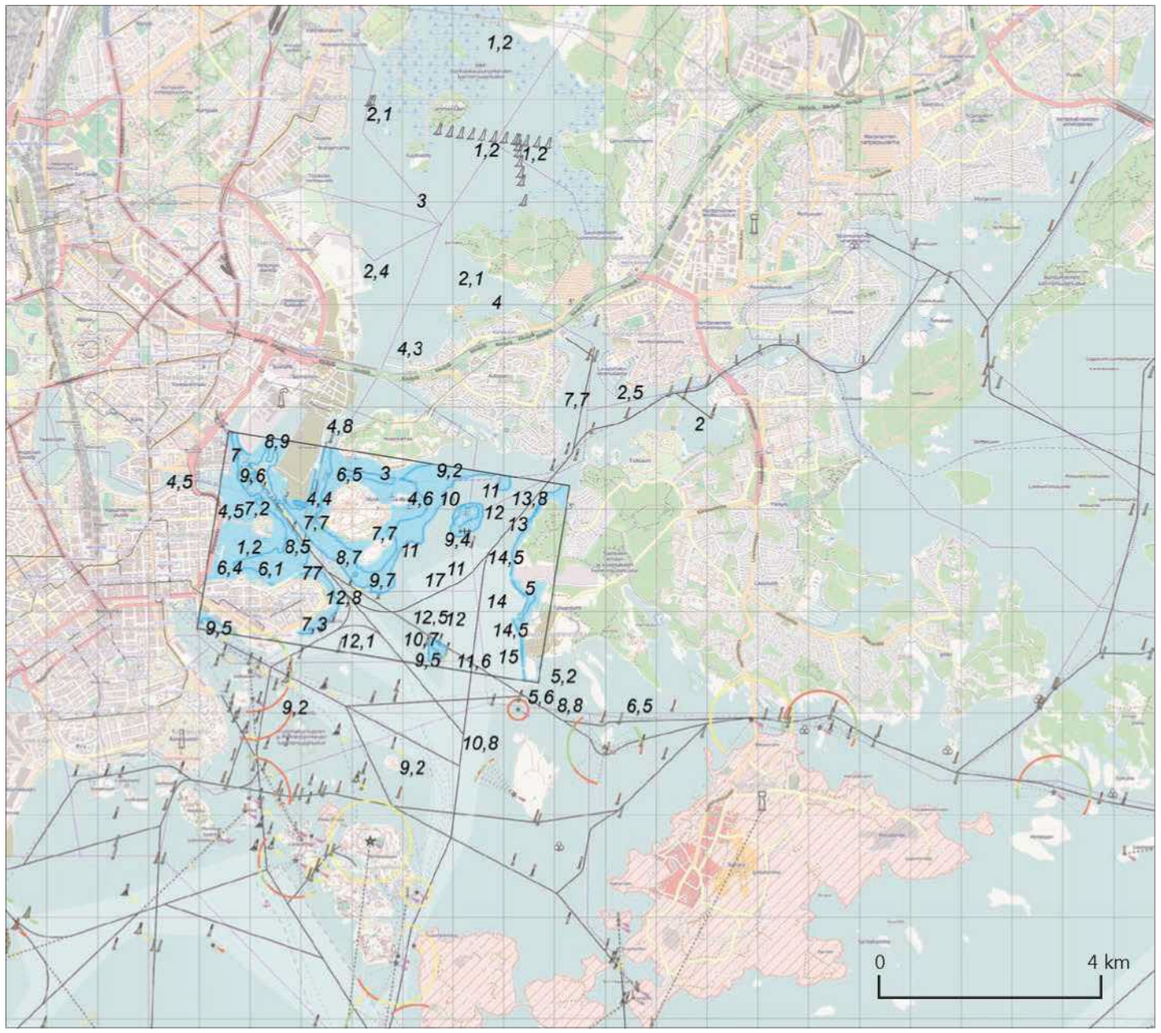


Figure 2.16. Depth conditions of the Crown Mountain and adjacent waters. Depth data: Transport Agency authorisation 2554. Extract from the boating map. (Source: Openseamap.org Creative commons).

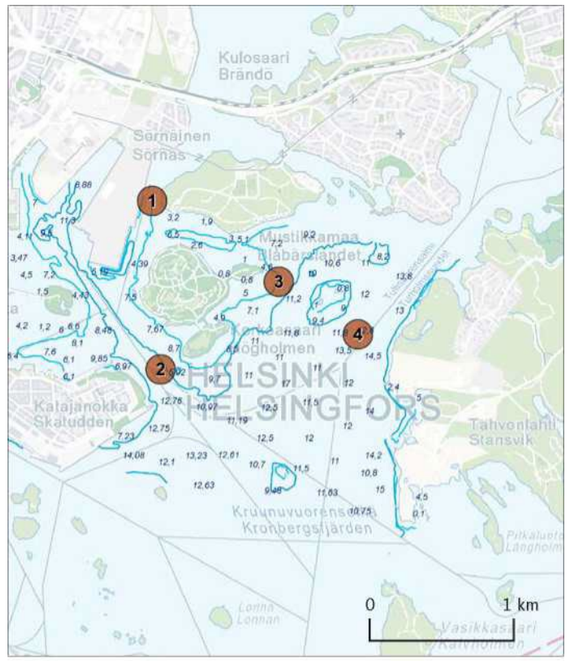


Figure 2.17. Position of flow measurement points: Black soil (1), Katajanoka (2), Cruunu Mountain West (3) and Cruunu Mountain East (4). Salinity, temperature and opacity were also measured at the observation points. Helsinki guide map. (Source: Creat Consulting Oy 2013).

In the project area, flow measurementswere carried out for project planning and environmental impact assessment in July-mar in July 2013 (Lude Consulting Oy 2013). Measurements were made at four points west of Mustikkamaa (point 1), in the Cruunu Mountains (point 2 and 3) and in the area between the High Island and Katajanoka (point 4) *(Figure 2.17)*. The directions and speeds of flow were measuredby rounds at metre intervals. The depth was 7 m at the point of inkland (1), 10 m at the western point of the Kruunu Mountain skeleton (2), 13 m at the eastern point of the Kruunu Mountain skeleton (3) and 11 m at the Katajanoka point (4).

Based on the flow measurements report (Lude Consulting Oy 2013), the highest measured bottom-off flow rates were 32 cm/s at the Mustikkamaa station, 15 cm/s at Katajanoka measuring station, 17 cm/s Kruunu in West and 19 cm/sin eastern. However, the average flow rates throughout the water column, with the exception of the highest wave layer driven by wind, were relatively low, ranging from 3 cm/s to 4 cm/s for all four measurement points. Such aladder, at low flow rates, can be sedimentated at the bottom of the sea.

The flowrates of the surface layer at wind times were well above thoseof the ground floor *virus (Figure 2.18)*.

At all four measuring points, the currents were roughly stratified,i.e. in normal conditions, the flow rates of the surface andthe bottom of the layer flowed in different directions. Due to the typical oscillation of the Gulf of Finland, the Natures of the water layers changed in the opposite direction every 22 to 26 hours. The two-layer flow and the diurnal rhythm were observed, in particular, at the *Mustikkamaa measurement site (Figure 2.18)*. The Vantajoki, which has a strong influence in the Han area, is increasing the generation of double-layer flow.

Flow measurements show that the main flow directions in the ground floor of the area are north-east-west *(Figure 2.19)*. However, at the measuring locations in the Katajanoka and Kruunu Mountains, the bottom forms slightly reverse the flow. In the surface layer, the flow directions vary more than in the ground floor. The force of-fluctuation in the heat is largely dependent on the open measurement position for the wind.

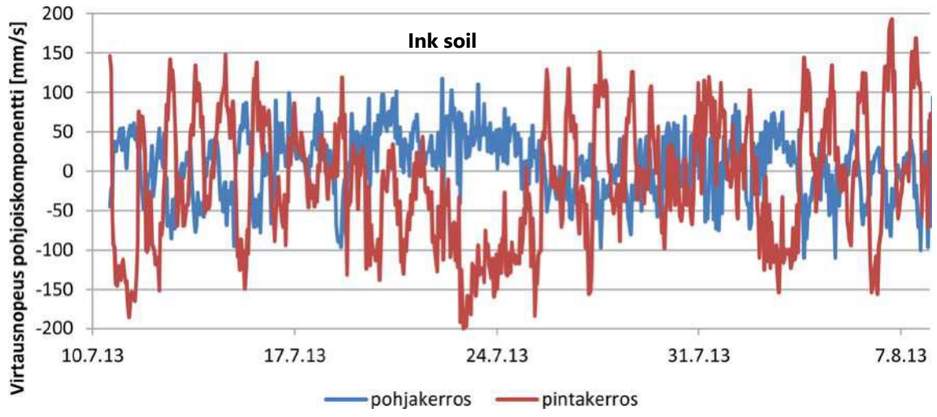


Figure 2.18. South-North flow component at the measuring point of Mustikkamaa. Negative (-make) flows pass towards the south and positive (+ characters) towards the north. The results clearly reflect the day-ahead flow rhythm. (Source: Creat Consulting Oy 2013).

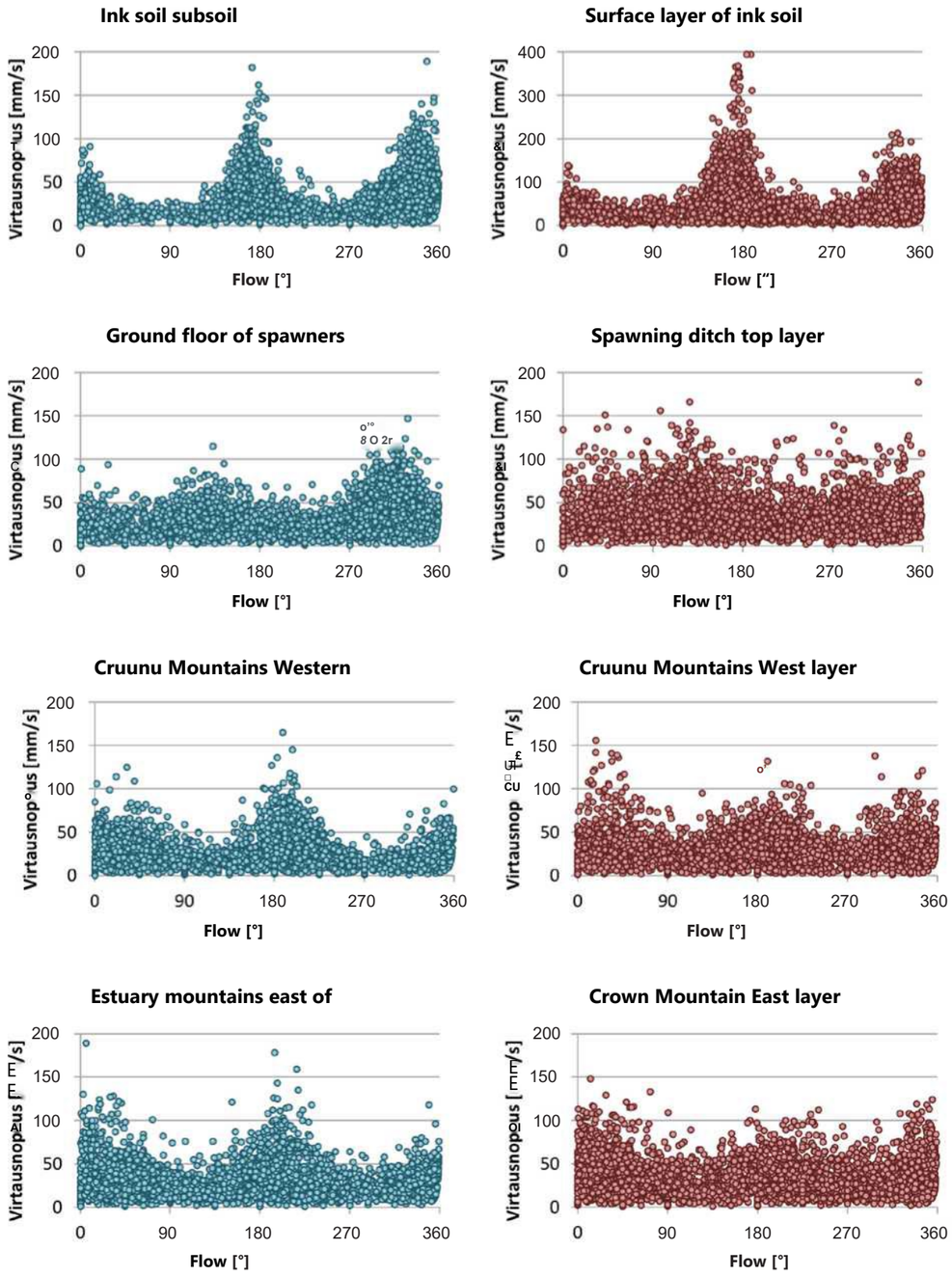


Figure 2.19. Directions and speeds in each place. Note the larger scale of the blue soil surface layer picture. (Source: Creat Consulting Oy 2013).

2.10.3 Load and water quality

The Kruunu Mountain spine is important for the dynamics of the maritimearea of Helsinki and Espoon, which dampens the impact of theriver Vantaa on the maritime area (City of Helsinki, 2013a). The turbidity and rich nutrient river of Vanhan Town in the Gulfof Vanhan kaupunki is therefore a major factor in the water quality of the Kruunu Mountain, bringing tens of thousands of tons of solids to the sea area each year. The values of opacity in the Vanhankau-Punginia are sometimes very high. In 2012, the values of opacity at point Vanhan-back 4 ranged between 14 and 140 FNU (City of Helsinki 2013a).

The impact of the Vantaa River on the sea is at its highest with high river flows, e.g.spring flooding. In 2012, the river Vantaa imported 110 tonnes of phosphorus and 1 850 tonnes of nitrogen into the sea area (City of Helsinki 2013a). In addition, the condition of the Kruunu Mountains is affectedby water turnover, the state of the Gulf of Finland, the soils of storm water discharged into the Kruunu Mounu Mountains from built-up areas, and air deposition. The importance of storm water for the quality of the Crounu Mountain Bellow is small given the precipitation ofthe Vantaa River and the accumulation of frequently recurring seawater in the area. Bubbles can quickly bring colder and more salinewater to the area on the basis of theGulf of Finland. On the basis of the ecological classification carried out by the Environmental Administration in 2013, Kruunuvuoenselkä and the Gulf of Vanhankaupungin are classified as 'avoidable' (the 'state of thewaters on the map' service).

The status of the sea areas of Helsinki and Espoo is monitored as a compulsory monitoringof the effects of waste water. The nearest point for compliance monitoring is in the Gulf of Vanhankaupungin (point 4). In addition, the City of Helsinki monitors the status of adjacent waters, of

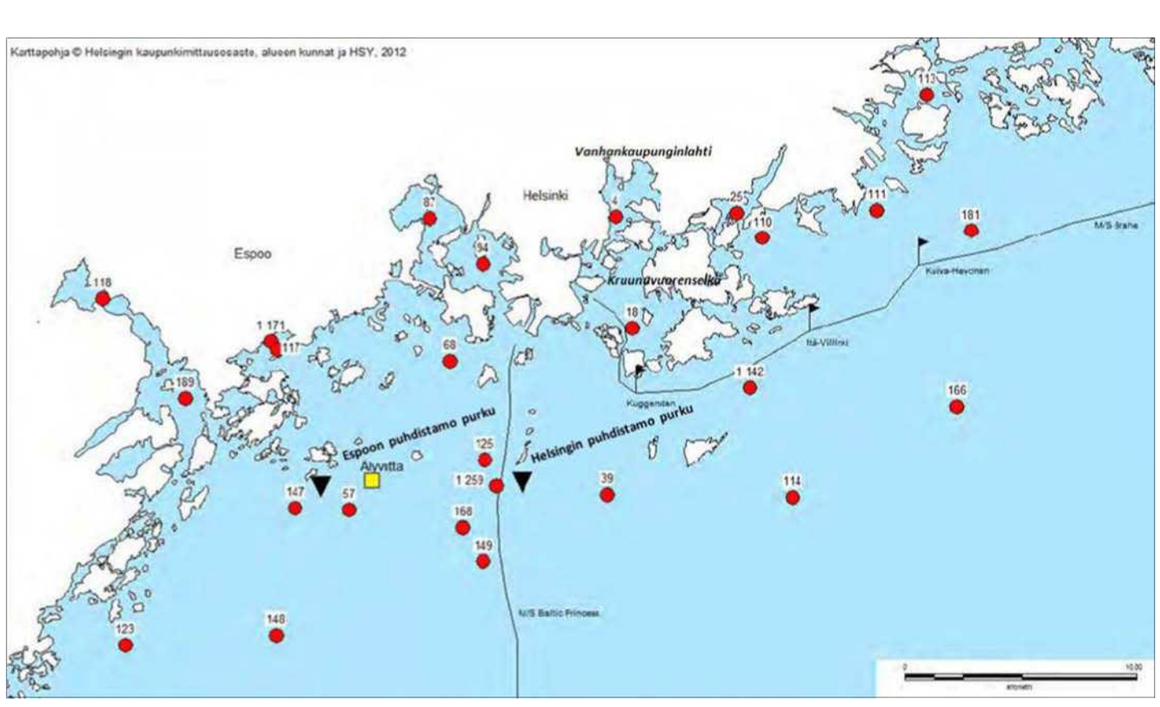


Figure 2.20. Waste water discharge sites in Helsinki and Espoo (black top triangles) and mandatory monitoring sites (red balls) in 2012. Black line and lines: Alg@line (Kristina Brahe route and sampling points and Baltic Princess route). (City of Helsinki 2013a).

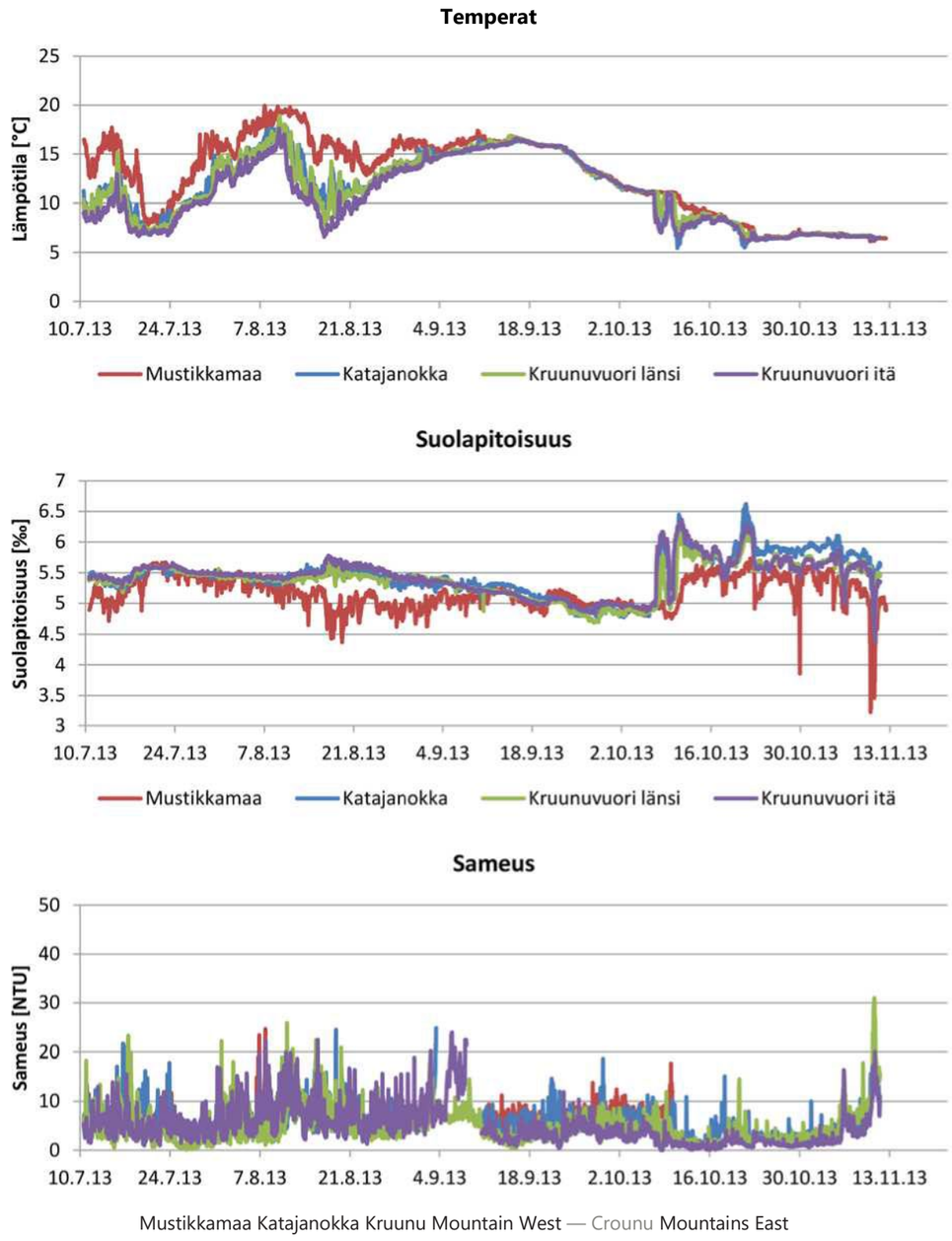


Figure 2.21. Continuously measured temperature, salinity and opacity values by location of observation. Incorrect readings due to intense soiling have been removed from the famous values. (Source: Creat Consulting Oy 2013).

which one point (18) is located in the *Kruunu Mountains (Figure 2.20)*. In this context, the state of the sea area of the Kruunu Mountain is described in the 18-year water quality data of the monitoring point and the EIA-me—

Rail options for the large-scale railways, EIA report

on the basis of continuous measurements (temperature, salinity and turbidity) carried out during the net operation. Continuous water quality measurements were carried out in connection with current measurements with four points between July and November 2013 (*Figure 2.17* and Chapter 2.10.1).

The Baltic Sea water is stratified due to the differences in density caused by temperature and salinity. On the southern side of the Mountain, the sea water is deposited with temperature in summerwhen the surface is warmer than the water close to the bottom. The additional-stratification is influenced by the flow and weather conditions of the river Vantaa. River water tends to be lighter than sea water and, in particular, at large river flows, it submerges the sea over thewater. In the Cruunu Mountains, theriver water is sequentially sequentially submerged out of the straits (City of Helsinki Gin 2013a). According to the former, in July 2012, the water was lower than usual.

During flow measurements (Chapter 2.10.1), water opacity, salinity (salinity) and temperature were continuously measured. On the basis of the measurement report (Lude Consulting Oy 2013), small differences were observed at the temperatures of the area due to differences in depth and location of the measuring sites. At the point of measurement of theink soil, there is a less salty and warmer vesiin the Van staw river during the summer period, while no significant differences in water temperatures or salt concentrations were observed at other measuring points *(Figure 2.21)*. In the temperature values, a periodbetween mid-August was observed when temperatures fell and the-concentration of salt increased as a result of the introduction of the seabody of water. A similar situation was also observed at the end of July, when the debriefing off the coast of Heine was discovered off Helsinki. From time to time, the salinity values at the point of measurement of the ink soil showed a marked decrease in salinitydue to increased river streams. A similar phenomenon was also found to be weaker at other measurement sites. The turbidity values were typical values of the inner archipelago, at their highest level in the east ofthe Kruunu Mountain in November, which are also strongly influenced by the clay-marsh introduced by the Van tattoo. In general, turusar has seen a brightening characteristic of the early autumn.

The Cruunu Mountain spine is the base of the total phosphorous and a-chlorophyll concentrations of surface water (Helsinki City of Helsinki, 2013a) as an honest sea area. In the summer, concentrations of inorganic nutrient-roads are at times low, especially for soluble nitrogen, indicating an efficient nutrient dynamismin basic production. It can be inferred from the water quality results that the main nutrient limiting basic production is nitrogen. The surface water of the Cruunu Mountain spine is sometimes very turbidity, most likely due to the flow of the river Vantaa. In 2012, the opacity values eased in the whole aqueous phase between 1,5 and 25 FTU (Helsinki kanki 2013b). In the nearby water layer, the values of opacity are often lower than those of surface water. No oxygen problems have been identified in the Bothnian water layer.

2.10.4 Sediments

Studies carried out

In and around the project area, there have been a number of morningand bottom-up studies carried out within the last ten years. The Geotechnical Department of the City of Helsinki's Real Estate Department has prepared a synthesis report on theground studies carried out in the region during the years (Helsinki City of 2008). In the context of this EIA procedure, a consolidated report(FCG Oy 2012a) has been drawn up on sediment studies carried out in the project area in 2004-2010 and additional studies have been carried out for five points. Since then, pigs have been studied in the sedimentin the project area in the context ofthe Haakon Gulf sediment study (FCG Oy 2012b) and in Sompasaari, Nihd and Terva in theisland (Vahanen 2013, 2014a, 2014b).

Bottom quality

According to a report by the City of Helsinki (2008),the surface of the lime varies steeply, including several bruising zones. The estimated surface of the rock lies in thedeepest berth in the range of approximately -25 to -30 metres. In the areasof the limony bottom, the soil consists of the lowest layer of moreens, the sand on it and the top clay layer. The clay is covered bya mild layer. The soil layers are naturally thin in the vicinity of the rocks. There are extensive filling areas in the shore of Kalasata-man.

Sediment quality

In a consolidated report (FCG Oy2012a) on sediment studies in the Kruunuvuorenselä area and in the Kruunuvuorenran- nan Haakonin Gulf study (FCG Oy 2012b), the total number of visual points was 61, with a-maximum depth of 3 m. In addition, sediments from the Isle of Sompa Island, Nihd and Terva Island have been studied at approximately 30 points (Vhanen 2013, 2014a, 2014b). Sampling has been up to 4 m depth.

The concentrations of harmful substances have been considered asnormal in accordance with the guidelines for dredging and draining the reef (2004). The levels of contaminants set out in the guideline are intended to assess the sea acceptability of dredging masses. In addition to the contaminants in accordance with the guideline, tremors of total nitrogen and phosphorus have been studied in sedi--mental samples.

In the 31 points examined for the Cruunu Mountain and Cruunu Mountain Shelf, the sampling depths were mainly a maximum of 0.6 m, but at 11 points the samples were taken up to 2-3 m. These 11 points are located on the Kruunu shore, the Bay of Haakon and the area between the Kruunu Mountain and the High Island. Of the 31 points examined, 16 points were found with levels of harmful substances exceeding level 2 of the Ministry of the Environment's dredging and disposal instructions. Concentrations above Level 2 were mainly observed on sedimentsurfaces (0-0.6 m). However, concentrations above Level2 were observed only in deeper layers (1-3 m) to the north of the Isle of Terva Island and to the West of Hylky Islands. Levels of harmful substances between Level 1 and Level 2 were generallyfound for the above substances and also for chromium, copper and zinc. Only at four points the sediment was found to be below the criteria levels of the dredging and draining guideline on the basis of samples.

The Sompa Island Strait, the Nihd region and the Tervae Island stalk were affected by levels of harm in excessof the dredging and draining manual tandem 2 at almost all of thesurveyed sampling points on the sediment surface. In some of the sampling points, exceedances of level 2 were also observed in the deeper two and four metres. Typical disruptors were PAHs, PCBs, heavy metals such as chromium and nickel and tributyltin (TBT).

The samples tested showed increased levels of nitrogen and phosphorus. In particular, samples with a high proportion oforganese material were typically also characterised by a markedly increased nitrogenpitch.

The quality of the sediment in the planning area is typical ofHels' herd city, reflecting in particular the long-term load of the use of the formerman.

Nature

2.11.1 General

The natural environment of the project area varies greatly- from urban structure to near-natural areas. Most of the project area can be considered to beaffected by mismanagement. In the centre, between Katajanoka and Sompa Island, the natural environmentremains small. Beaches are built.

Waters have been deepened for port operations and shipping routes. The natural features of the Mustikkamaa, the High Island and Hylky Islands are largely parked. There are few buildings, vegetation is more species-rich than the metropolitan area, and beach vegetation is also more rich. The island of the Bayalo to the east of the Kruu valley is naturally diverse. The environment of the Kruunu Mountain Basin is particularly important in terms of nature value.

The islands are home to a greater number of birds and other animals. 'Kruunu' is typical of the back of the inner archipelago with calded beaches. Inner plaques, the water vegetation is honest. A few bullets of the back are important areas for the birdpopulation.

2.11.2 Nature reserves and valuable natural sites

In the vicinity of the project there is one nature conservation area, the Stansviksite in the LAA jas basin. The site is protected by foliar forest vegetation. The Lajist includes plants of Lehto, cordon and rocks, such as black berries, blackberries, throat watch, blue bedand spring bird peas. The wood and the shrubs of the woods and hedges are represented by non-coniferous trees, dough berries, hot berries and hungers. The presence of rock ash is noteworthy.

The Stansvikinniemi and the surroundings of the Kruunu Mountains are valuable natural sites.

There is one habitat protected under the Nature Conservation Act, the Kruunu Mountain lihmus forest.

In addition, in the northern part of the Kruunu Mountain,- between Mustikkamaa and Ku losaari, the Norp and Kuutti have been reassigned as abird protection area. The bank-mounted narulok community, thousands in 2003 and some 900 pairs in 2013 (Matti-Lustarinen, unpublished accounting material) is the largest city in Helsinki. They also nest somelagoons and staircases.

North of the project area, north of Kulosaaari, there is a nature reserve in the Gulf of Viikki-Vanhankaupungina, which is also part of the Natura 2000 network (the Birds Directive and the Habitats Directive). The Bay of Vanhan Town was listed under the Ramsar wet protection agreement in 1976. In particular, it is an important life of-waterbirds.

There are a number of important rock areas in the large basin, which are demarcated in the City of Helsinki's Nature Information System. The KruunuMountain — Jakomäki transition line in the eastern part of the Kruunu Mountain spine is mentioned as aninteresting geologous target.

2.11.3 Vegetation and habitats

The most important areas of vegetation in the Large Strait are the Kruunu Mountainslampi, the Kruunu Mountain Leifer, the Stansvik Mining Rock, the Customs Island valley, and the Customs Island rock rock and its underground. Thereis a small strip of gravel on the south-east coast of the Eye Island, which grows around 2 m^2 of sea weave. In other respects, the area covered by the project is characterised bythe usual vegetation of the urban area, which is mainly found in the built environment.

During the EIA phase of the project, it was considered necessary to investigate the coastal vegetation of the project area in areas affected by the project. Coastal vegetation has beenestablished in summer 2013 (Lammi and Leinikki 2013). Beach vegetation was studied in areas where the planned bridge is located on the beach: The northern bank of the Isle of Terva Island, the northern coast of the High Island, the coastof the Lo Island Pa and the Kruunu Mountain at the northern end of the former oil port. The work looked at the presenceof valuable vegetation sites and habitats, as well as other importanthabitats. The terrain works were carried out on 24 July 2013 (Croupland) and 6 August 2013 (other areas). The inventory was carried out by FM Esa Lammi Environmental Planning Enviro Oy.

The**whole** northern bank of the Isle of Terva is builtaround a piece of work and the water bank consistsof a blocked stone. The woodpecker extends to the stone and the water boundary is plant-free. The low vegetation present in the area is wellestablished in terms of species and there are no specific valuable vegetation sites or endangered species.

The**northern bank** of the High Island is a beach builton both sides of the planned bridge. To the east of the bridge there is a narrow sand/grave. Coastal species are conventional cultural species.

The**periphery** of the Palosa Archipelago terraces is a reconstituted salmon carp and the south coast has been built. The north and east coasts of the island are natural, consisting of sandy beaches, sancture and rocks. Beach vegetation occurs at best in a few metres wide zone. Natural parts are characterised by sea beaches and small meadow patches. The most noteworthy species is the salinity in Helsinki only in some places.

The settlement area of the Krounu Mountainsis a filling soil and a loosely characteristic rock from which the topsoil has been peeled. The beach area is very sparse andthe beach is almost wooded. The area's vegetation is normal and, in many places, idle species. The shore species that occur only in some places in Helsinki are represented by morn cord. The areacontains an alien species classified as watched, striving grass, the presence of which is concentrated around the Kruunu Mountain-Back.

2.11.4 Bird population

During 2011, an environmental study by Yrjölä Oy laati in the context of the project was carried out on a bird survey on the number of birds to rest in the area, as well as the numbers, directions and flight altitudesof the birds flying in the area. The work started in April when the Kruunuvuoenselkä was still largely ice. The surveillance was carried out during both spring and autumn migration, and the last visit took place on 1 November 2011. The work was carried out by Rauno Yrjölä and Jorma Vickholm.

The movements of birds in the area differed between spring and autumn and between bird groups. The number of migratory birds in the area is not particularly high with ice significantly lower—

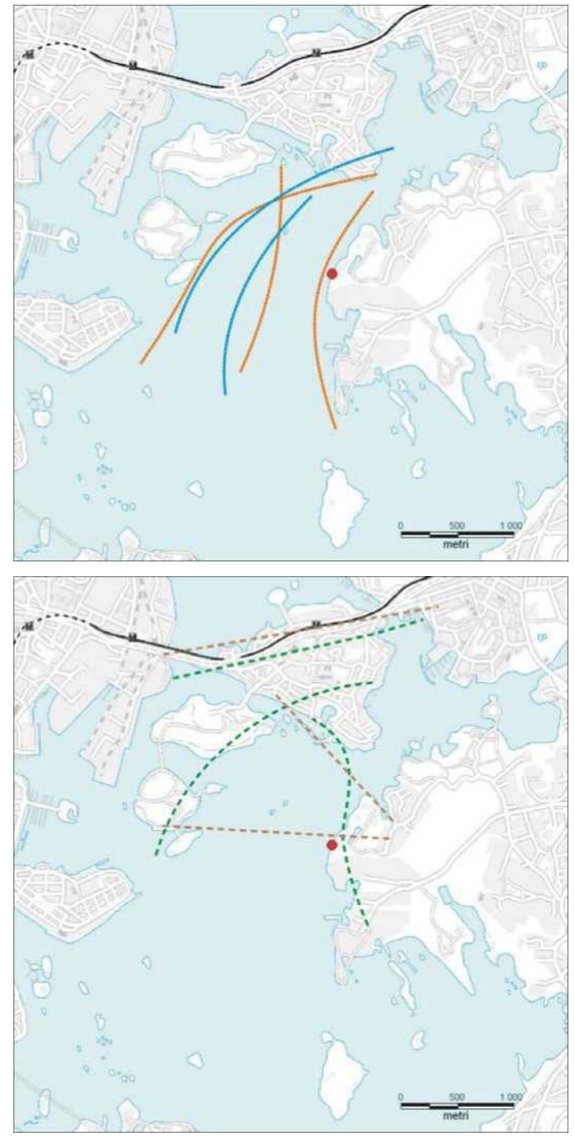


Figure 2.22. Navigation routes of waterbirds (blue) and guineabirds (orange) in the Cruunu Mountains (left picture).
(Brown) pathways for the movement of stem birds (green) and day-to-day birds around the Cruunu

why than in the rest of Helsinki. The movement of birds betweenthe feeding and rearing areas is more significant in the area than migration through the area.

In spring, the flight altitudes of log and waterfowl were lower than in the autumn. In the spring, a large part of the movement is the movement of local individuals between breeding sitesand feeding grounds. The most significant movement in spring is the movement oflog bird birds to the nesting bullets and their feeding areas to the south. Differences were observed in the mobility routes of the groups of species. On the waterfowl and the logs, the routes pass through the bullets of the Kruu doll and, on the other hand, along the beaches of the Hylky Islands and the High Island to Kulosa. In the case of terrestrial birds, the route passed through the High Island and Kulosaaari, not directly across the bay. In predators, routes and flight altitudes varied from one species to another. Predators also appeared to have an Eastern-West route, including the Kulosa Islands.

Most of the movement of local birds in the Crown Mountains consists of the movement of nesting species. There are four nesting banks in the 'Kruunu' area: Mother, NiMimen, elephant and Kuutti. In recent years, the Helsinki-mouth laundry colony wives at Norpa and all of the said bullets are also popular resting places outside the nest of waterfowl, guinea flies and cormorants. On the beaches of the Hyl Island and the Mining Park, there are, among other things, ducks resting, but on the Kruunu Mountain sidethere are few SOR salons. The number of ducklings in the ulul of-the breeding animal is small and the area is not a significant resting area for birds outside the nesting.

2.11.5 Bats

There are no known bat observations in the west of the hillside that are relevant toyour plans or assessment. In the planning area, the bats have been blockedin the Kruunu Mountains in the buildings of the Isle oflsle of Dog, van. The Uusimaa ELY Centre hasnow granted a derogation from the protection of bats for the construction of the Isles of Dog.

2.11.6 Aquatic vegetation and benthic animals

During the EIA programme phase of the project, it was considered necessary to study the aquatic vegetation and benthic invertebrates of the project area, as there was little historical data.

Aquatic vegetation was surveyed in summer 2013 on a line submarine over a total of eight lines (Lammi and Leinikki 2013). The surveys were carried out from 9 to 10 July 2013. Observation of the study line up to the lower limit of aquatic vegetation per depth m. The plots included bottom quality, sediment quantity, depth, percentage of aquatic plant species and benthic species, andaverage height. The inventories were carried out by the investigators FM Jouni Leinikki and FM Jaakko Leppänen Alleco GmbH.

At the western end of Palosaaari, there is a diversity of aquatic vegetation in shallow water, the predominant species being seaweed and slightlydeeper deeper than perch. A few pairs of tubers are present in tube plants at a depth of 1 to 1.5 m. Single-yearly algae are abundant on rocksof sparseness. In the area of the eastern point of Palosaaari, the ground is steep and, because of turbidity, the vegetation is not found at depths of more than 5 metres. The area is poor in terms of species.

The algae species in the Namma's Research Directorate are relatively poor. In the Qualky Island research line, water vegetation is the most diverse on the nearby gravel base of the beach, where the mu-Country pond forms a smaller grassland at a depth of approximately half a metre.

In the broad room research lines, vegetation is verysimilar to each other and the most abundant species are hot cargo pallets and lettuce. In the northernmost line, unlike other lines, mussels were found in deeper parts and migratory mussels from non-indigenous species were found.

The impact of Vantaajoki and shipping in terms of water opacity is evident throughout the research area. Because of turbidity, themouth of the aquatic plant is activated only in shallow water to which the auringon light can penetrate. According to the study, the observations tobe made to the mer are spectacular meadows on the Hylkys Island research line and the observation of migratory mussels in the northernmost line of Laajasalo.

The Bothnium Animal Survey was prepared during 2011. On 1 September 2011, samples of animals were taken from three sampling points for the Kruunu Mountainse-West (the Mountain Islands, the Strait betweenKatajanoka and the

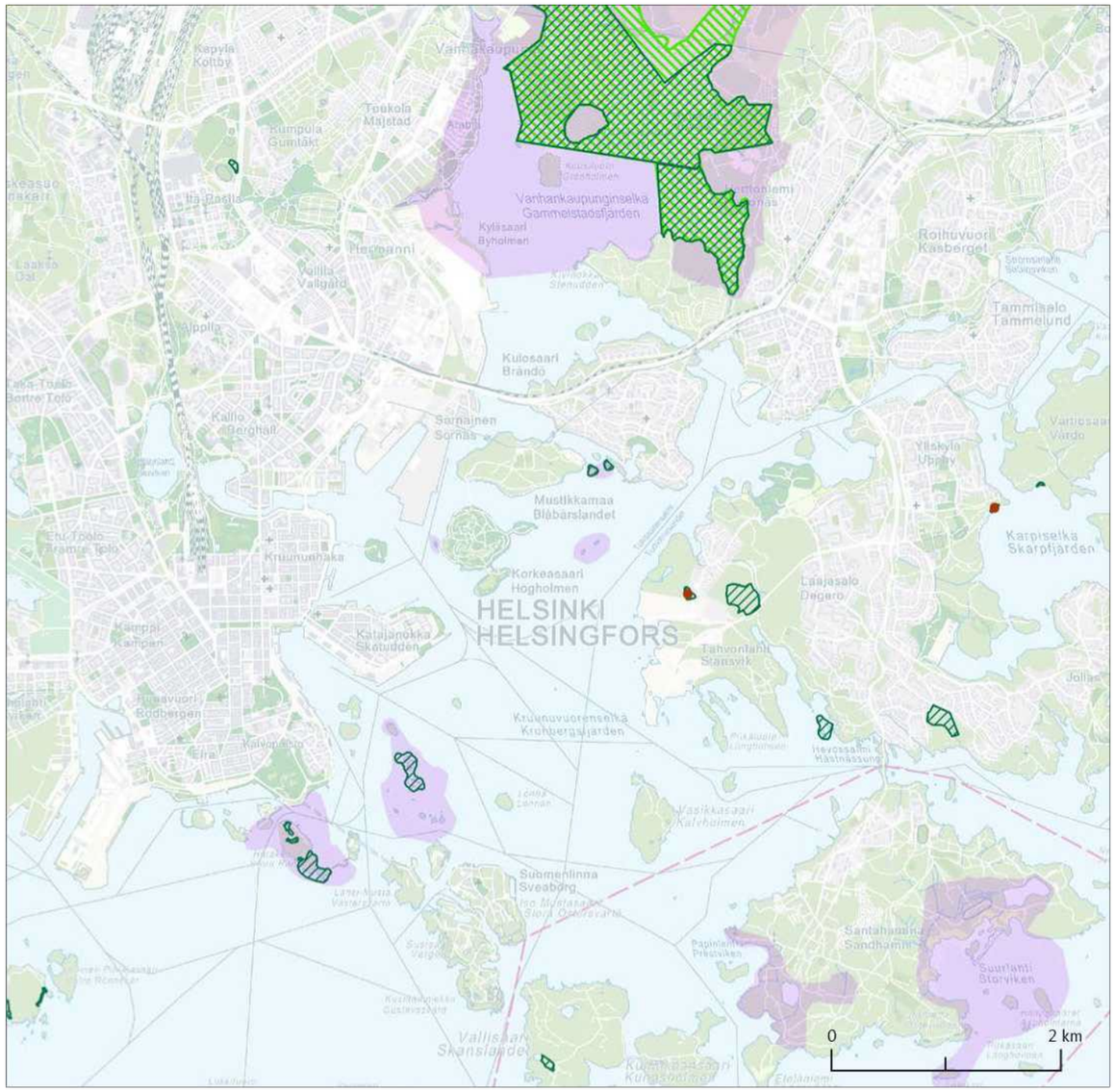


Figure 2.23. Nature reserves, protected habitats and other natural sites.

High Island, and the Kruunu Mountain spine). For the-sampling, method SFS 5076 was applied in the bay areas, where five parallel haulings were taken from each sampling point with the Ekman collector. The samples were sieved with a 0.5 mm sieve and the bottoms remaining in the sieve were preserved at 70 %

alcohol for further analysis. The samples were taken bya certified sampler from the Hel Sing Environmental Centre and analysed in the Environment Centreof Helsinki.

The benthic species of the area are not different from the rest ofthe benthic invertebrates of Helsinki we're, which is characterised by large variations in biomass and individual-numbers, even at local level. The sample piping in the Katajanoka-High Island strait and located in the Sörnaist Strait had clear indications of past bottom disturbances as most of the mussel population was small. Thismeans either that certain age groups have died entirely or that the mussels are unable to grow to large numbers. Sparsely and diverse worms typical of changedbottoms, larvae and mudle mussels are the most numerous in the species.

At the Nimman's sampling point, theKruunu Mountains had dampened changes in benthic invertebrates that point to problems in the bottom state. In the area, the reproduction of mud mussels was potentiallydeclining or prevented.

2.11.7 Fish and fishing

The fish structure and nursery areas of the Kruunu Mountain and adjacent areas have been investigated (Fish and Water Survey 2011b) in the context of this EIA procedure. The fish stock ofthe Helsinki sea basin provides information on the annual monitoring of fisheries.

The catch of Kruunu Mountains was the largestof all sub-areas in the Helsinki Sea Region in 2010 and 2011 (Ramboll 2012), according to the statements made by accounting fishermen. By far the largest number of pikeworm (525 kg in 2011) was caught, as well as decay, skimming, trout, trout, etc.

In the Fishing Survey for Fishing and Water Survey (2011b), me netels were habitate mapping, professional fisherman-interview, Gulf olympic fishing, juvenile seining and Coastal experimental net fishing. The fisheries study was targeted at the target areas of the different project options and the EIA-programme has no impact area, with the difference that themost eastern parts of the project were excluded. On the basis of the study's assessment, the fish effects of the project do not extend to the easternmost area presented in the programme due to the high distance and low water flow.

The fishery structure was studied on the Coastal experimental net net, which included 11 fish species (Fish and Water Survey 2011b). The total catch of the experimental net was 70 kg and 2 170 specimens. This catch was the highest number of decay, while the most significant species in the print catches were. The proportion of predators in the number of fish in the net exploratory fishing was small (8 %) with a muchhigher proportion of pigeon fish (34 %). In contrast, predator fish accounted for 21 % and pigfish 54 % of the Painosaal.

In the Fishing Survey of the Cruunu Mountain (Fish and Water Survey 2011b), 20 species of fish were caught using different methods. Dueto the muscular time, the study did not identify fish species commonly found at cool veden, such as more than 1 hide herring, chicory and migration pigs, flounder, sea trout and salmon.

The most important fish species are dog and perch, whose breeding areas are mainly located in the Bayof Vanhankau Pungi (Fish and Water Survey 2011b). The pike isalso present in the Bay of Vartiokylän, but thepond areas are located outside the inner bay on hard *bottoms (Figure 2.24)*. The most common species in the survey were dense, herring, salad, three-pins and TOK ko.

The straits in the project review area are Helsinki'smost favoured pike fishing grounds, especially during the winter when the hens gather in the deeps of the flowing straits.

Migratory and endangered species

Of the endangered fish species Kruunuvuo-Rhine, there are occasionally at least extremely endangeredsea trout, highly endangeredmigratory pigs and eel, salmon and hair that are classified as endangered, and eye skin. Sea trout and salmon migrate to Vantaajoki mainly in August-October, but migrations also occur at other times from early summer tofinal Pusus. The sea trout grow naturally in theriver Vantaajoki and young trout are planted in the mouth of the river. The trout of trout and salmon leave in spring summer. Adult trout are generally caught by gillnets in autumn and spring, but salmon is only available for a period of time—

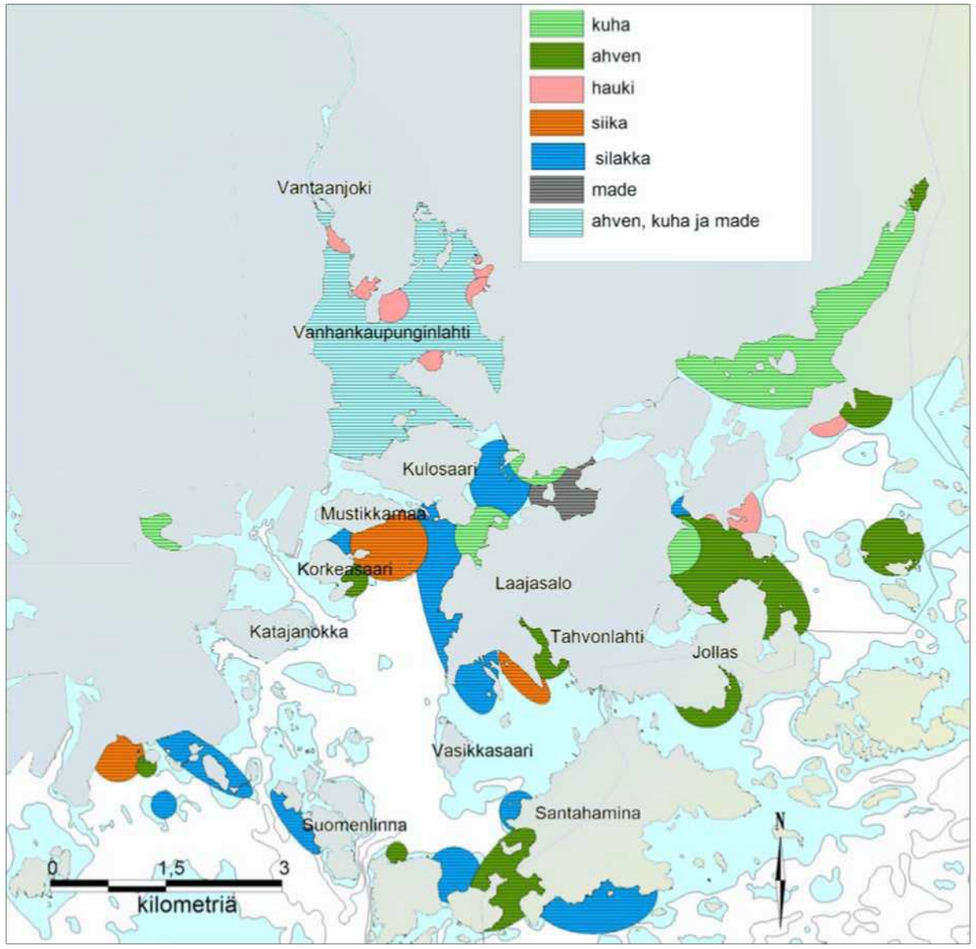


Figure 2.24. The location of the settlement area and of the nursery areas adjacent to the settlement area for perch, pike, geese, matt, pigs and herring. (Source: Fish and water survey 2011b).

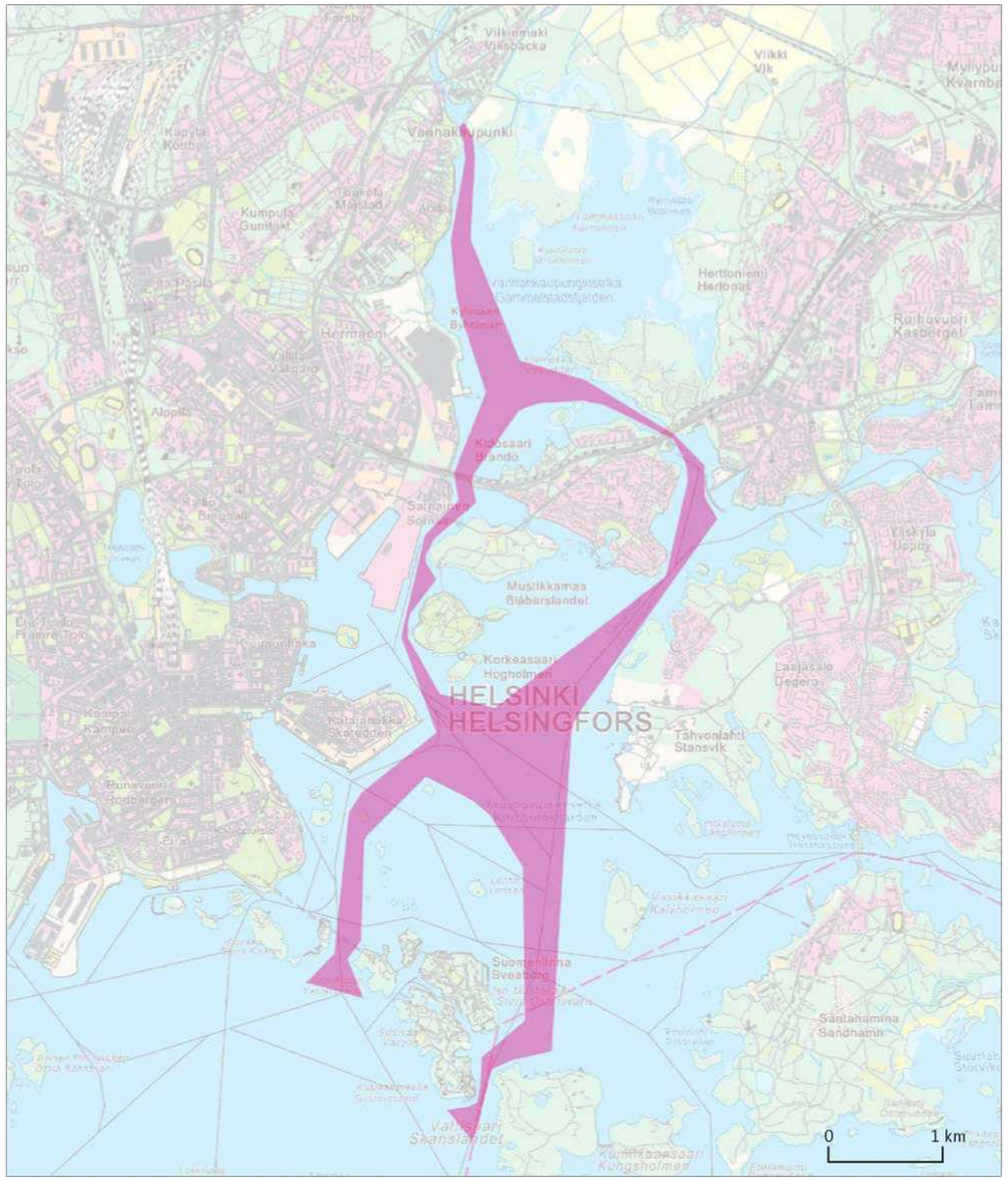


Figure 2.25. The Vantaajoki fishing ladder.
Vantaajoki fishing ladder

dark numbers compared to kilns. (Kala and Water Research Oy 2011b).

According to the current understanding, migration pigs do not increase in the Vantaariver, but a large number of migratory pigs are planted each year in the river mouth. After restocking in the autumn, the old summer lines migrate to the seato eat, and fish returning back to the estuary in about five years. Escapement takes place in September/October. In order to safeguard the escapement of migratory fish, the Vantaajoki fishing ladder *(Figure 2.25)* has been established, which is not allowed to keep rattable-gears (Kala and Water Survey Oy 2011b).

Fisheries

An annual survey of main and secondary fishermen is carried out in the Helsinki Sea Region concerning their professional fishing activities in the previous year. The survey relates to fisheries monitoring inthe Helsinki we riparian region. The survey will be used to determine the number of fishermen, where they are caught, the fishing gears, theamount of fish loaded, the catches by type of fishing and any observations on the impact on the fishing.

In 2012, a fisheries enquiry was sent to all 16 am worn fishing vessels or to the waters of the city of Helsinki in 2011 from the professional fishing licenceto the cooking municipality. Nine food cakes replied to the query, and five of them stated that they had fished on amathematical basis. All fishermen reported using nets, which, as in previous years, were the most commonly used gear. The networks were requested throughout the year. Only one fisherman reported using traps and seven were in use in 2011. In addition, herring netsand longlines were used in the area. The most significant species offish caught, which is economically clear, was pikefish. (Kala and Water Research Oy 2011a).
A study on the fishing grounds and nursery areas of the Kruunu Mountain and surrounding areas (Kala and Water Research Oy 2011b) was interviewed with the only professional fisherman fishing on the back of the Kruu nud. Accordingto you, professional fishermen mainly use bigeye-like nets (with a node spacing > 50 mm) and the economically significant prey species are perch, pikefish, pigs and flounder. By-catches are also abundant of bogs and orders.

Recreational fishing in the sea area off Helsinkihas been surveyed in 2011 (Ramboll 2012). According to the report, the highest catches in the Hel Sing Sea were made by gillnets, fowl and trapping, with trout, dogfish, perch and shooting as the most desirable fish. There were 316landings in the Kruunu Mountains and 84 in the Gulf of Vanhankaupung, compared to 4 484 in the entire Helsinki sea basin. The Mounu Mountains and the Gulf of Vanhankaupungina were the region with the highest catches of pike, bay, decay and brutality. Vanhan Town was also a major recreational fishing area. The bay of Töölön is an important area (oral communication of 10 December 2013 by Matti Mielonen and Jari-Pekka endkkönen, Helsinkibeauty).

3 Fishing port and Kruunu Mountain Coast in 2035

This chapter contains basic information on the design of the fishing port and the Kruunu Mountains and a presentation of the names and characteristics of the areas.

3.1 People's living conditions and comfort

A number of new residential areas**will be built** in 175 hectares in the fishing port. Construction takes a long way to the 2030 lug. 20,000 inhabitants will live in the fishing port.

Housing will be built in the new fishing port centre for more than 2 000 inhabitants. Around the metro station ofthe fishing port, the houses built around the eastern fairway are high towers. Apart from housing, there will be commercial and public services. To the south of the centre, the Kala Port Park will be built as a meeting point for the inhabitants.

The construction of dwellings has already started in the region. There will be some 2 700 inhabitants and the most important public services. There are many different types of housing in the region. A total of around 4 000 inhabitants will be built in thenorthern and southern parts of the network island. In addition, about 1500 new jobs and services are planned for the region.

A residential area for some 3,000 new residents will be planned in Sompa Islands. It is planned to live in Hermanninra for some 3 800 inhabitants, with 600 jobs and salvages. Housing is planned for 2 800 inhabitantsin Nihdi and nearby.

Five new terrace houses have been swallowed in the area of open coal storage in Hana Islands for a total of around 2 000 inhabitants. In Suvilahti, the old industrial buildings-migrated in the area and are mainly developed in the-cultural field. The village Island will expand the area of the-Arabian Ranna campus. In addition, apartments are being builtfor students and seniors.

The most significant changes occur in the areas of the fishing port and the Kruunu Mountain.

The**area** of the Kruunu Mountains is located opposite to theeast bank of the Kruunu Mountain spine. Housing is being builtfor around 11 000 people in the region. One third of the dwellings will be small houses. Housing will be deepand urbanised, but large areas will remain in the region for parks, forests, nature reserves andrough beaches for recreation. The new neighbourhood will be completed in the mid-2020s. The construction ofthe Krounu Mountains began in 2012. An oil tank 468 illumination was opened in the area.

The Kruunu Mountain Bank consists of eight sub-regions: Borgströminmäki, Gunillango, Kaitalahti, Kruunu Mountain, Hopealakso, Gulf of Haakon, the Isles of dog and Stansvikinnummi. There are two schools, several cookies- and two residential parks. The Bay of Haaakon opposite to Katajanoke becomes the centre of the Kruunu Mountain. The area has a beach-bulevard with othercommercial services and a sports hall.

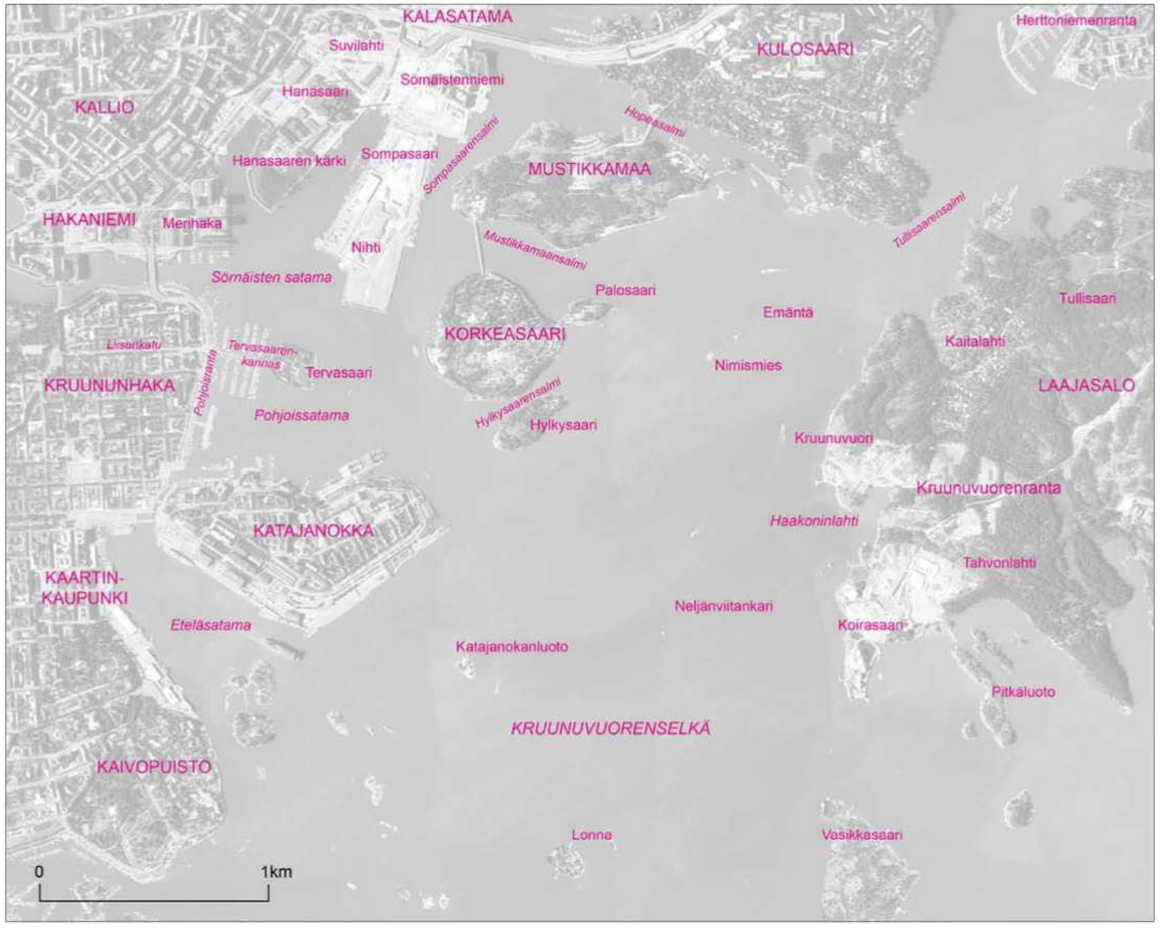


Figure 3.1.

The Stansvik area remains for recreation. Stansvik's outer areas are public recreation areas, although the map is-rented. The long-union, Varisluoto and Vanhakylä summer beaches are preserved. On the other hand, the new village remains under construction.

Figure 3.2. Visual picture of the new residential area of the fishing port (modified by KSV 10/2013 Eastran

3.2 Fishing port

In 2035, the fishing port has developed into an important-residential, service and job area for the back town of the chicken. Homes with 20 000 inhabitants are mainly in apartment blocks, but there are also lotions, urban grains, terraces and floating dwellings.

The centre of the fishing port, which includes a shopping centre, a hotel, offices and a transport terminal, is the heart of the area. The centre is composed of eight towers of 20 to 33 layers. The eastern fairway and the metro station are covered by a green cover. Thanks to good transport connections, the region will be a job for thousands of people in the future. In addition to both the services-provided by the centre of the fishing port, small shops, cafeterias and restaurants will enter the rest of the fishing port. The Centrealso has a social and health status.

In addition to the metro, the area is strongly connected to new tramways in the centre and Pasila. The exchange tunnel connects Her Mannand the corners' coastways, reducingthe flow-through traffic.

The maritime shores of the city, including their promenades, and the canals dividing the area, bring the water element close tothe best possible number. Among the many parks in the area, the most important Kalaport Park is the meeting of residentsof all ages.

Table 3.1. Fishing port in nut shell.

Fishing port	
Residents	20 000
Jobs	8 000
Floor area	1 350 000 k-m²
Land area	175 ha
Total coastline	approximately 6 km
Years of construction	2009-2035

Table 3.2. The hillside in a nutshell.

Crown Mountain	
Residents	11 000
Jobs	1 000
Floor area	500 000 k-m² housing 50 000 k-m² commercial
Land area	200 ha
Years of construction	2013-2030

3.3 Crown Mountain

In 2035, the Crown Mountain is a maritime neighbourhood with a home of around 11 000 inhabitants. The region has around 1 000 jobs and local services. The area is located both in a mixedstructure and in a mixed structure of ker ros, rows and segregated small houses.

The main services of the Kruunu Mountains, leisure and recreation activities and small jobs are distributed alongthe western and eastern shores and along the park axis connecting them. The centre of the area is located in the pruning of the park and the main street. The second service concentration is locatedon the West Bank around Haaakon Bay of KION.

The numerous recreation routes, beaches and natural sites in the hills provide a unique experience of good public transport connections. There is a large Helsinki parkin the slim vicinity of the Kruunu Mountains.

Figure 3.3. Visual picture of the new residential area of the Kruunu Mountain Coast (modified KSV 10/2013).

4 Transport system and its operation in 2035

This chapter describes the future transport system in the Helsinki region and the City of Helsinki, in which the alternatives to Laajasalo's rail transport are examined.

4.1 On general mobility

Between 2010 and 2035, several regional rail links have been opened and upgraded *(Figure 4.1)*. The weight of-mobility has shifted to public transport and cycling and walking. Mobility services have evolved. Theproportion of holders of driving licences and of the au tone in younger age groups has fallen.

Metro has been extended to the west in Kivenlah and to the east to the Öster Sundom. The extensions of the metro have increased the number of users. Metro automatically operates a flux of less than twominutes. The problem for metro starts with the capacity treete at the most loaded line spacing at the Kulosaaari fishing port. Pisarara has been in use for many years. TheHakanie go metro station and Pisara station form a busy rail hub. The circumference line is operational, and thering line is also circular. The city has built alot of cycle paths and cycling is a popular way throughout the year.

The share of electric cars has steadily increased and there are already extensive charging points. Parking policy is more climate neutral than inthe past. Parking pricing and effective parking control have made the right use of parking spaces moreefficient. Within the city, few people travel with their own car.

In the city, rail transport is a transport hub. It is supported by an access bus system and a call-bus system.

4.2 Transport system

Public transport in the Helsinki region will increasingly be based on rail transport in the future. The extension ofthe metro in Matinkyla and Kehärata is being built. In thefuture, the metro line continues to expand in Kivenlahti and Ös tersundom. The transport system planfor the Helsinki region HLJ2011 also aligns with Pisarara, the new eastern rail link via the airport to the east (airway) and the rail Jokeri *(Figure 4.1)*.

The planned new public transport group in theCruunu Mountain would integrate a large urban unit into the city's kits. Nowadays, the eastern public transport in the metrois dependent on metro. Its capacity will not be sufficient forever, there is also a need for other connections to the metropolitan area. In 2035,the area of 'Laajasa lo' is a part of a town with more than 20 000 inhabitants, which is approximately 5 km away from the three statues of the city's centre, which characterises the city's centre. Today's connection via Kulosaaari is longer.

The large-scale public transport networkas a rail link is in line with the Helsinki Regional Transport System Plan (HLJ 2011) in the first phase of the projects to be carried out before 2020. The transport systemis currently in the process of being updated (HLJ 2015) and a newplan will be completed in 2015. The main projects are presentedin *Figure 4.1*.

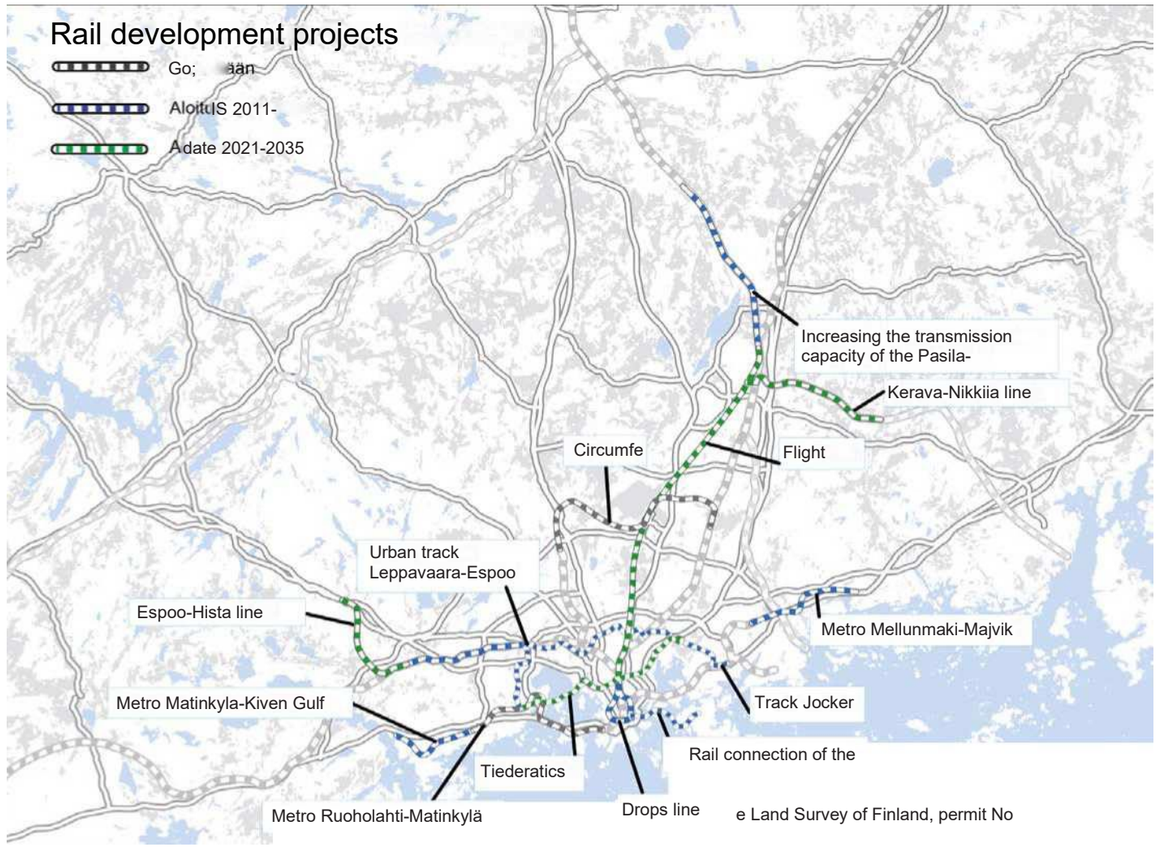


Figure 4.1. Public transport corridor projects starting before 2035 under the Helsinki Metropolitan Transport System Plan (HLJ 2011). (Source: HSL 2011).

In addition to the development of rail transport, regional bus connections will be developed, in particular transversal connections. KE'sconfused hull bus connections improve the operation of public transport through transversal connections, where traffic growth has been the highest in recent years. In due course, these hulls may create high-speed rails when the number of passengers has increased sufficiently.

The conditions for the operation of public transport will be improved through the development of connection, parking andconnecting cycling. The conditions for walking and cycling will be improvedby making the network more coherent. The development of mobility will focus on smooth and easy travel chains. Points of particular importance for this objective are theinterchange points for travel, in particular the comfort and safety of the busiest *interchange points (Figure 4.2)*.

In order to assist the mobility of the region, informationsystems will be developed to support both public transport and other forms of vehicle transport. More information is collected on the mobility of the region to inform about mobility disruptions and to develop differentservices. Communityisation and crowdsourcing can bring about new types of mobility patterns and services.

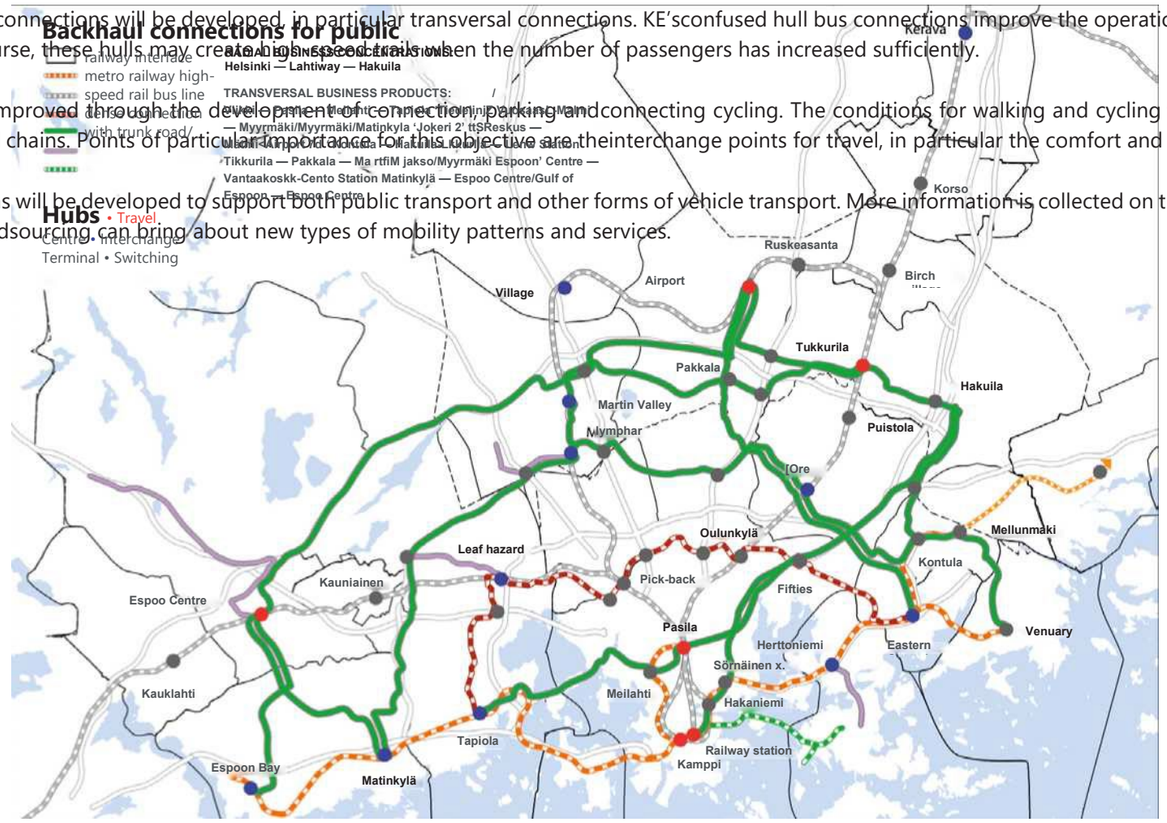


Figure 4.2. Backbone connections for public transport in the Helsinki Metropolitan Transport System Plan (HLJ 2011). (Source:

5 Environmental impact assessment procedure

This chapter summarises the issues relating to the environmental impact assessment procedure, the legal basis, the purpose and the substantive requirements. The progress of the evaluation and its main steps are also presented. The parties to the procedure and the

Content of the evaluation procedure and its

The purpose of the Environmental Impact Assessment Act is to 'promote an environmental impact assessment and integrated consideration of effects inplanning and decision-making, while at the same time increasing public accessand participation'. This is intended to prevent adverse effects on the environment and to reconcile different perspectives and objectives in advance.

On 24 June 2009, the Uusimaa Environment Agency adopted a decision on the application of the EIA procedure to the Laajasalo rail exchange ehdot project.

The environmental impact assessment procedure is divided intotwo sections, namely the tillage of the evaluation-programme and the impact assessment and its presentation in the evaluationreport.

Evaluation programme

In the first stage of the EIA procedure, a programme for the assessment of effects onbuildings is drawn up. The evaluation programme is an explanationof the current status of the project area and a plan (work programme) on which environmental impacts are to be investigated and how they will be carried out. The evaluation programme shall set out the basicinformation on the project and its timetable, the exchangesto be studied and a plan for participation arrangementsand information.

The contact point shall makethe appointment of the evaluation programme visible and ask for opinions on the programme from the variousofficials. Citizens and others may express their views to the contact pointduring the period of availability. On the basis of the opinions and opinions delivered on the programme, the contact-authority shall provide its opinion to the developer within one month of the end of the period of visibility. The environmental impact assessment work will then continue with the assessment report.

- The evaluation programme was completed on 31 August 2010 and submitted to the contact point.
- The lis pendens of the evaluation programme was reported on 13 September 2010 in Helsinki Sanom and Hufvudstadsbladet.
- The evaluation programme was published between 13 September and 12 November 2010 on the city planning board of theCity of Helsinki. In addition, the alert was available on the website of the Uusimaa ELY Centre.
- The evaluation programme was available from 13 September to 12 November 2010 at the City of Helsinki City Planning Office and the Info and exhibition facility in Laitur. In addition, theevaluation report lost has been available in the Libraries of Largesalo and Herttoniemi, as well as on the project manager's website.
- The contact point issued an opinion on the evaluation-plan on 3 December 2010.
- A presentation on the evaluation programme was held on28 September 2010 at the Helsinki City Planning Agency's Auditio. Representatives from the contact office,the city of Helsinki and the planning consultant were present.

Figure 5.1. Diagram of the progress of the EIA procedure.

year	2010												2011	2012	2013												2014								
month	1	2	3	4	5	6	7	8	9	10	11	12			1	2	3	4	5	6	7	8	8	9	10	11	12	1	2	3	4	5	6	7	8	9
Preparation and evaluation programme																																			
Preparation of an EIA programme																																			
Design of Bridge, Waterway and Cableway options and Bridge Competition																																			
Specification and description of options																																			
Clarification of the description of the status quo + planned land use 2030																																			
Tasks of the contact point																																			
Decision on the application of the EIA procedure to the project																																			
Notice on the completion and visibility of the EIA programme																																			
The EIA programme can be viewed																																			
Opinion of the contact point on the evaluation programme																																			
Impact assessment and evaluation report																																			
Environmental impact assessment																							1				1									
Identification of the significance of impacts and comparison of options																												1							
Preparation of an EIA report																																			
Tasks of the contact point																																			
Notice on the completion and visibility of the EIA report																																			
The EIA report can be viewed																																			
Opinion of the contact point on the assessment report																																			
Interaction																																			
Public events																																			

Information and organisation of participation

Evaluation report

The assessment report shall compile the studies and assessments made in the context of the EIA procedure to assess the environmental impact ofthe project. The key issue is the comparison of alternatives and the assessment-of their feasibility. The report also presents the evidence used in the evaluation, including references,the evaluation methodology, uncertainties in the evaluation work, the-prevention and mitigation of adverse effects and the monitoring of impacts.

The contact point publishes and displays the evaluation-report in the same way as the evaluation programme. A public event will be organised to present the main findings of the evaluation. The contact point shall gather the opinions and opinions of the authorities on the report and, on the basis of those opinions and its own expertise, shall give its opinion on the report within two months of the end of the period of visibility. The evaluation procedure ends with thejoint authority's opinion on theevaluation report.

The EIA procedure is not an authorisation procedure but aims to provide information for decision-making. The assessment report and the opinion of the contact point shall be taken into account inthe subsequent decision-making and permit assessment.

Parties to the evaluation procedure

The project manager is the city of Helsinki (urban mowing-agency) and the Uusimaa body as the contact point isthe Centre for Arts, Transport and the Environment. The environmental impact assessment programme was drawn up by Trafix Oy's and LandProOy's joint work association, andSito Oy, together with LandPro, Trafix and Crede Consultin- gin Oy, was responsible for drawing up the assessment report.

In Helsinki, during the period during which both the-evaluation manual and the evaluation report are available, the City Board compiles the opinions of the citygin boards and sends its opinion to thejoint authority.

The environmental impact assessment procedure is an open process aimed atincreasing citizens' access to information and participation. Participation inEGTCs refers to the interaction between: the person responsible for the project, the contact point,any other official, any person whose circumstances or interests may be affected by the project, and the entities and foundations whose field of activity maybe affected by the project. As part of the EIA procedure, formal consultation as required by thelegislation is carried out ifthe contact point responds.

Public events

The first public meeting of the EIA report took place on 21 October 2013 in Laitur, Kamp. The invitation to the event was published, among others, on Helsinki Sanom, on the website of theAgency and Laitur, and on the Helsinki Plantte-lee facebook. The event was an opportunityto hear with designers. More than 100 participants attended the event. There were approximately 10 representatives of the City of Helsinki and the consultant. In addition, representatives of the NewCountry's ELY Centre were present.

The project and its options were presented and what-impacts will be assessed. Some ten minutes of speeches had been requested in advance from themain organisations. The citizens' association of Laajasalo, the association of residents of Kruununha, boatmen and the Ranta group took the floor. A presentation of STX's boards was also held. Therewas a close debate on the pros and cons of the options. The negative effects of the bridge on the Kruununhaa area were raised by the Kruunhakas. Katajanoka's worshiphighlighted the negative effects of increasing public transport on the flow of traffic in Katajanoka. The Layalolai-set stressed the need for a bridge on the side of Laajasalowith a ring, and stressed the importance of the bridge also allowing for the use of vehicles. Boatmen explained the drawbacks of the bridge toneileage and the Ranta group to the maritimeity of Helsinki. Several interventions were in favour of a waterborne connection. There was also support for the cableway link.

Thirteen feedback forms were returned, several of which-supported a public water transport connection, with cableways. The tramways and the tunneled metro also receivedpins. There were objections to the tram and vehicle bridges.

The second public meeting will take placeduring the period during which the EIA report is available in spring 2014.

Monitoring group

During the EIA programme phase, the project brought-together a monitoring team composed of representatives of residents' organisations and other associations (e.g. boating). During the EIA report, the Monitoring Group was invited to public events and they wereinvited to speak at the first session. In addition, a presentation and discussion session was held on 11 March 2014 on themain content of the r viation report. Among other things, a preliminary summary of the evaluation report was presented. There was a lively debate on the significance of impacts and the profitability of alternatives

Group interviews

The project organised two group interviews, bringing together residents from the main regions affectedby the project. The aim was to gather the views of ordinary residents on the options. The interviews were gathered at a public event, a announcement on the KSV's Facebook and Laitur websites and through resident associations. Participants were provided with the themes of the interview in advance, as well as a request for a broader mapping of theviews of the neighbourhood. The discussion was based on alternative maps and other information about the project. Theinterviewed debate was recorded and analysed.

The first interview took place on 19 November 2013 in Laituri for the inhabitants of theback town of the chicken. A total of eight people participated in the interview (three from the Kruunhay, two from the Kataja noka, two from the fishing port and one user from the High Island;

On the culosaary). The second interview took place on 27 November 2013 in the Ylis House in theLaajasalo. A total of eight people participated in the interview (seven from the Large Houses and one from Jollas). Since Mr Hertto nie's representative was prevented from attending the interview, a telephone interview was held on 5 December 2013.

Other feedback

In addition, contributions were received via e-mail and-speech barriers.

The contact point issued its opinion on the evaluation programme on 3 December 2010. The content of the opinion is described in the following chapter (chapter 6) and the full *text of the opinion is set out in Appendix 1*.

Content of 6 contact points' opinion on the EIA programme

This chapter summarises the opinion of the contact point on the environmental impact assessment programme and how the developer has taken these issues into account in the assessment.

The Uusimaa ELY Centre hasrequested opinions from the City of Helsinki, the Helsinki City Transport Institute, the Helsinki Environment Centre, Helsinki Port, Uusimaa Union, the Helsinki Regional Transport Association (HSL), the Helsinki Regional Environmental Services Association (HSY), the Helsinki Borough of Helsinki(Keski-Uudenmaa Provincial Museum), Museo Agency and the Ministry of the Environment.

The evaluation programme received 6 opinions and 36 opinions.

The contact point issued its opinion on *3 December 2010 (Annex 1)*. The contact point's opinion summarises the main issues and sets out how they have been taken into account in this EIA *report (Table 6.1)*.

Table 6.1. The main content of the opinion of the contact point on the EIA programme.

Content of the opinion of the contact point on the evaluation	Taking into account in the evaluation report
Consideration of options	
The options set out in the assessment programme are sufficient and the-setting of alternatives meets the minimum requirements of the EIA legislation. The comparison options are sufficiently different to identify the differences between the basic options. The assessment report should describe in more detail the previousdesign or reduced alternatives (e.g. cableways) and the sub-option for the carriage of a tram or bus by ferry over the Kruunu kernel should also be assessed in the context of the waterborne transport option (VE 6).	• A brief presentation of the options previously explored, such as the branching of the metro in the direction of Laajasalo from the Hert, and a bridge through artificial islands between Katajanoka and Kruunu Mountain. • The water transport option is a bus bridge. • New options include a cableway and a bridge, where vehicle traffic is allowed.
Effects on urban structure and land use	
In the assessment report, the relationship between the option and the layout situation should be opened at each level of the hierarchy of the plan (municipal plan, zoning plan, town plan) and estimate the need for a change of plan. A sensitivity analysis should be added to the examination of all transport options, i.e. the possible civilian use of Santahamina	• The estimates have been carried out as required. • The civilian use of Santahamina and Vartiosaare has been assessed as a sensitivity assessment in theimpact assessment of the movement list
Impact on transport	
The evaluation programme presents public transport corridor projectsin the Helsinki Metropolitan Transport System (PLJ 2007). As the evaluation progresses, the Helsinki Region Transport System Plan (HLJ 2011), currently under consultation, has to be taken into account. The evaluation report shall also take into account the work of the province of Uusimaa, the draft of which has been assessed for the forthcoming opinion in spring 2011. The target year of the provincial plan is 2035 (EIA target year 2030). The fuel transport of the Hanasaari power plants shall be taken into account in the assessment. The map of the small-volume port must be updated in the assessment report. With the new inhabitants, the recreation pressures on the Kruunu Mountain shouldbe reduced and may increase traffic to the area from outside the immediate catchment area. This should be taken into account in the	• HLJ2011 and the most recent steps in the provincial plan have been taken into account. • The target year for the evaluation has been changed to 2035. • The fuelkulls of the Hanasaari power plant have been taken into account in the bridge solutions in the Port of Sörnainen and in the assessment thereof. • Shortcomings in the map of smallboat marinas have been completed. • Increasing recreational craft traffic has been taken intoaccount in irrigation.
Impact on the cultural environment	
There may also be underwater cultural heritage sites that are not known. The assessment report shall consider the effects on the characteristics of the built environment. The badge of nationally valuable cultural environments-should be opened in the evaluation report. The map of cultural heritage sites should be updated in the evaluation report.	• The necessary archaeological inventories are to be carried out after an assessment report has been drawn up. • The assessment is carried out in relationto the characteristics and the importance of nationallyvaluable dock environments has been clarified.

Continuing

Content of the opinion of the contact point on the evaluation programme taken into account in the evaluation report

The effects of the projects during the construction and operation of the projects on fish migration to Vanhankaupunginski and the river Vantaa must be assessed, as well as the effects on reproduction in these areas.

In addition to the studies provided for in the programme, it is necessary to carry out coastal vegetation surveys at the points where the option runs on the High Island and on the coast of Laajasalo. Water vegetation surveys at the grubbing points should also be carried out. In addition, the eutrophication of waters and corrosion of beachesthat may be caused by concrete-installed tunnels and pen gerrys shall be assessed and mitigation measures shall be presented. The contact point welcomes the clarification of the importance of the back of the Kruunu Mountain as a route to the Gulf of Vanhankaupungin and the resting of birds as aplace. Potential effects on water bodies should also be taken into account in the assessment of impacts on the Natura 2000 site in the Bay of Vanhan Town.

It is necessary to examine the current situation of flow conditions and to explain the effects on flows, water exchange and water quality with sufficient precision, either modelling or otherwise, to enable the assessment report to reliably assess thefeasibility of conditions and to compare the effects of alternatives on water. It is also necessary to assess the impact of the changes in the flow conditions resulting from the construction on the flow conditions and the state of thevan Natura 2000 area in the Bay of Vanhan Town and its northern part.

The need for deformation will be considered on the basis of the first results available in September and the resulting estimates.

The risk of collision with electric cables and other cables inthe air space should be increased, especially in darkness and fog, to the effects on birds.

The effects during use should be taken into account, as terraces and bridges and possibly rail noise and vibrations may affect the comfort of fish and fishermen in the water area.

The need for a Natura assessment should be clarified. As a preliminary point, there is no need to carry out an actual Natura assessment in accordance with the law.

Economic impact

The evaluation programme shows in Table 1 the technical characteristics andbenefits/cost ratios of the options. The table as such does not fully open up the characteristics of the different options, as the aim is apparently to describe movement from the Broadband to a specific location in the centre (metro-alternative-sa Kamppi). The evaluation report should provide a table and map describing, by option, the examples of trips with identical distances, e.g. between the easternmost position of the metro options of the broad room and Kamp.

Participation and reporting

The evaluation programme lists the sources used. It is also useful to include in the evaluation report a list of the starting material used during the evaluation.

With regard to the necessary permits and decisions, the concept of 'water law permit' has been misconceived. This is a permit under the Water Act, which is issued by the Regional State Administrative Agency of Southern-Finland.

- Impacts will be assessed and discussed with fisheries experts in Helsinki.
- After the programme phase, the following faults have been commissioned: Algae and migratory bird survey, monitoring of benthic invertebrates, Ranta and aquatic plant surveys, beach and aquatic plant surveys of the Horseren, Terva Island and Kruunu Mounu beach (aquatic plant herbs carried out by diving by Alleco Oy), water quality and flow measurements at four points (Lude Consulting Oy), Kalat and chick production and Sedi ment studies.
- Consultations were held with the ELY Centreon the need for water modelling on 21 November 2013.
- The water impacts associated with all optionshave been made in the form of expert assessments without water modelling.
- The risk of bird collision is assessed-qualitatively.
- The sound progressionof underwater explosions is estimated as an expert judgement without modelling of underwater noise.
- In-service noise and vibrations are not estimated to be an essential amenity factor forfishersl l, nor are they estimated to have a significantimpact on chicks.
- The need for a Natura assessment has been assessed.

The transport impact assessment sets out illustrative journeys; the journey time, the time of the transfer and the part of the journey made by different means of transport. In addition, travel-time achievability is presented for all options.

A list of sources is attached to the evaluation report and references are used in the text.

- The list and descriptions of the necessary authorisations are: completed and misstatements have been corrected.

7 Methods and limits for impact assessment

This section sets out what impacts have been considered, how the significance of each effect has been considered and in which area they occur. The principles for comparing options have also been explained.

Environmental impacts

For the purpose of this project, the environmental impact refersto the rail link between the LAA and the Helsinki peninsula for the implementationof fungi alternatives; direct and indirecteffects of construction and operation on the environment.

In accordance with the EIA Act, the assessment must consider theinteractions between them, including the effects:

- human health, living conditions and comfort;
- soil, water, air, climate, vegetation, organisms and biodiversity;
- community structure, buildings, landscape, urban image

The EIA report presents the resultsof the estimating and the comparison of alternatives. Its purpose is to support subsequent decision-makingby describing the advantages and disadvantages of the different options andexplaining why they are preferable and cheaper from differentangles.

Assessment of the significance of the effects

Environmental impacts are assessed for allrelevant impacts but focussed on significant environmentalimpacts. More and more attention has been paid to assessing the significance of impacts in recent years. The Centre around-Finland (SYKE) coordinated the EU-funded (LIFE+) project "Multi-objective assessment practices and tools for improving the quality and effectiveness of environmental impact assessment (IMPERIA)". This EIA has applied the methodology developed by the Imperia project to assess the significance of impacts *(Figure 7.1)*. The author of the evaluation report has been involvedas a partner in the Imperia project.

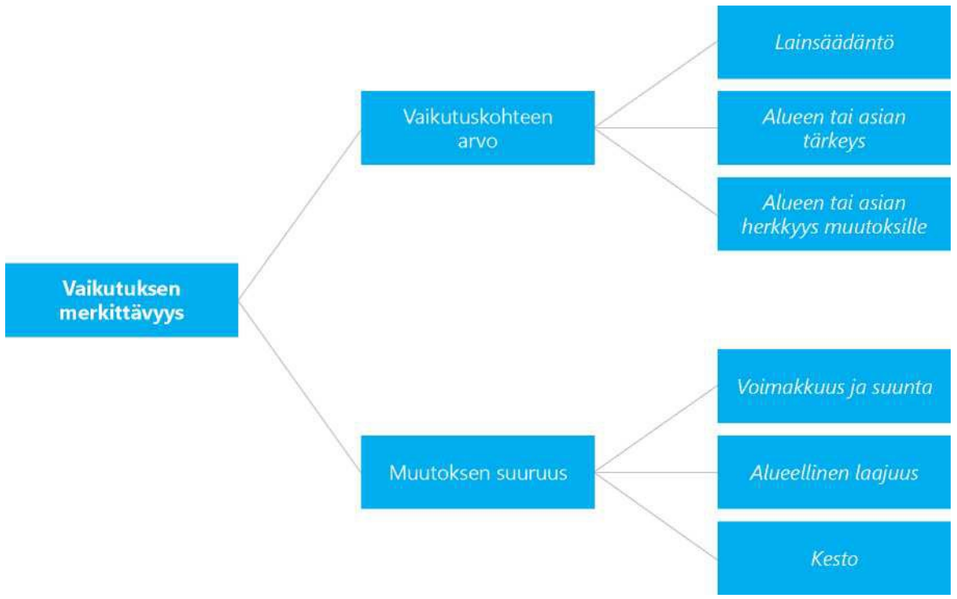


Figure 7.1. The framework for the assessment of significance.

Table 7.1. The magnitude of the impact.

Size of impact	
Author	**Examples of dimensions**
Intensity of change	Small/moderate/large
Direction of change	Positive/negative/neutral
Duration in time	Short time (e.g. construction)/long/permanent
Regional scope	Middle-effect area/local/regional structural spill-over effects
Reversibility	Fast-reversible/slow-reversible/permanent
Saturation capacity	Cumulative effects
Frequency	One-off/frequent/continuous
Probability	Likely effect/likelihood

Table 7.2. Factors of importance of the catchment area or

Importance of the site or site	
Author	**Examples of dimensions**
Characteristics of the area	Built/intact environment, city/rural/natural environment
Value	Economic value/recreational value/landscape value/social value or biological value/use value
Legislation	Protected areas/species, etc.
Rareness	Threatened/Understanding
Targeting different population groups	Children/old-age/working age
Number of population	Individuals/community

The objective of the methodology for assessingsignificance is to enhance the assessment of the impact of the various domains and to provide as clearly as possible the monet factors affecting significance (*Table 7.1* and *Table 7.2*).

The significance of the impacts has been assessedas a broader set of issues (land use, landscape and urban image, transport, water bodies, nature, sediments, etc.) which are-sub-regional (e.g. traffic impacts divided into changes in traffic volume, changes in modes of transport, accessibility, etc.).

Significance has been assessed in this EIA report and Ido not use a five-stage classification *(Table 7.3)*to support thinking, where the impact can be negative or positive. However, it has not been printed as a broad "all-inclusive" matrix, but the more extensive dossiers interpreted by the consultant as the most relevant ones (*Table 7.4, Table 7.6* and Chapter 10) have been taken into account in the summary of adverse effects. The mobility characteristics and effects of the alternatives and their conformity with the formulas shall be considered in the light ofthe objectives pursued. Indicative examples of adverse effects to varying degrees can be found in the table *(Table 7.5)*.

Comparison of options

The comparison of options also includes a description of thegaps and weaknesses of the options from different perspectives. In order to compare the options, a summary table has been compiled showing significant and very significant adverse environmental effects *(Table 7.6)*.

The mobility characteristics and effects of the alternatives and their conformity with the formulas shall be considered in the light ofthe objectives pursued.

Table 7.3. Thinking of classifying significant negative and positive effects in the EIA report.

Classification of the significance of the	
+ +	Significant or very significant positive impact
+	Low to moderate positive impact
	Neutral change or no impact
—	Minor or moderate negative impact
— —	Significant or very significant negative impact

Table 7.4. Indicative matrix for the interpretation of the significance of the adverse effect (i.e. magnitude of the effect/sensitivity of

		Size of impact		
		Large	Moderate	Small
Importance of the catchment area or	Large	**Very significant**	Significant or **very significant**	Moderate
	Moderate	Significant or **very significant**	Moderate	Moderate to minor
	Small	Moderate	Moderate to minor	Low

Table 7.5. Indicative examples of adverse effects to varying degrees.

Negative (negative, adverse) impact	
No impact (neutral 0, unchanged)	The impact is not different from the current situation/background/background/natural level.
Limited impact	The change is small, limited impact area, short duration and/or low or moderate sensitivity/value of the object. Or the change is medium and the object is of low value.
Moderate impact	The effect may be small, but the sensitivity of the target is high. Or high impact, but low sensitivity of the target. Or both are moderate.
Significant impact	The impact exceeds acceptable limits and standards. The impact is high and affects moderately valuable resources/objectives. Or the impact is medium and affects an important (sensitive) region.
Very significant impact	**The impact exceeds acceptable limits and standards and cannot be compensated/accepted under any circumstances. The impact is high and affects very valuable resources/objectives. Or the impact is very large and affects an important (sensitive) area.**

Table 7.6. The structure of the impact comparison table used in this evaluation report.

Ve x	Environment	Land-use planning and transport
	• Significant negative effects • Very significant negative effects • Material factors of uncertainty • Synergistic effects • Need for Natura assessment • Assessment of environmental feasibility	• Compliance with formulae and land use targets • Functioning of the transport system and compliance with the objectives of the transport system

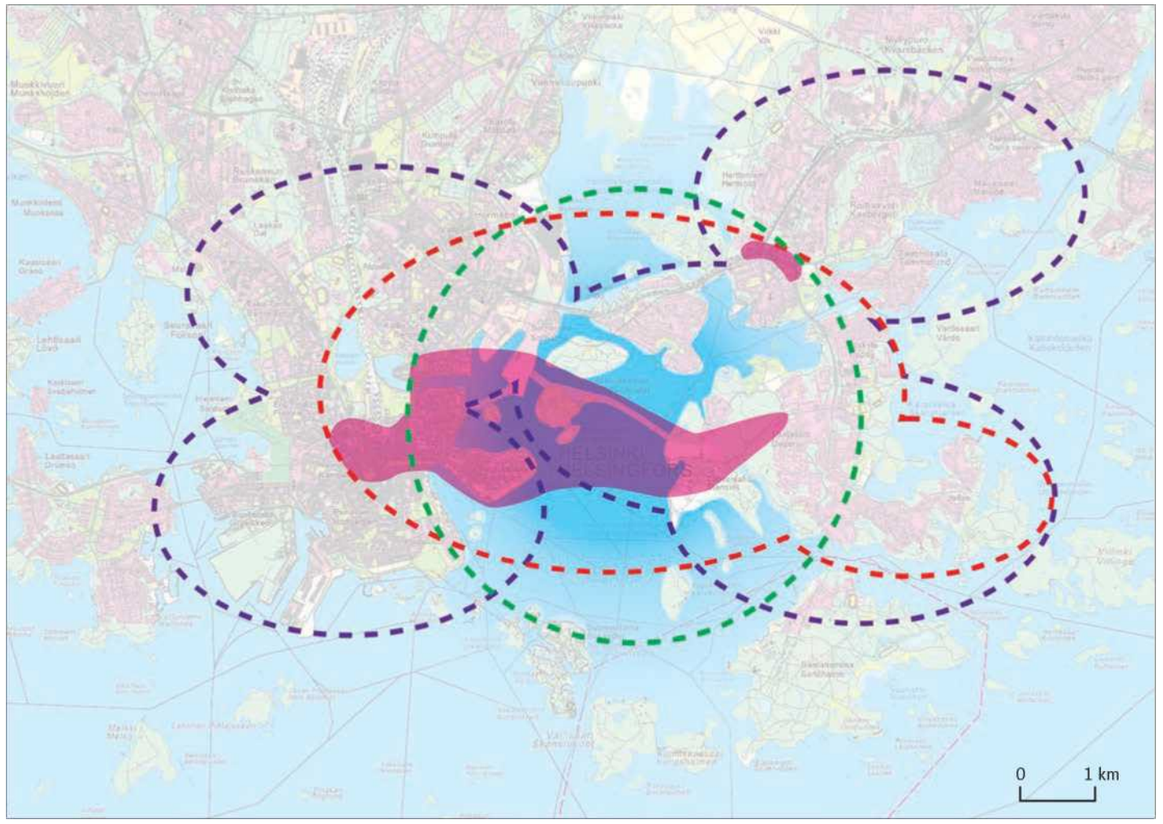


Figure 7.2. Outline of the impact area of the project.

Demarcation of the catchment area

The extent and significance of environmental impacts depend onits nature. Different types of environmental impactsare addressed in different territorial ways. Some of the effects are local, others are touching on large regional ornational naïve entities. The effect may be of a character ofPiS or regional in nature.

The immediate vicinity of the environmental impacts of this project includes those areas where the alternatives involve new construction. As a significant proportion — depending on exchange dosage— takes place in the water catchment area, much of the so-called estua-ride of Vantajoki has been considered as a catchment area. The mainurban area has been considered as an area of transport impact. The map shows very indicative areas where accessibility will be improved. Depending on the alternative condition, the-project will have effects on, for example, the modal split. The bridge's direct and immediate catchment areas are three kilometres from pylons. In the south, the zone extends to the north bank of Finnish Castle. In this area, the bridge is clearly visible in the landscape, butnot dominated by

8 Construction and effects during construction

Through maps, texts and tables, this chapter presents the main characteristics of the options, in particular for construction. The project information in the tables is indicative. The design of the different options and project elements has been done at different times and with different degrees of precision. The plan data can be found in the plan reports mentioned in the source catalogue. As the method of construction plays a key role in the creation of environmental impacts, the effects during construction are also described in this chapter.

Ve 0 (+) Carton buses for Herttoniemi metro station

VE	Description of the option	New transport infrastructure *Land construction; dredging, mass requirements, surplus masses (preliminary estimate)*
VE 0	Connecting buses to Herttoniemi metro station	Stretchways and eastways and concrete tunnel in Herttoniemi, tunnel and trough structures approximately 1 000 m of which approximately 700 m concrete

Plan

The public transport service in the Large Room is based on a bus connection tothe metro station of the Hertto nie. The arrangement of the BussiTerminal at the station is in line with the current improvement plans.

Bus bridges will be increased and the distance between the lines will be increased. According tothe plans of NY, there would be five connecting lines in the Broadtail, which operate between 7.5 and 12 minutes.

This option includes some additional bus stops.

This option includes, for the Herttoniemi Centre, the stretch of the easternfairway and the Linnan lantern roads forthe construction of the tunnel for the Linna Building Tank (as isthe case for the other swaps, except option 8). *Figures 8.2* and *8.3*.

Construction and work areas

Any new stops will be built in the street area of existing and planned new streets or in areas to be created as a street.

The construction of the Tunnel requires the use of thefour areas surrounding the four above-ground structures as construction sites. Tunnel mining will become a lot of soil and aggregates which may need to be stored or disposed of in other areas. The drainingof unusable soils and aggregates restrictsthe other use of the area.

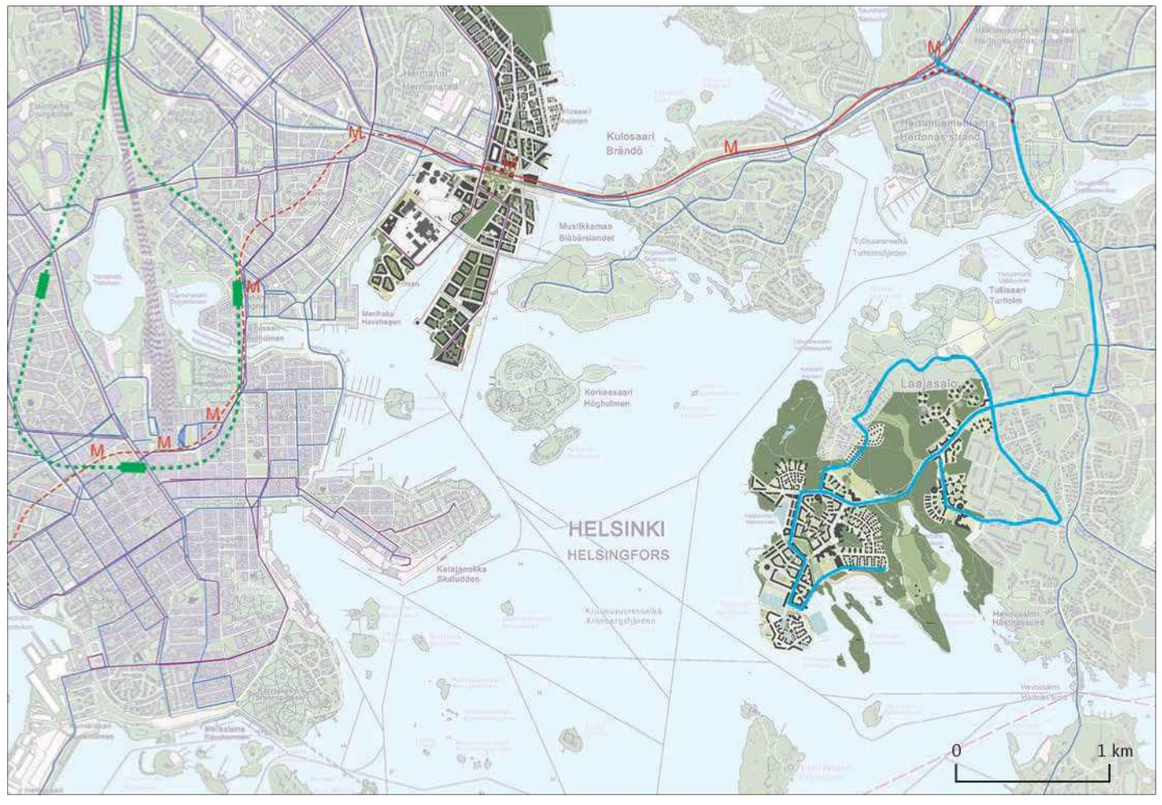


Figure 8.1. Option 0, connection traffic as it currently

Effects during construction

Soil and bedrock, groundwater

The implementation of option 0 will have no significant impact on soil and bedrock or groundwater. In practice, there is only a feeling of skippers inthe construction of the line where excavations and quarrying are carried out. Excavation and quarrying generates solid-rich waters which are diverted through clarification either to the terrain, rain to a water seweror to a sewage sewer. Water cooked with-quarrying often also contains nitrogen compounds released from explosion and are alkaline due to injections and betoins. During construction, the groundwater surface may decrease locally because groundwater entering excavation is pumped out of the area. However, during construction, the aim is to ensure that the drainage isas positive as possible, thus reducing the impact on groundwater.

Surface water, fish and fishing

In the construction of the tunnel of the Linn Landways, the waters discharged to the terrain or to the rainwater sewer are dischargedin a type of sequentially into the watercourse through the settling basin, thus reducing thesolid load on the water body. The pH of the waters shall be adjusted if necessary. The waters leaving the tunnel may cause temporary turbidity and nitrogen concentration in the local darknessof the Tiiliruuk Bay, where the increase in nitrogen content may temporarily increase the amount of phytoplankton. The impact onwater is limited. This option has no impact on fisheries or fisheries.

Eastern Corridor

The current cross-section of the eastern waterway remains 3+ 3 lane to the west of the ramps of the Linn Landways, the 2+ 2 lane on the section between the building road and the labour leader street, and the 3+ 3 lane to the east of the Leader's street. The current bandwidths remain at 3.5 m throughout.

Runway and tunnel

The varnish lantern is a main street. The runway is the eastern waterway between the basic cross-section 3+ 3

Nature

Construction has little impact on nature.

Transport, mobility and housing

The construction of the tunnel for the Linna-BuilderRoad will have an adverse effect on farmers, pedestrians and cyclists, as well as bus services during theconstruction period, probably for several years. Working-time transport arrangements are challenging. Work onthe ground's noise has an impact on the comfort of living.

Outdoors and recreation

The construction of the runney lanterns has a negative impact on the accessibility of the Herttoniemimap park.

Herttoniemi arrangements (not VE 8)

— Abraham Wetter road. This is in line with the current lane regime. The outer lanes are in the final situation bus and coach lanes. This equalisation remains as it stands.

A concrete tunnel with a covered length of 670 m shall be built under the pavement. Both ends of the covered section require a concrete support wall structure. Support wall structure related to the eastern fairway

Figure 8.2. Tunnels and trough structures for the eastern fairway and the Linnawant lanterns.

the length is 220 metres. The length of the pan structure is 130 m.

The designed road tunnel is a double tunnel with its own single lane vehicle tunnel for each direction of travel. The tunnel is submerged, i.e. its openings are above the central area.

The tunnel has a bandwidth of 4.5 m and a total tunnel width (distance between interior walls) of 8.5 m. Light traffic in a tunnel is not permitted.

To the south of the tunnel, the basic cross-section of the Linnanrakatorajan highway is three to the south and two strips north. In addition, there are four m wide light roads on both sides of the road (separated jk and pp).

For the Herttoniemi map, the current street area is too narrow for the proposed solution and therefore cannot be achieved without a change in the urban development plan.

Source: Design of the eastern fairway and the junction of the Linnan lantern. Revision of the Master Plan. Pöyry 2011.

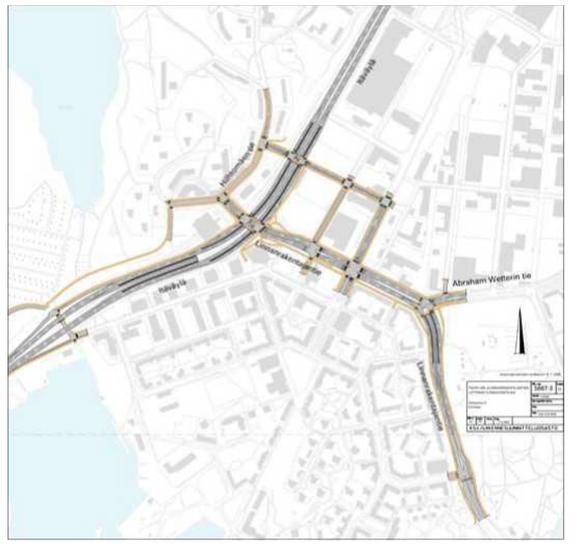


Figure 8.3. Ground streets for the eastern fairway and the Linna-building lanterns.

Ve 1 Rail and light traffic connection (cycling and walking) on bridges from Kruununha to Kruunu shore

VE	Description of the option	New transport infrastructure *Land construction; dredging, mass requirements, surplus masses (preliminary estimate)*
VE 1	Railway and light traffic link at bridges On the crunch On the Crown Mountain	Tunnel of the Lännary lanterns in Herttoniemi
		Bridge north — Nahti 600 m, underpass height 7 m (lift bridge underpass height 40 m)
		Bridge Nihti-High Island 280 m, width 15.5 m, around 40 bays at the fairway and underpass height 7 m
	Total length East boundary of the Snellman-Kruunu Mountain sub-division area 5 600 m	Terrace High Island-Palosaari 500 m
		Bridge Physical-Croup (Crown Mountains) 1 100 m, underpass height 20 m, bay of pillars at fairway approximately 200 m, pylon height 135 m
		Masses to be dwarfed in bridges and terraces estimated to be around 50 000 m 2

Plan

The Liisankatu is transformed into a public transport street. A connectionof three bridges and street sections will be built between the na of the North Bank and the Lajasalo for trams andbeacons for glanding and walking.

A no-bridge bridge will be constructed between the northern shore and Sompa Islands. In Sompa Island, the tram line is located onthe planned street network and the link between Sompa Island and the High Island coincides with the High Isle of Kruunu Mountains.

The public transport network for the large-scale hub is a tramway link from thefares through the Kruunu Mountain to the Broadsalo. Two tramlines have been designed for Laajasa loo, one of which would, according to preliminary plans, run from the Island of Wet to Kruununuvuo and the other from the railway station to Yliskyl. The frequency would be between 5 and 10 minutes for each line.

In addition to tram lines, the bridges have a smooth cycle path and apedestrian link. Bridges can be used as a route for emergency vehicles between the Broadsalo and the Cities.

KSV, HKL and HSL identify possible tram routes between Sompasaari and the centre. It is assumedto be in line with the Tervasaar-Liisankatu route. Other options are shown *in Figure 8.6*. The alternative numbering of the picture refers to the Kalaport-Sompa island-Keskusta track. Alignment options. KSV, HKL, draft HSL 16.8.2013. **The description of all connections (Ve 1, Ve 2, Ve 3, Ve 4a and Ve 4b) is VE 1 after the description.**

Construction and work areas

Liisankatu from Snellmankadu to the North Bank

The construction of the crossroads requires a wrapping of the street structure, the creation and construction of tramway tracks and the reorganisation of the street space *(Figure 8.5)*. Thework of the building may be carried out within one year.

A bridge with lifts from the North Bank to Niht

The construction of a bridge from the North Bank to Niht requires civil engineering works and, to a lesser extent, a terrace inthe area of the North Bank and the Terva Island.

Possible more extensive filling works are linked to the end of the bridge to Kruununha, possiblythe constructions of a typical park area linking the northern shore, the Terva Island and the new bridge.

The car parks in the Terva Island are transferred to the edge of the street area in the north parallel to theshore. At the end of the car park, as an extension of the existing port building, a reservation for theadditional building for port operations is foreseen in the ship's plans.

The Terva Island stock retains service access andother parking spaces. For the rest, the position has been transformed into an area of residence.

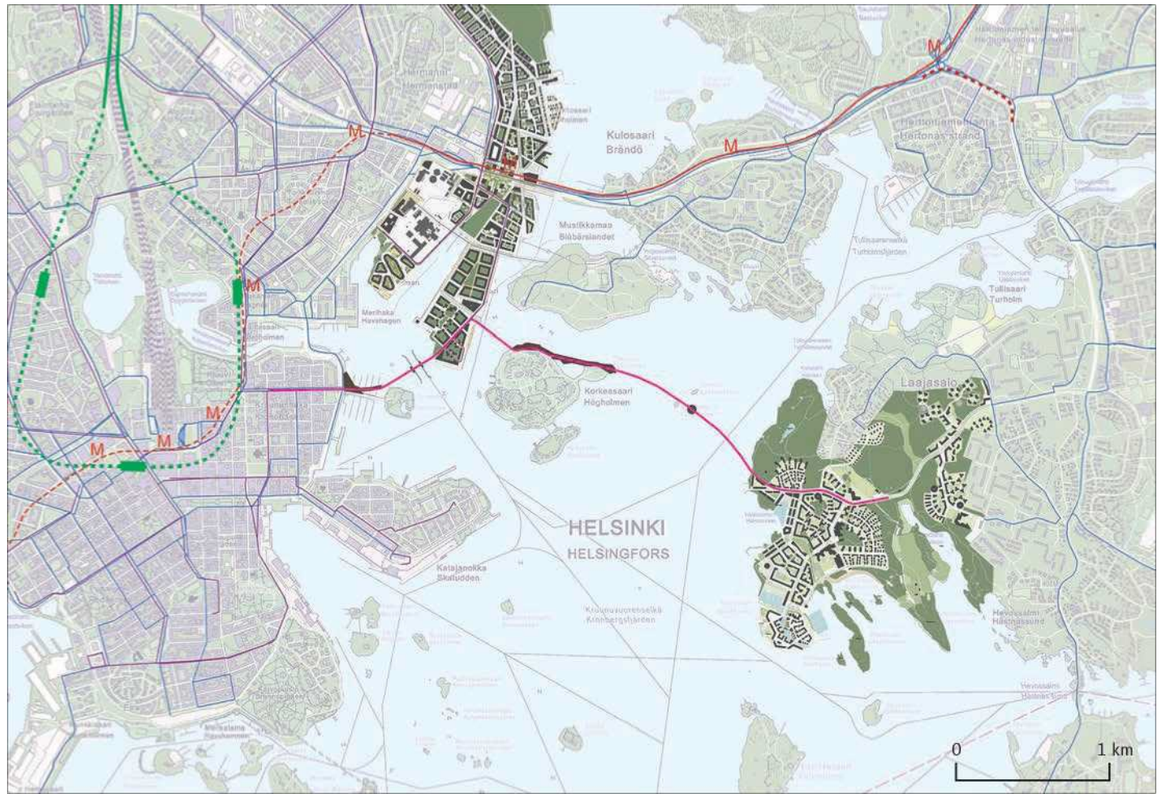


Figure 8.4. Railway and light traffic link on bridges from Kruununha to Kruunu

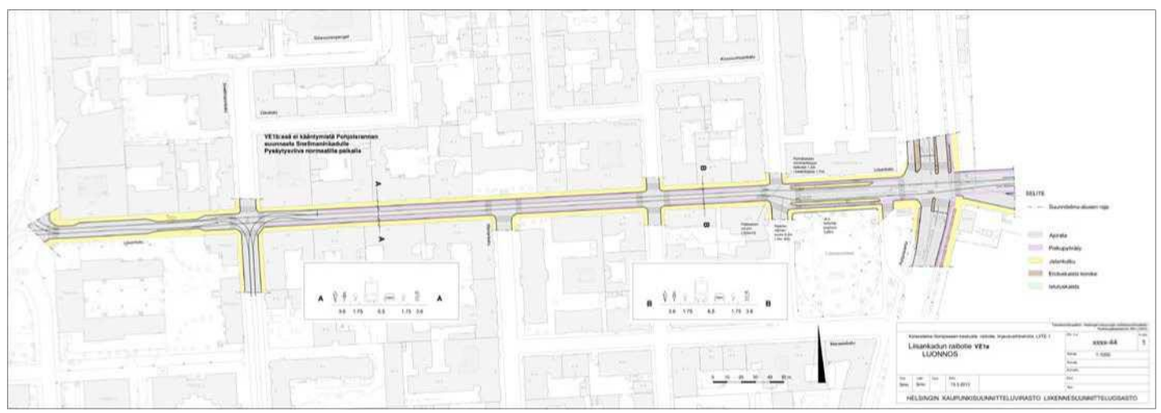


Figure 8.5. The transformation of the cross-border street into a public transport street is part of the tram-way options under consideration in the EU (extract from the study on Fish Harbour — Sampas Islands — Central Rail).

The boat quays north ofthe Terva Island strain move to the north of the new fairway and turn it intoa directional skirt. The number of moorings is maintained at the same time as themass is planned.

Intermediate support for fixed bridge sections is designed-to be used for steel tubing or drilling hubs.

On the basis of thestudies carried out, it would appear to be possible to base the aid on the Kruununha on land as well. On the Sompa Island side, the landsubsidy is based on drilling rocks, since there are old, possibly stony filling sites in the case of land aid. The method of establishment is confirmed by additional baseline studies.

At thisstage of design, all fixed bridge structures are presented as federal structures. They can also be carried out in the form of live concrete structures. All intermediate aids are of steel concrete. The pillars are flat and narrowing down. Base plates placed in so-called intermediate water are designed to be underwater and the actual pillar structures are designed as dry work.

A lifting bridge is designed to be set upon steel tube or drill rocks (builder ropes). At the edges of the waterway under the bridge, steel pipeswill be built on the rocks.

The construction of the Nosto Bridge may be carried out partly by working polil or in stages from beaches. The grading of the nostos bridgepylons is the most demanding part of the bridge building.

If the need to open the bridge at a later stage is removed, it is possible to obtain from the lifting bridge the appearance of a bridgeof almost normal ground track by unloading the lifting towers.

The Bridge is part of the "Gem-ma Regalis" win-win international bridge.

The pilework of bridge foundations is carried out at intermediatelevels, which are set up on the basis of steel piping rods. The bridge is also made up of steel tube rods which are ironeddown and concreteised with self-sealing concrete. The pile blocks are swept as dry-work with the help of dike ovens. The pillars are made either in the form ofon-site casting structures.

At the bridge, the seabed is deepest at a depth of approximately 10 metres. The silver-clay layers of the seabed are estimated to be approximately 10 metres thick.

Bridge between Nihdi and High Island

The clay layers of friction soils underneath the meadow and the lowest on the rock with moreenia. On the shore of the High Island there is rock, with water fillings on the Sompa Island side.

On the High Island side, there is a need to dredge an additional depth of about 0.5 m.

On the Sompa Island side, due to past mass changes, it may be possible to use land-seal bases with this old filling with drops. Otherwise, the land subsidies on the Sompa Island side are concrete steel blocks and water-placed piles with large diametersteel blocks. The lengths of the piles are between 10 and 23 metres. On theHKR side, the last intermediate aid is set up on a land or limestone basis.

The bridge is a 9-piece tensioned concrete from a beam bridge approximately 300 m long. The useful width of the bridge is 15.5 m.

The Bridge is part of the "Gem-ma Regalis" win-win international bridge.

Sparkling lines are built between the High Island and the Kruunu Mountain. The main developments in the construction of the Cruunu Mountain Bridge are as follows:

The pilework of bridge foundations is carried out at intermediatelevels, which are set up on the basis of steel piping rods. The bridge is also made up of steel tube rods which are ironeddown and concreteised with self-sealing concrete. The pile blocks are swept as dry-work with the help of dike ovens.

The pillars are made as normal on-site casting structures. Upon completion of the bridge pillars, thebridge steel beam shall be installed on uncoupled bridges by means of pushing. For push-in installation, install benches at the ends of the bridge. Alternatively, the steel beam may be raised ontotheir houses by stroke using ferry cranes. When the beam is stationary, a stamping and a fake lidshall be installed.

Pylons are established as rock. The lower part of the foundations is concreteised in the form of underwater casting and the upper part as dry work. The draining of the poles is carried out by means of elevatedmoulds with a run-up of 4-6 m. The cable supports are installed in the run-off by a tower crane.

River Mountains

The construction of complete rocks beginsby removing the first section of the steel beam andstitching it into a steel beam between the pallets. When the belly is fixed, the cables shall be installed andthe voltage shall be maintained. The tension of the cables is carried out simultaneously atthe same time on both sides of the pylons. The lid of the section is then rolled out. The construction then moves away from the pylon towards the rope-free spacing in the block at a time, repeating the steps described above. Both sides are done simultaneously in order to maintain a balance between the mastopilist pylons.

Finally, surface structures and fittings are installed and the cables are finally adjusted.

Soil and bedrock, groundwater

During the construction phase of Option 1, there are no significantspawnings in the ground and bedrock or groundwater in the project area. The construction requires a large amount of soil (penke reets, foundations, concrete products) for which the area of origin is not yet known at the EIA stage and the impact assessmenton extraction areas cannot therefore be extended.

The effects on groundwater mainly occur only in the construction of the tunnel of the slurry building, where extensive elevated sweeping works are being carried out.

Excavation and quarrying generates solid-rich waters which are diverted through clarification either to the terrain, rain to a water seweror to a sewage sewer. Water cooked with-quarrying often also contains nitrogen compounds released from explosion and are alkaline due to injections and betoins. During construction, the groundwater surface may decrease locally because groundwater entering excavation is pumped out of the area. However, during construction, the aim is to ensure that the drainage isas positive as possible, thus reducing the impact on groundwater.

Surface water, fish and fishing

Surface water effects arise from the water discharged from the construction site of the Linnanbuildingajantie tunnel, as isthe case in other swaps except option 8.

Dredging, quarrying and filling operations occur when bridges and waterbanks are built. Generally speaking,water works lead to temporary turbidity of water and the spread

Effects during construction

of nutrients and potential contaminants in sediment. Harmful substances are often largelycommitted to and circulate with the substance of the Chinese. The potential toxic effects of harmful substances are mitigated by the fact that they are generally committed to the solid, that is to say, harmin a better form than when they are soluble. In some cases,rye roasting may reduce the oxygencontent of the water when the organic matter in the aqueous phase begins to break down. Underwater mining is a source of noise which may causethe fish to be expelled on a temporary basis. Many issues related to the impact of water works, such as working methods and timing of works—

extraction, quality and grain size of the material to be treated, weather and flow conditions.

The main water works and impacts are caused by dredging, filling and pen-glass on the Palosaaari and High Island land beds, which last about half a year. Other waterworks are shorter for some weeks.

In the dredging and filling areas of the project area, the solids areconcentrated in the water. However, the water does not necessarily turbid withsil, as the current water in the project area is often very turbidity due to the waters in the Vantaajoki river. Consequently, the increase in the solid content of the works does not appear to have asignificant adverse effect on fish and other aquatic organisms, except in the immediate vicinity of the site, which are adapted to the turbidity of thearea. Dredging works are not estimated to cause oxygen problems on the bottom-loop water layer due to the current good oxygensituation and the mixing of currents. No significant eutrophication effects are estimated from dredging works. Benthic animals are destroyed in dredging and filling areas, but in dredging areas the benthic invertebrates return in a few years. Water works and the noise theycause can temporarily deter fish and cause some hindrance to the rise ofmigratory fish if the work takes place during the migration period. However, water works are not considered to preventthe flow of fish, as they have a strong propensity to climb and drive them into the spawning area despite the disturbance caused bythe water works. In addition, the intensity of the effects of the works differs from one part of the catchment area to another and fish are able to avoid the most disturbed sites.

In the project area, flows take place on two layers, i.e. the ground layer and the surface layer, with flow rates often reversed. The main directions of flow are north and south. On the basis ofthe flow measurements study (Lude Consulting Oy 2013), solids from water works can be transported around 2-5 km from the site and beyond the-time of large currents or myrs. As a result, there are thousands of solids from water works going northwards to-the Bay of Vanhan Town and its Natura area. In thewestern direction of ETE, the catchment area extends mainly to Santahamina and Vallisaaari. Contaminants in sediment pose a risk to aquatic life, but they are not estimated to have significant acute or chronic effects due to the temporary nature of the work and dilution of concentrations. In addition, ADRs are often committed to the solid and therefore less harmfulin the form of solubles. Anti-contaminants bound to the solids retract to the bottom as flow rates decrease. When degraded sediments are fed, accountshall be taken of the load-reducing working methods and thetiming of work where possible.

The adverse water effects of this option areassessed as harmful to the water body due to the duration of the water works andthe presence of protected fish species such as trout and VaELlussisis in the submarine and the effects may also extend to a Natura site. Changes will be made to the Vantaajoki fishing ladder.

The work of the boat can cause damage to the fishing sturgeon inthe Kruunu Mountains and the Gulf of Vanhankaupungina.

Nature

Dredging operations, fillings and the construction of piling and pond walls may cause disturbance to the bird population.

Transport, mobility and housing

The construction of the tunnel for the Linna-BuilderRoad will have an adverse effect on farmers, pedestrians and cyclists, as well as bus services during theconstruction period, probably for several years. Working-time transport arrangements are challenging. The work onthe ground has a negative impact on the comfort of living.

The construction of the Liisanki Street is, however, of a temporary but rather long-lasting nature to the detriment of residents, trade andmovement.

The transport, earth moving and pile construction of the bridges can disturb the inhabitants of the area and move-images around the area.

Outdoors and recreation

The construction of the runney lanterns has a negative impact on the accessibility of the Herttoniemimap park.

Parts of the North Bank and parkingplaces in the Terva Island are unavailable as construction sites.

In the case of the Island of Health, it isnecessary, during construction, to dismantle or replace dozens of locomotiveson boats.

Construction can hamper the high level of boating in the area and the racing activities of the Kruunu Mountain spine.

Some of the building materials are brought tothe area and others are removed by water, which may cause some damage to recreational boating.

The construction of the Bridge and the High Island Public Transport Route limits the current use of the surrounding areasin Ressa.

The construction work can cause harm to the people and-animals visiting the High Island.

Rail options between the Sompasaari region (Nihti) and the metropolitan city

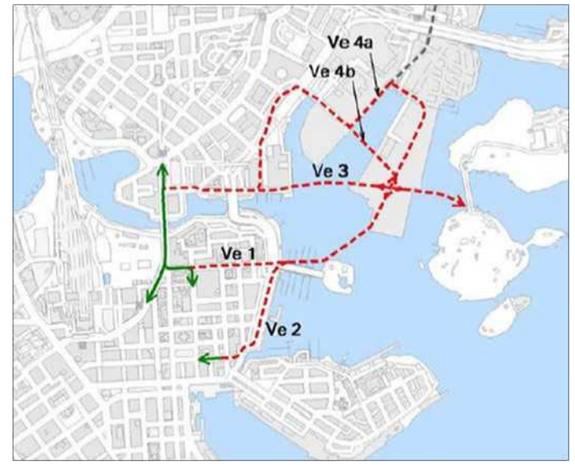


Figure 8.6. Tramway, cycling and walking links previously explored between Sompa Island and the Cities (extract from the report from the 'Kala Harbour-Sompasaari-Ceskusta

Rail options between the fishing port (Nihti) and the city of origin

During the planning of the public transport system solution for the Kruunu Mountains and the tram connections to the fishing port, the tramway runs from the Kruunu Mountain shore through the High Island to Sompa Island and then on a bridge towards Tervasaari and Kruununhaka toLiisanka du. Option 1 is the surrogate option.

Under Option 2, the tramway runs from the Isle of Sompa via theTervasa reindeer from the northern bank to Alexanterinkadu.

Under Option 3, the tramway will be taken directly from Sompa Island on a bridge to Meriha and then to Hakanime, which is already well served today, and especially after Pisararada, with excellent public transport links across Helsinki and thecapital city. For options 4a and 4b, the tramway will also passthrough Me riha and Hakaniemi: In 4a by land through Hanasaari and at Ve 4b with a bridge from Sompa Island.

Ve 2 Concrete link between rail and light traffic (cycling and walking) and bridge from Kruununha to Kruunu Mountain

VE	Description of the option	New transport infrastructure *Land construction; dredging, mass requirements, surplus masses (preliminary estimate)*
VE 2	Railway and light traffic concrete concrete and bridge link from the Kruuntain to the Kruunu Mountain. The section between the Liisankatu and the High Island is the same as in Option 1 Total length 5 250 m	Tunnel of the Lännary lanterns in Herttoniemi
		Bridge North — Nitro 750 m, underpass height at fairway 7 m (bridge underpass height 40 m)
		Bridge Nihti-High Island 280 m, width 15.5 m, around 40 bays at the fairway and underpass height 7 m
		A concrete large-element tunnel of 1 000 m, a dredging mass of approximately 800 000 m 3, a rock-break of approximately 20 000 m 3 (fixed cube), a sea sandfilling of approximately 400 000 m 3, a quarry filling of approximately 135^{000}m 3 and a preloading
		Construction basin, High Island (includes concrete tunnel elements from the building
		Driable masses of approximately 240 000 m 3. quarrying rock crumb approximately 5 000 m 3 (fixed cube). quarry filling approximately 25 000 m 3, a quarrying bench of approximately 150 000 m 3, a sealmoreene and a mass exchange of approximately 100 000 m 3
		Construction basin, rock tunnel orifice, Cruunu Mountain. Dwarmable masses of approximately 80 000 m 3. a lubricant bench of 80 000 m 3, a condenser of 23 000 m 3
		Rock tunnel 250 m
		Masses to be dwarfed in bridges and terraces estimated to be around 25 000 m 2

Plan

Liisankatu-Kork Island

The solution between Liisankatu and the High Islands is the same as in Option 1. There is a tunnel built from the High Island to the Kruunu Mountain Bank with concrete elements.

The public transport network for the large-scale hub is a tramway link from thefares through the Kruunu Mountain to the Broadsalo. Two tramlines have been designed for Laajasa loo, one of which would, according to preliminary plans, run from the Island of Wet to Kruunuvuo and the other from the railway station to Yliskyl. The frequency would be between 5 and 10 minutes for each line.

In addition to the ladder lines, there is a cycle path and a pedestrian link in the bridges and in the tunnel under the lining of the mountains.

The connection can be used as a route for emergency vehicles betweenthe Broad strait and the base city.

KSV, HKL and HSL identify possible tram routes between Sompasaari and the centre. It isassumed to be in line with the Tervasaari Liisankatu route. Other options are shown *in Figure 8.6*.

High Island — Cruunu Mountain

A concrete-installed tramway, walking and cycling tunnel will be built between the High Island and the Kruunu Mountainside. The tramroad and light traffic connection continues eastwards from the tram stop near the High Island's ny-ty bridge to the north-east bank of the island on the bridge over the coast of the island. Light traffic runs to the south of the tramway. The tramway and light chestlined along the beach up to the road to Palosaare. There their elevation is lowered and they are initially in an open conical structure with a steel-glass roof. Theyare routed between tracks through a bridge connected to trough structures.

When the track is depressed downwards, the structure changes from trough to be-tunnel. The cross-section is three-hole; rail traffic and medium-mile traffic are carried outin the maintunnels. The rescue department may use the lighttravel tea tunnel for alarms.

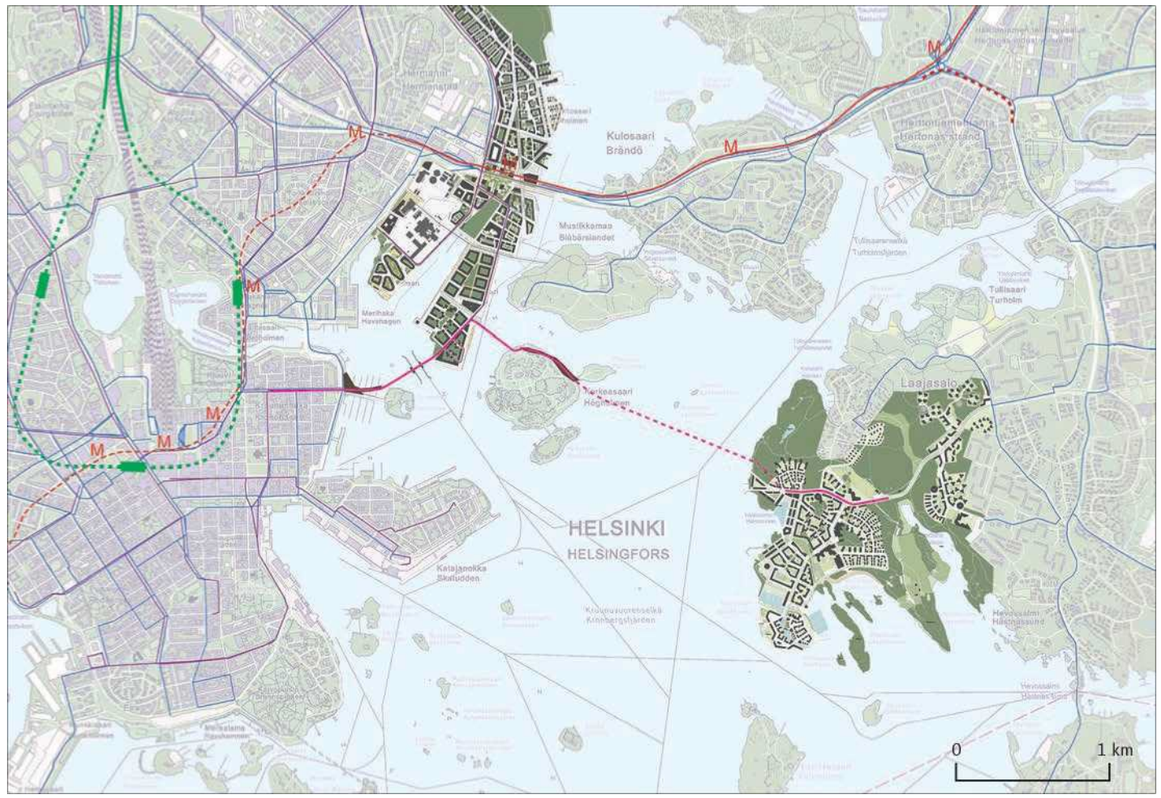


Figure 8.7. Concrete link and bridge for railway, walking and cycling traffic from the Kruununha to the Kruunu shore.

Construction and work areas

For the concrete tunnel, the seabed shall be fed at the tunnel and filled to the level of establishment. The filling shall be carried out by a lubrication and a crushing, which shall be levelled into the tunnel's chassis. This is a suitable solution for setting up where the thicknesses ofthe land layers to be replaced are reasonable. Where the thicks of the soils to be replaced would be toolarge, it is proposed that the alternative solutionbe set up either by establishing deep stabilisation or by concreteplating on toilets and partial mass change.

Concreteitunnel is made from parcels. The parcels are constructed in a separate area from which they are extracted to the right position one at a time. In the right location, the parcel is immersed in water and the ANKis drained in place. Accordingly, the following parcel is put in place and the space between the blocks is compressed. Finally, the tunnel iswrapped on the friction soil in order to protect the structure and ensurethe stability of the pad.

A kilometre-length concrete tunnel is designed tobe constructed on 125 m long elements. The immersion from the surface of the water is controlled and the element is controlled on the ferries by meansof export winches or cranes. The tampers located inthe end of the elements allow an accurate counting of the element in its position.

The installation of the elements begins at the end of the KruunuMountain from the rock tunnel to be constructed. This allows the interior fillings of the tunnel and the fitting-out to be carried out at a pace compatible with the installation of the elements. Near-tail fillings around the tunnelulture may also be carried out at the same rate.

At the end of the crochet liner, a joint structure to be mounted asa dry work is introduced. The floating structure is carried out as a dry work by constructing an opening-up bath which is surrounded by outer beds. The rim benches of the basin are constructedand the water is pumped out of the inside of the basin. The periphery of the mouth-basin can be made as a traditional soil dam with moreenitic sealing and a quarry bench. Removal of muds and clay layers from the border dams to reveal the rock).

The clays and mud are removed from the inside of the basin and the trap-boat exchange isremoved from the bottom, which is compacted by a drop-tight twist. The drying process is carried out by drying pump directly on the basis of the pond.

In the Kruunu Mountain, the traffic moves as a dry work to the rock tunnel, which isbuilt on the edge dam, which is separated by concrete walls into three separate hours of dirtand then open surgery, where it rises to thesurface of the ground and is linked to the tubing of the future area of theKruunu Mountain.

The rock tunnel is extracted and reinforced by bolting and rye-cubonising. Pre-injection, spray concrete pans and discrete curtain structure achieve watertightness and frost-resistance. The challenges in the construction of the rock tunnel relate to the crossing of oil tanks, the watertightness of the tunnel and the potential weakness zones of the rock.

The construction of the elements could take place in a-reservoir of the Palosaare beach. The rim dam of the basin is designed as a land or lunch-pocket wall. The 'effective' area of the construction basin must be around 133 m x 150 m and,in phase 1 of the building base, at level -8, brought at level -8. The dimensioning of the basin takes into account an area approximately 10 m wide for the construction crane and the space required for the concrete part of the tunnel. In the northern part of the building basin, Palosaare shore is likely to have to deepen the bottom ofthe basin by mining.

The capacity of the building basin as a construction site is hampered by its location behind difficult transport connections. The transportneeds to the reservoir are very high, e.g. rock and earth masses built by dams and terraces, concrete masses, moulding and reinforcement materials for the castings of elements and openings. It may bepossible to establish its own concrete station in the vicinity of the building basin.

It is also possible to extract concrete elements elsewhere-from the yard. In any event, if the building pond is not constructed, acontractor will have to build smaller benches forthe construction of structures at the entrances of the High Island, as it is not possible toswim as elements of concrete structures.

Dwarfable earth pastes

Rubbed soft soil layers are replaced bysea sands imported. Dredging spoils are taken into the sea to existing drainage areas or new areas subject to a separate EIA procedure (Helsinki Porta 2013). Applications for permits for the new depopulation area are currently being prepared.

Any unnecessarily contaminated dredging,mainly surface columns, is intended to be placed inside thefields, either encapsulated or taken into reception inthe booths.

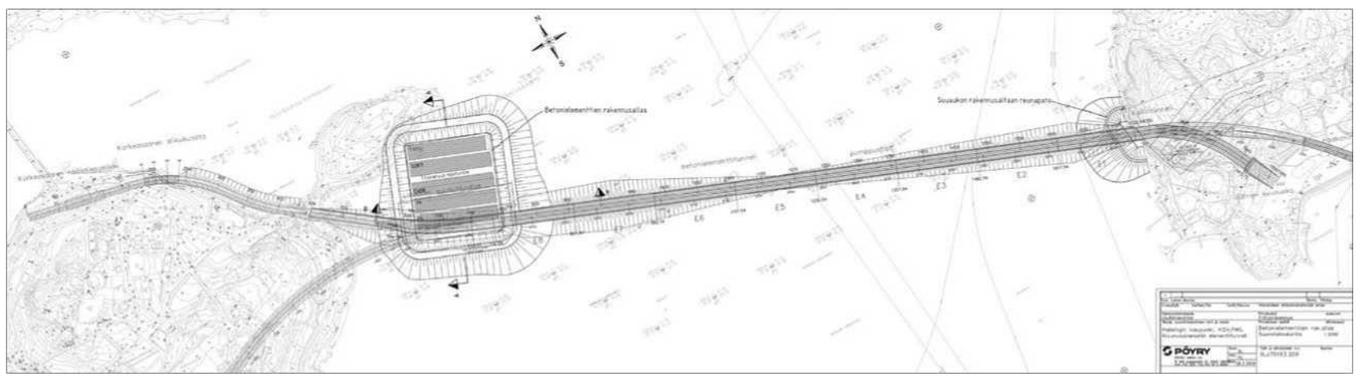


Figure 8.8. The line section of the immersible concrete tunnel is dredged, mass changes and sidebanks underwater. The Palosa Island has a temporary large-element shipyard at and above the water boundary and a temporary reservoir of the entrance in the Kruunu Mountain.

Effects during construction

Soil and bedrock, groundwater

During the construction phase, there are no significant effects on the ground and bedrock or groundwater in the periphery. Constructionworks require a large amount of soil (e.g. bedrocks, foundations,concrete products) for which the provenance is not known in advance and therefore, during the EIA phase, the impact assessment cannot be extended to the extraction areas.

In practice, effects on groundwater occur only in the construction of the tunnel of the Linnan constructors, wherework and quarrying are carried out. Excavation and quarrying generates solid water that is diverted through clarification either to the terrain, rainwater drain or sewage sewer. The waters in contactwith Lou often also contain nitrogen compounds released from explosion and are alkaline due to injections and betoins. During construction, thesurface of the Poh-Water can decrease locally because the groundwater entering the excavation is pumped out of-the area. However, in the construction process, the aim is to ensure that the drainage is as watertight as possible, thus reducingthe impact on groundwater.

Figure 8.9. Bedding of the concrete tunnel element on the site.

(Source: VTT 2005).

Surface water, fish and fishing

Surface water effects arise from the water discharged from the construction site of the Linnanbuildingajantie tunnel, as isthe case in other swaps except option 8. The water effects of the Linnanrakator'sroad are indicated under option 0.

The water works and effects are similar to those of swap 1, with the exception of the construction of a concrete tunnel instead of the Kruunu Mounu Bridge, the construction of which will have far greater and longer-term effects than the construction of the bridge. The main water works and effectsare thus caused by dredging, filling and embankment of the Palosa and High Island land and terraces and the massive quarrying, dredging and filling of the concrete-lunch of the Kruu valley, which are carried out throughout the tunnel. The construction of the tunnel will take more than one year. Asthe construction cannot be scheduled for one period of open water in practice, the effects are spread over at least two years. Other water works are shorter and last for a few weeks. The water impacts of Option 2 are described ina different way under condition 1 and only the differences between these options are set out below.

The catchment area is the same as in Option 1, but it is more likely thatsolids from water works will spread more than 2-5 km away. There is also a higher risk to aquatic life from sediment contamination than under Option 1 dueto high dredging volumes. Benthic invertebrates are destroyed from a much larger area than option 1 and do not return to concrete tinnel. The extent of the short-lived damage to fish depends in particular on the timing of the construction of the concrete lin. However, the project does not prevent the emergence of migratory fish.

The water impacts of this option are assessed as very significant due to the duration of thewater works and the presence of protected fish species, such astrout and migration, and the potential impact on the Natura site.

Water works are likely to cause damage to fishingduring work in the Kruunu Mountains and Vanhankaupun-Gulf.

Changes will be made to the Vantaajoki fishing ladder.

Nature

Depending on the timing, the installationof the concrete tunnel is likely to have an adverse effect on the birds.

Transport, mobility and housing

The construction of the tunnel for the Linna-BuilderRoad will have an adverse effect on farmers, pedestrians and cyclists, as well as bus services during theconstruction period, probably for several years. Working-time transport arrangements are challenging. The work onthe ground has a negative impact on the comfort of living.

The construction of the Liisanki Street is, however, of a temporary but rather long-lasting nature to the detriment of residents, trade andmovement.

Transport, earth moving and pile construction of bridges and tunnels may cause disturbance to the inhabitants of the area and to those moving there.

Outdoors and recreation

The construction of the runney lanterns has a negative impact on the accessibility of the Herttoniemimap park.

Parts of the North Bank and parkingplaces in the Terva Island are unavailable as construction sites.

In the case of the Island of Health, it isnecessary, during construction, to dismantle or replace dozens of locomotiveson boats.

Construction can have a significant negative impact on the buoyant knives in the area and onthe racing activities of the Kruunu Mountain spine.

Some of the building materials are brought tothe area and others are removed by water, which may cause some damage to recreational boating.

The construction of the Bridge and the High Island Public Transport Route limits the current use of the surrounding areasin Ressa.

Ve 3 Metro Kamppi-Laajasalo; rock and concrete tunnel and the bridge over the Kruunu Mountain

Effects during construction

VE	Description of the option	New transport infrastructure *Land construction; dredging, mass requirements, surplus masses (preliminary estimate)*
VE 3	Metro Kamppi-Laajasalo; the rock and concrete tunnel and the bridge over the Cruunu Mountain spine, the gradient and structure of which differ from option 1; Total length 6 500 m	Tunnel of the Lännary lanterns in Herttoniemi
		Stations Kamppi, Errat/West end of the Esplanades and Kruunu Mountain
		Kamppi — Eastern coast of Katajanoka 3 300 m
		A tunnel constructed from concrete large elements 600 m; R Extractable*masses of approximately 150 000 m 3,*[quarrying] *a rock-break of approximately 50 000 m 3 (*[solid] *cube), sea sandfilling approximately 200 000 m 3, quarry filling*[approximately] *70 000 m 3 and preloading masses of approximately*[80] *000 m 3. Note: a rough estimate of the masses.*
		Kalliotunnel in High Island 400 m
		Betonitunnel at Palosaaari 300 m
		Terrace in Palosaaari 100 m
		More than 1 000 m from Metros
		Rock tunnel in Kruunu Mountain 300 m
		Concreteitunnel in Haakon Bay 200 m
		Rock tunnel for 400 m Kruunu Mountain metro station
		Masses to be dwarfed in bridges and terraces estimated to be around 25 000 m 2

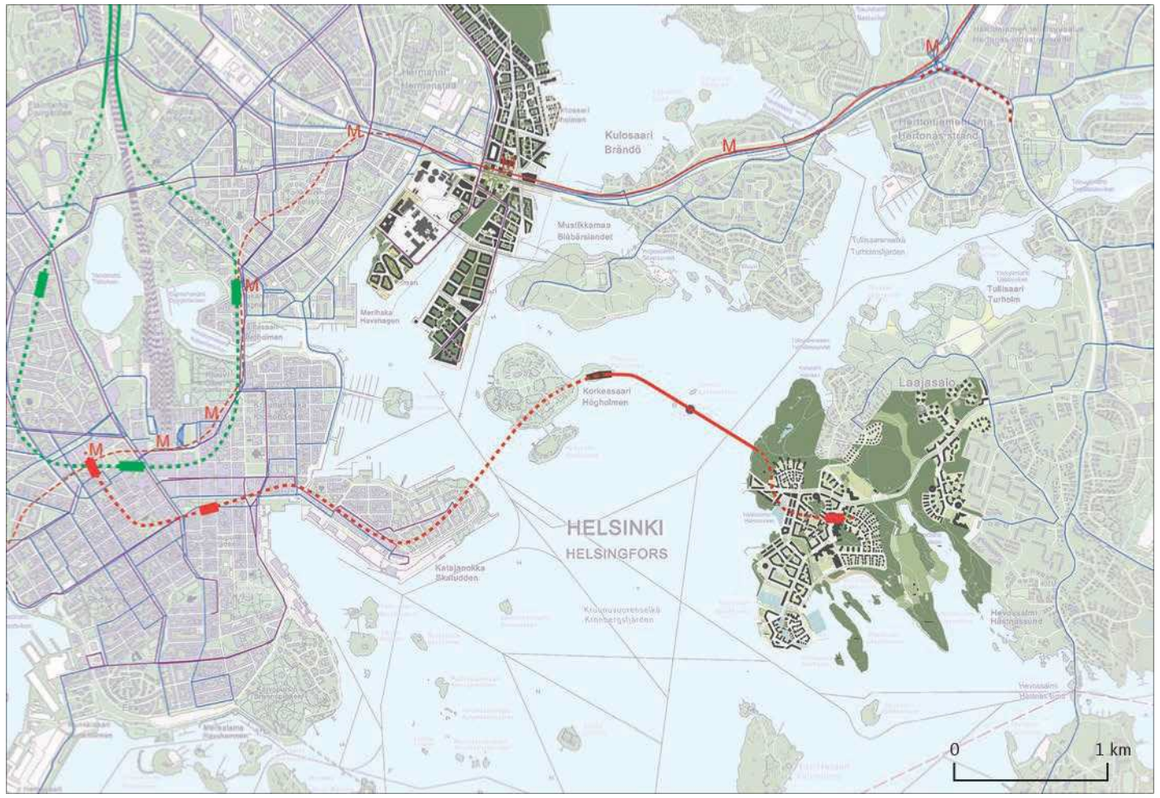


Figure 8.10. Metro Kamppi-Laajasalo; the rock and concrete tunnel and the bridge over the

Plan

Between the tip of KAMP and Katajanoka, the line is located deep in the rock tunnel to be extracted. In the street, the tunnel starts to rise towards the ground. Undershooting of the strait involves the construction of concrete tinnel. In the western part ofthe High Island, the track rises close to the ground and coincides with the level of the bridge over the Kruunu Mountain on the concrete tunnel. The maximum slope of the Metroradan is 3.5 %.

The cross-Bridge of the Cruunu Mountain Bridge is similar in principle and is partly located in the same location as Option 1, but with a smaller gradient. In the Kruunu Mountain, the entrance of the metro is located in the 'Kallen-oot', where the bridge can be linked to the four knots to be built onthe rock.

In Kamp, the station is located in a rock previouslyextracted.

The design elements of the metro, the ground conditions- and the unobstructed underground humidity limit the possibilities for mowing the mouth of a station located in the area of Ermen-Esplanades. *Figure 8.11 shows* one initial option for the position of the station.

There is no foreseen positionin the town plans in the Cruunu Mountain. The metrotunnel option requires working tunnels of about 400 metres in length on the Kruunu Mountain beaches, as well as clearance and relief shafts.

This option requires the construction of a concrete tunnel under the Bay of Haakon before the construction of the residential area of the Kruunu Mountain.

Construction and work areas

Construction requires finding suitable working tunnels. The central area and the Katajanoka aim to exploit existing driving tunnels and manage mining through them.

The volumes of sleeves are around 100 000 m 3 in the central[driving tunnel and] around 100 000 m 3 in the Katajanoka driving tunnel ([fixed] cubes). A vertical trunk Kata is needed for a metro-line

the division close to the start of the concrete tunnel and a number of vertical connections to the area of the Station of the Station. There is also a need for a driving tunnel in the High Island.

In particular, there are uncertainties about the construction of the be-tunnel section between Katajanoka and the High Island.

Use

Metro is expected to be operatedbetween approximately 10 minutes.

Soil and bedrock, groundwater

In the excavation and quarrying ofthe slides' tunnel, solid-containing waters which are diverted through clarification either into terrain, rainwater sewers ordrainage drains. Waters in contact with quarrying often also contain nitrogen compounds released from explosion and are alkalinely due to injections andbetoins. During construction, the groundwater surface may decrease locally because groundwater entering excavation is pumped out of the area. However, in the construction process, excavation is sought to make thesoil as watertight as possible, thusreducing the impact on the northern water.

The construction of option 3 will not lead to significant adverseeffects on the ground and bedrock or the bottom water of theproject area.

The construction requires a large amount of soil (e.g. terraces, foundations, concrete products) for which the site isnot known in advance and therefore, during the EIA stage, the spawning assessment cannot be extended to the extraction areas of the materials. The Louprice generates a lot of aggregates that can be used for aggregates in the project, such asterraces.

Possible groundwater leaks from rock tunnels are attheir mouth during the construction phase, which can reduce the groundwater level locally and thus cause ground deflection in soft areas (point of the luv, beach areas). The construction of the Kluv rubble site is challenging from a conceptual point of view.

In the course of construction, mining and quarrying generates solid-rich waters, which are channelledinto the terrain, rainwater sewers or sewage sewers. Waters in contact with quarrying often also contain nitrogen compounds released from explosion and are alkaline due to injections and betoins. However, in the construction process, efforts will be made to ensure that excavations and tunnel facilities are as watertight as possible.

Surface water, fish and fishing

Surface water effects arise from the water discharged from the construction site of the Linnanbuildingajantie tunnel, such as:

for other options, with the exception of option 8. The water effects of the runners have been presented asa replacement under condition 0.

The major impacts on water are caused by massive streaming, quarrying and filling operations in the construction of a concrete concrete between Katajanoka and the High Island, as well as dredging works in the construction of the Kruunu Mountain metros bridge. The water works will last for more than a year, probably at least duringthe open water season. In addition, the waters resulting from the quarrying of metro tunnels may be-diverted to the area of the project area, which may cause temporary turbidityand increased Typ pi concentrations locally. Growthin phytoplankton may occasionally increase the amount of phytoplankton locally.

In the dredging and filling areas of the project area, the solids areconcentrated in the water. However, the water does not necessarily turbid with eyes, as the project area is already at present very turbidity due to the water slopes of the Vantaajoki river. The increase in the solid content of the works is unlikely to cause significant damage to fish and other aquatic organisms, except in the immediate vicinity of the construction site, which have been adaptedto the turbid waters. Dredging works are not estimated to causeoxygen problems in the dark bottom water layer at present due to-its oxygen condition and the mixing of currents. No significant eutrophication effects are estimated from dredging works. Benthic animals are destroyed from dredged areas, but benthic invertebrates return in a few years, except for concrete tunnel. Water worksand the noise they cause can temporarily deter fish and hinder the rise of migratory fish to some extent if the work takes place during the migration period. Water works are also considerednot to prevent the flow of fish, as they have a strong rise and drive them into the spawning area despite the disturbances caused by the water works. In addition, the intensityof the effects caused by the works is different in different parts or-in the spawning area and the fish are able to avoid themost disturbed sites.

In the project area, flows take place on two layers, i.e. the ground layer and the surface layer, with flow rates often reversed. The main directions of flow are north and south. On the basis ofthe flow measurements study (Lude Consulting Oy 2013), solids from water works can be transported around 2-5 km from the site and beyond the-time of large currents or myrs. As a result, there are thousands of solids from water works going northwards to-the Bay of Vanhan Town and its Natura area. In thewestern direction of ETE, the catchment area extends mainly to Santahamina and Vallisaaari. Harmful substances in drunk sediments pose a risk to aquatic life, but they are not estimated to have significant acute or chronic effects due to the temporary nature of the work and dilution of concentrations. In addition, ADRs are often committed to the solid and therefore in no-harmful form than solubles. The anti-contaminants introduced into the solids retract back to the bottom as thespeeds decrease. For contaminated sediments ruopates, accountshall be taken of working methods that reduce loads and the timing of work where possible.

The water impacts of this option are assessed as very significant due to the duration of thewater works and the presence of protected fish species, such astrout and migration, and the potential impact on the Natura site.

Water works are likely to cause damage to fishingduring work in the Kruunu Mountains and Vanhankaupun-Gulf.

Changes will be made to the Vantaajoki fishing ladder.

Nature

Dredging operations, fillings and the construction of piling and pond walls may cause disturbance to the bird population.

Transport, mobility and housing

The construction of the tunnel for the runway is detrimental tocarers, pedestrians and cyclists, as well asbus services during the construction period, probably several years

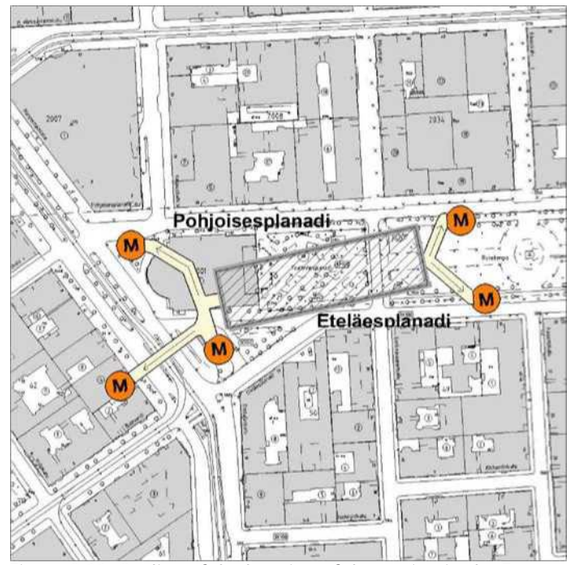


Figure 8.11. Outline of the location of the station in the Ermen-Esplanade area.

time. Working-time transport arrangements are challenging. The work onthe ground has a negative impact on the comfort of living.

The transport, earth moving and pile construction of the bridges can disturb the inhabitants of the area and move-images around the area.

Outdoors and recreation

The construction of the runney lanterns has a negative impact on the accessibility of the Herttoniemimap park.

Construction can hamper the high level of boating in the area and the racing activities of the Kruunu Mountain spine.

Some of the building materials are brought tothe area and others are removed by water, which may cause some damage to recreational boating.

The construction of the Bridge and the High Island Public Transport Route limits the current use of the surrounding areasin Ressa.

Ve 4 Metro Kamppi-Laajasalo; rock and concrete tunnels

Effects during construction

VE	Description of the option	New transport infrastructure *Land construction; dredging, mass requirements, surplus masses (preliminary estimate)*
VE 4	Metro Kamppi-Laajasalo; rock and concrete tunnels Total length 6 500 m	Tunnel of the Lännary lanterns in Herttoniemi
		Stations: Kamppi, Erder/West end of the Esplanades and Kruunu Mountain
		Kamppi — Eastern coast of Katajanoka 3 300 m
		A tunnel constructed from concrete large elements 600 m; *dredging masses of approximately 150 000 m 3· quarrying rock minced approximately 50 000 m 3 (solid^{cube}), sea sandfilling approximately 200 000 m 3, quarry filling^{approximately} 70 000 m 3 and preloading masses of approximately^{80} 000 m 3. Note: a rough estimate of the masses.*
		Kalliotunnel in High Island 400 m
		Betonitunnel at Palosaaari 300 m
		Terrace in Palosaaari 100 m
		A concrete large-element tunnel of 1 000 m, a dredging mass of approximately 800 000 m 3, a rock-break of approximately 20 000 m 3 (fixed cube), a sea sandfilling of approximately 400 000 m 3, a quarry filling of approximately 135^{000}m 3 and a preloading
		Construction basin, High Island (includes concrete tunnel elements from the building
		Construction basin, rock tunnel orifice, Cruunu Mountain
		Rock tunnel in Kruunu Mountain 300 m
		Concreteitunnel in Haakon Bay 200 m
		Rock tunnel for 400 m Kruunu Mountain metro station

Plan

The plan is similar in other respects to option 3, but has a beto-alignment tunnel in the Kruunu Mountains, as set out in Option 2, instead of a bridge. The plans for the concrete element- Tunnel also foresee the use ofthe tunnel for possible metro traffic.

Construction and work areas

Construction requires finding suitable working tunnels. The central area and the Katajanoka aim to exploit existing driving tunnels and manage mining through them. The fares are about 100000 m 3 in the centre^{and} around 100 000 m 3 (fixed cubic) in the^{Katajanoka} tunnel. A vertical trunk of the metro-line near the start of the concrete tunnel and anumber of vertical connections to the area of the Station of the Engineer station is required. A driving tunnel and trunk are also expected to be needed in the High Island.

The plans are very preliminary. In particular, the construction of the concrete section between Katajanoka andthe High Island is uncertain.

Use

Metro is expected to be operatedbetween approximately 10 minutes.

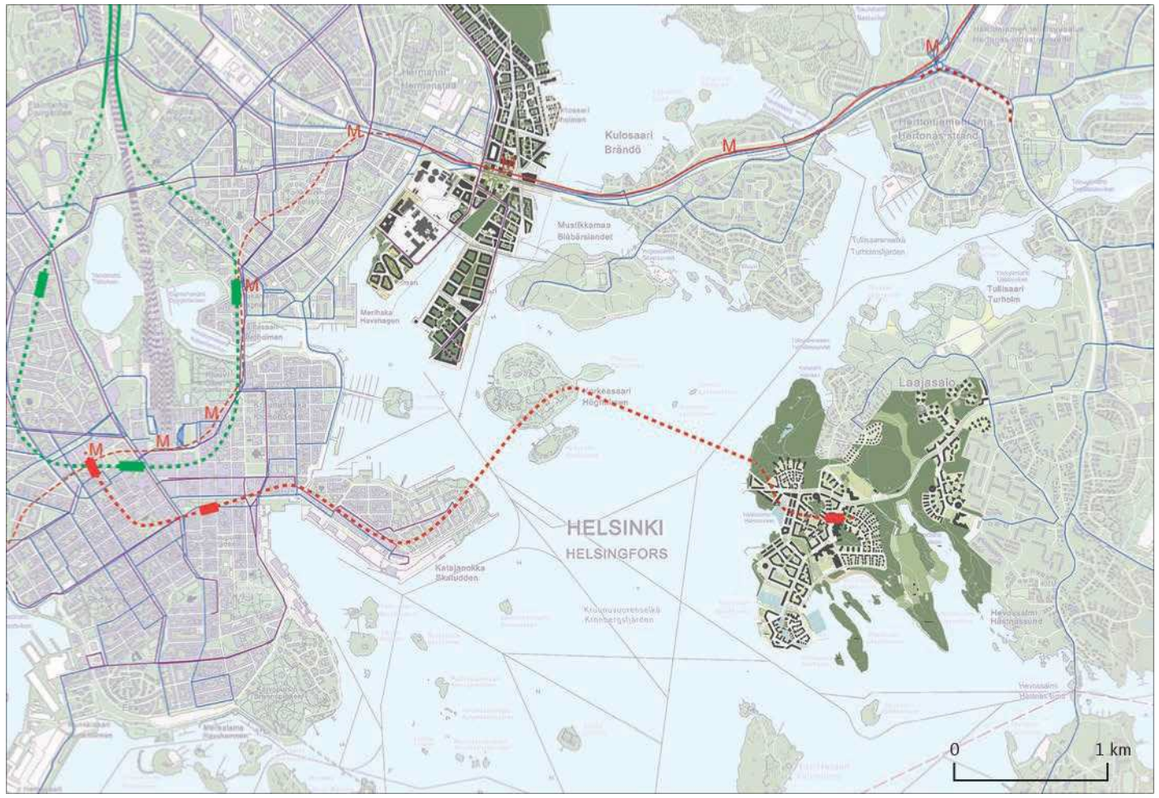


Figure 8.12. Metro Kamppi-Laajasalo; rock and concrete tunnel.

Soil and bedrock, groundwater

In the excavation and quarrying ofthe slides' tunnel, solid-containing waters which are diverted through clarification either into terrain, rainwater sewers ordrainage drains. Waters in contact with quarrying often also contain nitrogen compounds released from explosion and are alkalinely due to injections andbetoins. During construction, the groundwater surface may decrease locally because groundwater entering excavation is pumped out of the area. However, in the construction process, excavation is sought to make thesoil as watertight as possible, thus-reducing the impact on the northern water.

The effects during construction are essentially the same as for option 3.

The sub-sea concrete tunnel consumes soils which arenot known at the EIA stage and therefore the impact assessment cannot be extended to the extraction areas.

Surface water, fish and fishing

Surface water effects arise from the water discharged from the construction site of the Linnanbuildingajantie tunnel, as isthe case in other swaps except option 8. The water effects of the Linnanrakator'sroad are indicated under option 0.

The water impacts of the option are highest when compared to the impacts of other options. The effects of the two concrete tunnels are similar to those set out in Options VE 2 and VE 3, but are much stronger when large-scale hydraulic works are carried out in two areas. The risk to fish and other aquatic organismsfrom potentially harmful sedrivers is the highest in this option due to the high number of dredging masses and the length of working time. Masshydraulic construction in two areas, especially if they are carried out at the same time, can be seriously disrupted but temporarily disturbed by migration.
The water impacts of this option are assessed as very significant due to the duration of thewater works and the presence of protected fish species, such astrout and migration, and the potential impact on the Natura site.

Water works are likely to cause damage to fishingduring work in the Kruunu Mountains and Vanhankaupun-Gulf.

Nature

Depending on timing, the installation of a concrete kernelis likely to have a disruptive effect on thelin nus.

Transport, mobility and housing

The construction of the tunnel for the Linna-BuilderRoad

Construction can have a significant negative impact on the area's buoyant vehicularity sealing and racing activities of the Kruunu Mountain spine.

will have an adverse effect on farmers, pedestrians and cyclists, as well as bus services during theconstruction period, probably for several years. Working-time transport arrangements are challenging. The work onthe ground has a negative impact on the comfort of living.

The transportation, earth moving and pileconstruction of tunnels and terraces can disrupt the streets and thepeople moving in the area.

The construction of the Betonitunnel has adverse effects on shipping in the northern port. Depending on the timing of-the fielding, the effects may be significant.

Changes will be made to the Vantaajoki fishing ladder.

Outdoors and recreation

The construction of the runney lanterns has a negative impact on the accessibility of the Herttoniemimap park.
Some of the building materials are brought tothe area and others are removed by water, which may cause some damage to recreational boating.

The construction of the Bridge and the High Island Public Transport Route limits the current use of the surrounding areasin Ressa.

Ve 5 Metro Kamppi-Laajasalo; rock tunnel

Effects during construction

VE	Description of the option	New transport infrastructure *Land construction; dredging, mass requirements, surplus masses (preliminary estimate)*
VE 5	Metro Kamppi-Laajasalo; rock tunnel Total length 5 500 m	Tunnel of the Lännary lanterns in Herttoniemi Stations: Kamppi, Erder/West end of the Esplanades and Kruunu Mountain Kallotunnel Kamppi-Kruunu Mountain, depth approximately 60 in the eastern east of the

Plan

Metro is expected to operate around 10 minutes. The LAA-would operate five connecting lines on the Kruunu Mountain beach, three of which would also pass to Herttoniemi metro station. The frequency of connecting buses would be between 10 and 12 minutes according to preliminary plans.

The aim has been to find as short a metro link as possible in the wholerock tunnel of the whole of the nak with the Laajasalo. It includes significant technical and economic risksin the case of the Kruunu Mountain spine dueto cocktails. There is no information on the rock quality in the weakness zone, nor is the exact location of the rock surface known. In addition, therequirements of the pre-loading operation and the management of risks may bring-additional costs to be met.

It is not possible to organise escape routes, ventilation shafts andwork tunnels directly on the surface on the sea section approximately two kilometres long. Therefore, the deep tunnelconnection requires a system of three tunnels.

In the triangle tunnel, a separate service tunnel brought MII atthe same time as an attack road and a separate escape route for the rescue service. The tunnel is deepest at a depth of 62 metres above sea level. The starting points of the exit steps in the Katajanok and the Kruunu Mountain are located in vertical trunks about 50 m belowthe ground, which makes their use difficult. From the same level, air-conditioning shafts and work tunnels would start.

The metro station of the Cruunu Mountains isexceptionally deep.

Construction and work areas

Construction requires finding suitable working tunnels. Work tunnels are built in the centre, the Katajanoki and the Kruunu Mountain beach through which the rock brewery to be extracted is transported to the building sites at thetime of construction. In the centre and in the Katajanoka, the aim is to make use of existing tunnels.

Between KAMP and Katajanoka, the hub of the driving-tunnel is approximately 100 000 m 3[and] Katajanoka's list of driving hours isapproximately 100 000 m 3 ([fixed] cubes). The volume of the rock breakage between Katajanoka and Kruu is about 130 000 m 3 from the Broad basin[and] 280 000 m 3 (solid cubes[)] from Katajanoka.

The Metro Line requires a vertical pit to the Katajanoka and several vertical connections to the Engine Station area.

In the case of metrotunnel options, construction requires the use of the surrounding areas of up tofour superstructures as construction sites.

Tunnel dredging and quarrying will become a lot of soil and aggregates that may need to be stored or disposed of in other areas. The draining ofland and rocks suitable for recovery restricts the otheruses of the sites.

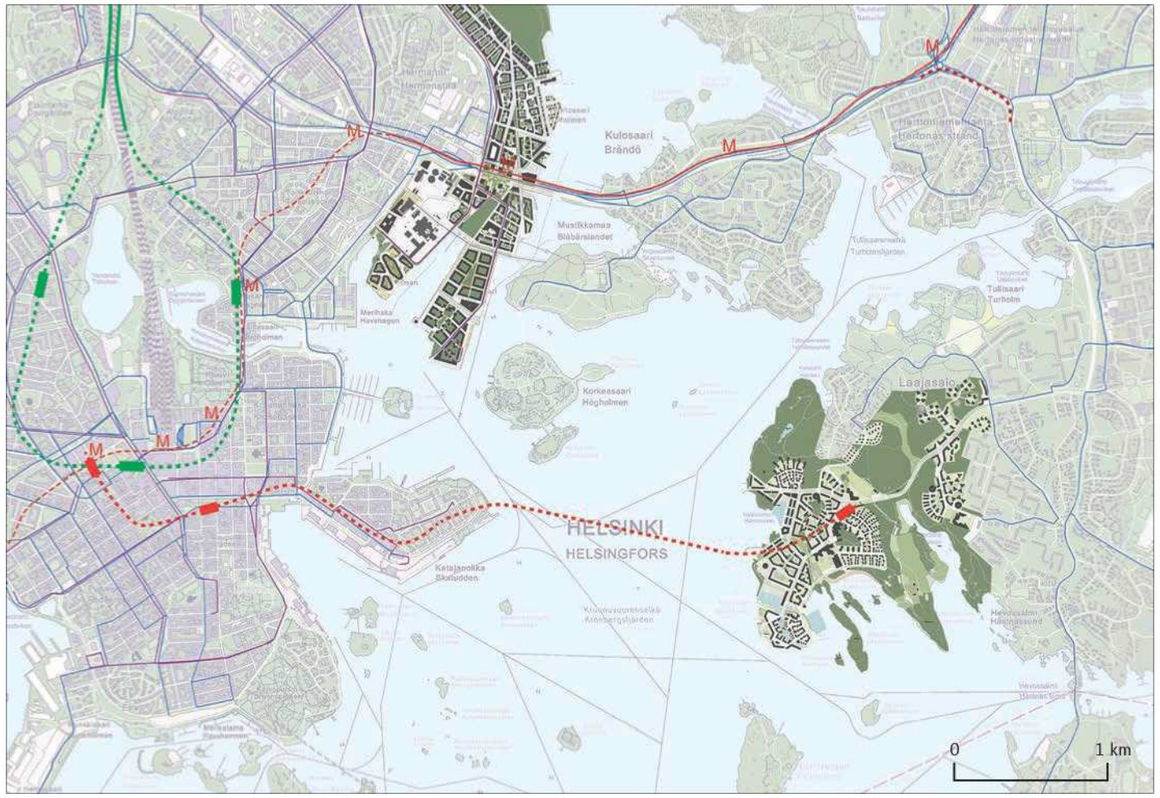


Figure 8.13. Metro Kamppi-Laajasalo; rock tunnel.

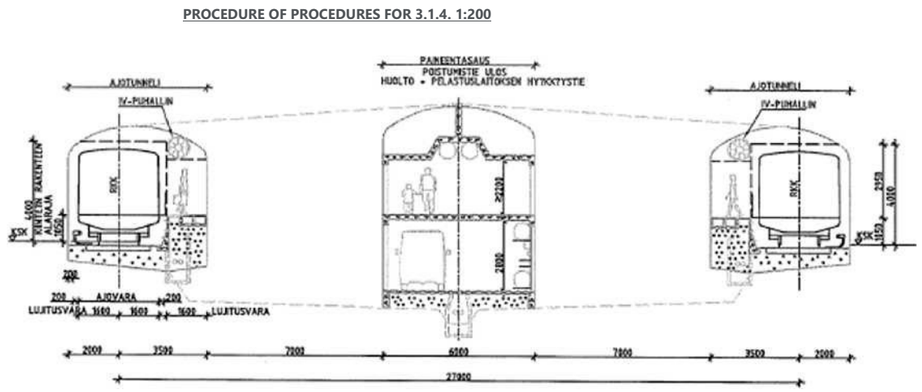


Figure 8.14. Metro track tunnels and separate escape and survival tunnels.

Soil and bedrock, groundwater

In the excavation and quarrying ofthe slides' tunnel, solid-containing waters which are diverted through clarification either into terrain, rainwater sewers ordrainage drains. Waters in contact with quarrying often also contain nitrogen compounds released from explosion and are alkalinely due to injections andbetoins. During construction, the groundwater surface may decrease locally because groundwater entering excavation is pumped out of the area. However, in the construction process, excavation is sought to make thesoil as watertight as possible, thus-reducing the impact on the northern water.

The effects on soil, bedrock and groundwater during construction are in part the same as in Option 4. The need for soils under this option is significantly lower than for Options VE 3 and VE 4, as neither the top ofthe land nor the concrete-four-sea surfaces are carried out.

The construction of the rock tunnel in a deep-stretched spindle is a demanding construction work.

The main sources of additional rock mills are the alternatives. A useful use for Louheelle should be found close tomy cause. Such sites are likely to be found at a reasonable distance from quarrying sites, whether transported by lorry or by barge to intermediatestorage after the meadow.

Surface water, fish and fishing

Surface water effects arise from the water discharged from the construction site of the Linnanbuildingajantie tunnel, as isthe case in other swaps except option 8. The water effects of the Linnanrakator'sroad are indicated under option 0.

The construction of metro tunnels has an impacton water. The waters leaving the tunnel can cause job opacification and higher nitrogen concentrations locally in and around the marine region. An increase in nitrogen content may temporarily increase the amount of phytoplankton, as the nutrient limiting basic production in the project area is mainly nitrogen. Fish and other aquatic organismsare not estimated to be significantly harmed beforethe said changes to the aquatic environment. As a result, although the construction period isquite long, water impacts are estimated to be moderately significant. The noise caused by the explosion work in the tunnelmay affect the fish temporarily. No adverse effects on fish stocksor fisheries are expected.

Nature

This option will not lead to adverse natural effects inthe project area during construction.

Transport, mobility and housing

The construction of the tunnel for the Linna-BuilderRoad will have an adverse effect on farmers, pedestrians and cyclists, as well as bus services during theconstruction period, probably for several years. Working-time transport arrangements are challenging. The work onthe ground has a negative impact on the comfort of living.

Working-time transport to a rock crumb may have an impact ontransport and, in particular, on the living environment of the Katajanoka region, as the volume of transport is high.

Outdoors and recreation

The construction of the runney lanterns has a negative impact on the accessibility of the Herttoniemimap park.

Transport to the rock crumb from thetunnel site takes place through tunnels. Their locations are not designed, as a result of which the impact on outdoor and recreational areas during construction cannot be assessed.

Ve 6 Water traffic from Crounu Mountainside — Central

VE	Description of the option	New transport infrastructure *Land construction; dredging, mass requirements, surplus masses (preliminary estimate)*
VE 6	Waterborne transport from Kruunu Mountain-Central	Tunnel of the Lännary lanterns in Herttoniemi
		Quay and free platform at Katajanoka and quay in the Kruunu Mountain, Terminals in Katajanoka and Kruunu Mountain

Plan

The water connection would operate as a bus bridge between Laajasalo and theback town of the chicken. The ferry can also be walking or wheeled. The shortest ferry connection is arranged betweenKataja noka and Kruunu Mountain.

The Katajanoka tip area allows for the construction of a terminal building on the other metropolitan sides in a simpler waythan the current city,but rather the convenience of the city. The necessary stops and waiting points for buses will be provided for the ferry of the Katajanoka tip. It is also possible to implement the necessary portfacilities in the place.

Construction and work areas

New quays should be built on both beaches and connectionsto the ferry shore should be arranged.

The maritime route needs to be built and upgraded to a limited extent with a relatively small number of construction and signposting activities. Dredging is only needed in the vicinity of beaching points, probably only at the end of Katajanoka.

Fixed quay constructions and moving calories shall compensate for changes in altitude and the change in the centre of gravity of the ferry during loading. The ferry location of the Katajanoka requires two parallel structures. It maybe necessary to introduce a ferry sleeve in the eventof a pitch failure or accident. In addition,Finland's transport needs its own quay and scallop tracks.

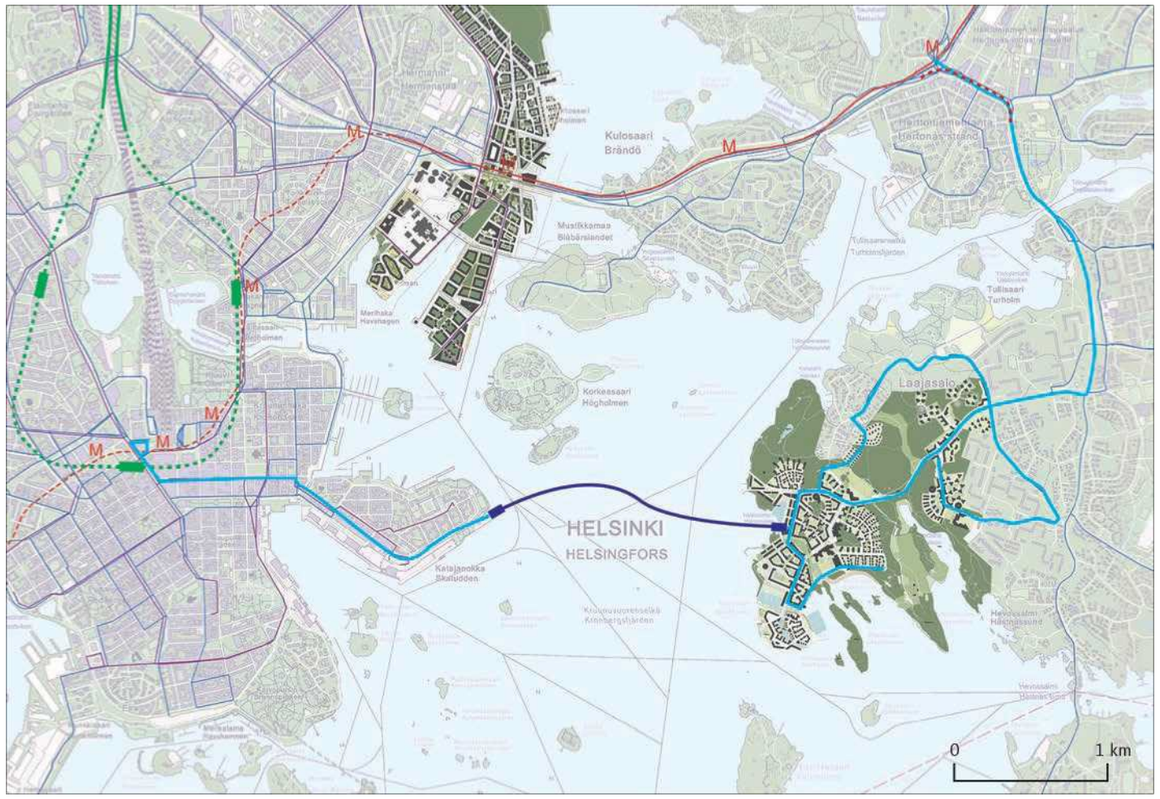
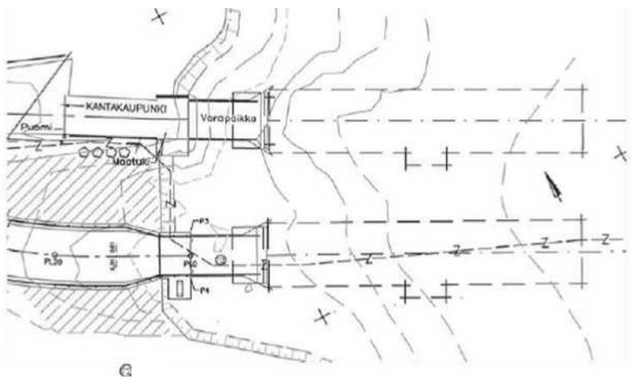


Figure 8.15. Waterborne transport from the Crounu



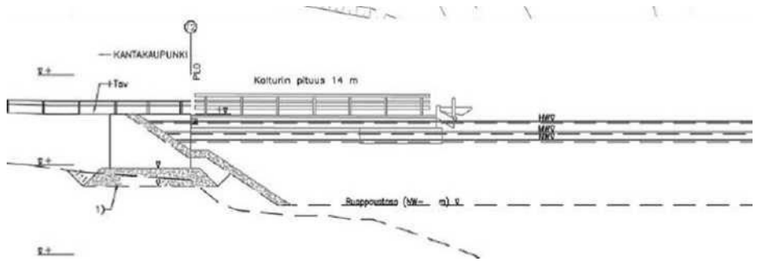


Figure 8.16. A draft of the platform's quay and calth construction.

Use

The ferry is one part of the journey chain and the hull is made up of bus lines (as well as the current metroyh from Herttoniemi). From the ferry, the routes continue from both beaches as four different bus lines.

In the metropolitan city, the lines run from Katajanoka to different parts of the centre. In the Large Room, the lines end with the Kruunu Mountains, Santahamina, Jollas and Yliskylä.

The frequency of the ferry is six minutes and the driving timeof the vehage is equal. As a general rule, the ferry would be moved to and out of the bus. It would also be possible to travel on the ferry on a different list of walking andcycling traffic using a gates and a part of the ferry. Sufficient passenger capacity has been estimated to be around 150 persons. According to the traffic forecast, approximately 8 800 passengers per day would be used by

Effects during construction

Soil and bedrock, groundwater

The construction of ferry terminals requires theuse of the surrounding areas as construction sites. Thedredge becomes soil masses which need to be stretched to other areas.

The implementation of option 6 will have no impact on the ground and bedrock or groundwater, except in the context of the construction of the tunnel of the Linn builders where excavation and quarrying is being carried out. Excavation and quarrying generates solid-rich waters, which are channelled intothe terrain, rainwater drain or sewage sewer. Waters in contact with quarrying often also contain nitrogen compounds released from explosion and are alkalinely due to injections andbetoins. During construction, the groundwater surface may decrease locally because groundwater entering excavation is pumped out of the area. However, in the construction process, excavation is sought to make thesoil as watertight as possible, thusreducing the impact on the northern water.

The measurements on ground, bedrock and groundwater-are roughly the same as for option 0.

Surface water, fish and fishing

Surface water effects arise from the water discharged from the construction site of the Linnanbuildingajantie tunnel, such as:

for other options, with the exception of option 8. The water effects of the runners have been presented asa replacement under condition 0.

Small-scale dredging at berth causesthe mixing of solids with water. Even the water does notnecessarily turbid with the eyes, as in the project area the water is already very turbidity due to the waters surrounded by the Vantaajoki river. As a result, no adverse or nuisances to the aquatic organism due to turbidityare estimated. Dredging may also result in the release of watertea from potential contaminants in the sediment. The risk of potential contaminants in sediment is assessed as low, due to the short duration of dredging, small-scale dredging and limited effects tothe area due to protected dredging areas. In addition, ADRs are usually committed to the solid, i.e. in a less harmful form than when they are soluble. Anti-contaminants bound to the solids retract to the bottom as flow rates decrease. When feedingcontaminated sediments, consideration is given to reducing the workload and timing ofwork. Benthic animals are destroyed from small dredging areas, but benthic invertebrates are likely to revert to the-rest of the year. There are no estimates of adverse impacts on fish stocks or fisheries. The significance of the spawning-effects of the option is assessed at most as moderate.

Nature

There will be no adverse effects on nature.

Transport, mobility and housing

The construction of the tunnel for the Linna-BuilderRoad will have an adverse effect on farmers, pedestrians and cyclists, as well as bus services during theconstruction period, probably for several years. Working-time transport arrangements are challenging. The work onthe ground has a negative impact on the comfort of living.

The possible improvement of the street network and the construction of quay and terminal structures will not cause a major work-time rotary nuisance for cars or light traffic.

Outdoors and recreation

The construction of the runney lanterns has a negative impact on the accessibility of the Herttoniemimap park.

The construction of the Katajanok and the Kruunu Mountain does not cause any significant work-time damage to recreational activities.

Ve 7 cableways Hakaniemi-Kruunu Mountain

VE	Description of the option	New transport infrastructure *Land construction; dredging, mass requirements, surplus masses (preliminary estimate)*
VE 7	Cableway Hakaniemi-Kruunu Mountain (not in the evaluation programme)	Tunnel of the Lännary lanterns in Herttoniemi
		Two terminals, two intermediate stations

Plan

The Köysway installation requires a propulsion machinery, a turning station, a basketroom and an operating and control centre. The use nozzle and the basket shall be placed in the Kruunu Mountain's weapon in man. The main control and control centre of the system should be located within the basket storage facility.

The option under consideration includes, in addition to terminal stations, stations in Sompa Islands and the High Island. Line approximately 4 kgmetres long and average speed, with deceleration at station points, 20 km/h (5.5 m/s) with mat-ka time of 12 minutes/direction. The frequency is 30 seconds, i.e. a distance of approximately 170 m between the baskets. There are no more than 48 baskets carrying around 20-30 people and a reserve of 2.

The Hakaniemi and its location in front of the Hakaniemi commercial hall offer great opportunities for flexible, comprehensiveand frequent exchanges.

The cableway of the mountains of the mountains of the mountains is operated around 20 hours aday, all over the week.

The stations are occupied by 5-10 people.

Construction and work areas

According to the preliminary study, the cableway is technically feasiblefrom Hakaniemi to Kruunu Mountain. In particular, strong tension and tension forces are transmitted to stations and support columns. The foundations will be adequately calibrated.

The bases are constructed and set up in the same way as wind turbines. The basis can be either a land-based tile base, which in soft soils is ballless, or a rock basis by injection of anchor bars into the rock, which requires intact rock.

The groundwork in the waters is carried out as dry work. The support column maybe raised in parts by a crane on the top ofthe foundations or by means of a ferry crane.

The sizing requirements for the base columns and station foundations are particularly challenging due to the existing underground structures at the turnaround station of the metropolitancity in Hakaniemi.

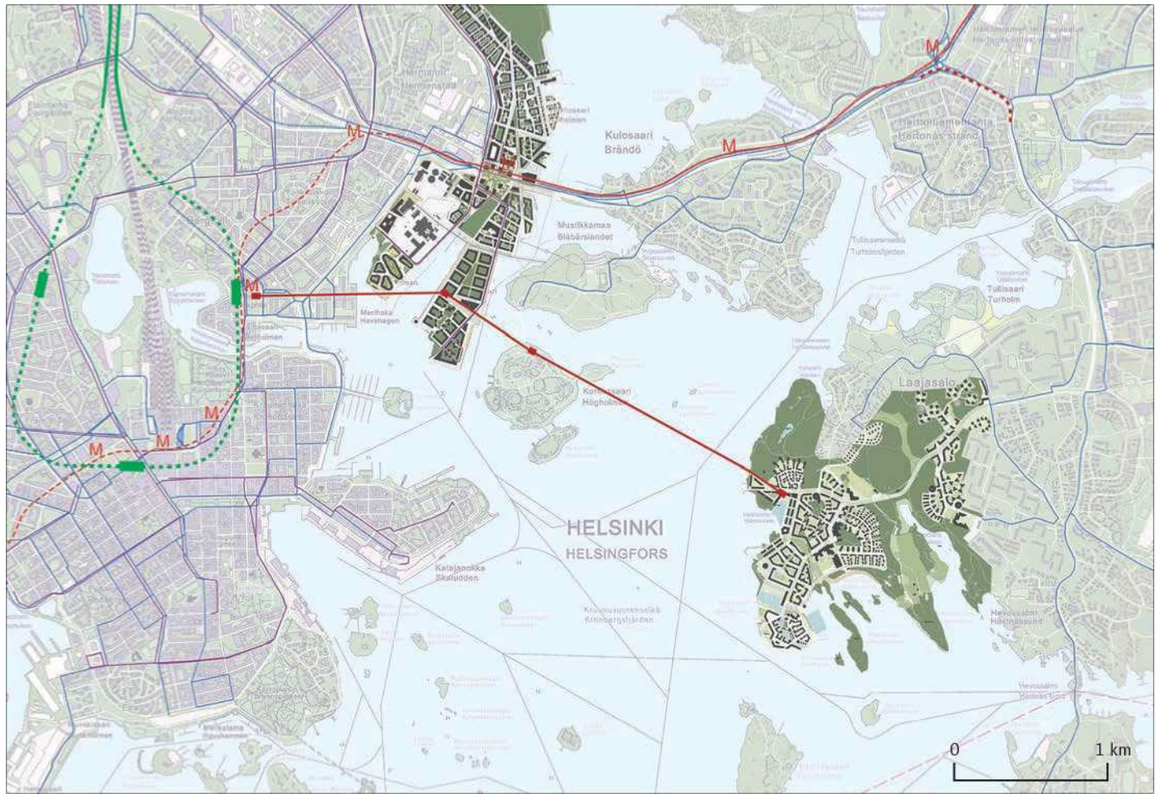


Figure 8.17. The cableway Hakaniemi-Kruunu

Construction works limit the use of the work in the-surrounding areas.

Use

A cableway station and interconnections would make sense to plan on the roadand be implemented in connection with the design of Pisara, provided that the cableway option is advanced for further planning.

The alignment shall be kept straight between stationsfor technical reasons. Hakaniemi is the most challenging target for the design of the approach, where existing buildings and urban conveniencelimit the orientation options. The track shall riseat a steep angle to reach the Meriha buildings.

In Hakaniemi, the primary line runs from the commercial hall in the direction of Näkins, reaching Meriha andcrossing the loshes. If the alignment causes insurmountable technical,urban or other disturbances, it isallowed to move the line from the Hakaniemen shore.

Construction requires five work areas of approximately 50 x80 m^2. In addition, one site is built up inthe area.

Effects during construction

Soil and bedrock, groundwater

The implementation has no impact on soil and bedrock or groundwater. The effects are roughly the same asfor conditions VE 0 and VE 6. A relatively small amount of soil is consumed by basic products and construction products.

In practice, effects occur only in the construction offour barrels of slurry builders where excavations and quarrying are carried out. Excavation and quarrying generates solid-rich waters which are diverted through clarification either to the terrain, to rain drainsor to sewage sewers. Waters in contactwith quarrying generally also contain nitrogen compounds released from explosion and are alkaline due to injections and betoins. During construction, the groundwater surface may decrease locally because groundwater entering excavation is pumped out of the area. However, during construction, the aim is to ensure that the drainage isas positive as possible, thus reducing the impact on groundwater.

Surface water, fish and fishing

Surface water effects arise from the water discharged from the construction site of the Linnanbuildingajantie tunnel, as isthe case in other swaps except option 8. The water effects of the Linnanrakator'sroad are indicated under option 0.

Small-scale dredging at the pylon of a cableway in the Crown Mountains will cause the solids to becontained in the water. However, the water is not necessarily turbidto the eyes, as the area covered by the project is already very-turbid, often due to the waters surrounded by the Vantaajoki river. As a result, no adverse effects on aquatic organisms due to turbidity are estimated. In principle, solids from dredging can be transported around 2-5 km from the place of work and at a time of major currents or storms. As arule, solid solids pass through the flows to the north or south.

Dredging may also lead to therelease of contaminants in sediment to water. The risk ofpotential contaminants in sedi is assessed as low as dredging is of short duration and small scale. In addition, the substance is usually present ina less harmful form than when it is soluble. Harmful substances bound to the solids retract to the bottom as flow rates-decrease. The feeding of contaminated sediments takes into account the reduced load working methods and the timingof work, where possible. Benthic animals are destroyed from small dredging areas, but benthic invertebrates are likelyto replenish in a few years. There are no estimates of adverse impacts on fish stocks orfisheries. At most, the significance of the water effects ofthe option will be assessed as moderate.

Nature

The bird population may be disturbed by dredging work, shooting and construction of a planned pillar of a cableway in thesea area of the cableway.

Transport, mobility and housing

The construction of the tunnel for the Linna-BuilderRoad will have an adverse effect on farmers, pedestrians and cyclists, as well as bus services during theconstruction period, probably for several years. Working-time transport arrangements are challenging. The work onthe ground has a negative impact on the comfort of living.

The site and construction of Hakaniemi terminals cause adverse effects on movement in the market area.

Construction can cause a temporary disturbance to living in Meriha.

Outdoors and recreation

The construction of the runney lanterns has a negative impact on the accessibility of the Herttoniemimap park.

The construction of a cableway, including the installationof wire ropes, causes short-term damage to boating.

Ve 8 Vehicle, tramway and light traffic connection (cycling and walking) on bridges between Keskusta and Kruunu Mountain

VE	Description of the option	New transport infrastructure *Land construction; dredging, mass requirements, surplus masses (preliminary estimate)*
VE 8	Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain Total length East boundary of the Snellman-Kruunu Mountain sub-division area 5 600 m	No Tunnel of the Linnanary lanterns in Herttoniemi Bridge North — Nihti 750 m, underpass height 7 m (lift bridge underpass height 40 m) Bridge Nihti-High Island 350 m, underpass height 7 m Bridge over the Crown sleeve to 1 100 m in vehicle lanes

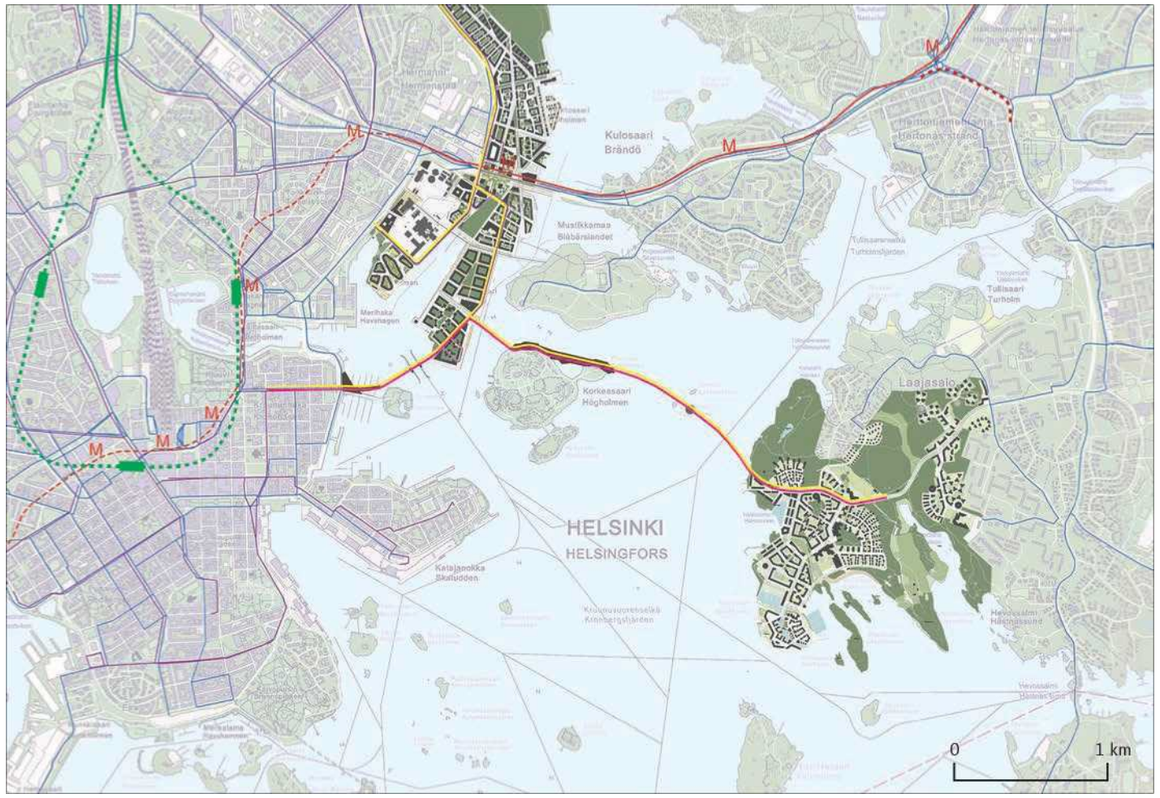


Figure 8.18. Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu

Plan

As option 1, but car traffic is derived from Nihdi both towards Liisankadu and the fishing port-Hakaniemi.

Trams, motor vehicles, walking and cycling are separated from the section of Nihdi,the High Island and the Kruu Mountain.

Can do so in two stages, such as VE 1. If necessary, the decks of the CruunuMountain Bridge and the Bridges of the Bridges are modified atthe other stage of construction to allow lanes to be built for car traffic. This requiresthe structures to prepare for the Leven bridgedecks in phase 1.

Does not include the Tunnel of the Linnanrakentajankis in Herttoniemi.

Construction and work areas

As in Option 1, but slightly wider.

Effects during construction

Soil and bedrock, groundwater

The effects on soil, bedrock and groundwater are broadly comparable to Option 1. However, the difference is more massive construction and a higher demand for land. Under this option, the construction of the tunnel for the builders is excluded and thus also the resultingcosts.

Surface water, fish and fishing

The effects on water are largely similar to thoseof Option 1, but for the Kruunu Mounu Bridge, slightly mouthrings. In addition, the option does not consist of theconstruction of a tunnel for the Liuntan Architecture, which means that the effects of the tunnels on the Tiiliruuki Bay will not occur differently from the other options. The water impact of this option is assessed as high due to the duration of the water works and the presence of protected fish species, such as-trout and migration, and the potential impact on the Natura area.

The work of the boat can cause damage to the fishing sturgeon inthe Kruunu Mountains and the Gulf of Vanhankaupungina.

Changes will be made to the Vantaajoki fishing ladder.

Transport, mobility and housing

In the areas of Nihdi, Sompasaari and the fishing port, the development of street facilities to meet the needs of increasing vehicle trafficis causing major work-time disruptions.

The construction of the Liisanki Street is a temporary, but rather long-lasting disadvantage for residents, trade and transport.

Outdoors and recreation

The effects during construction are the same as inOption 1.

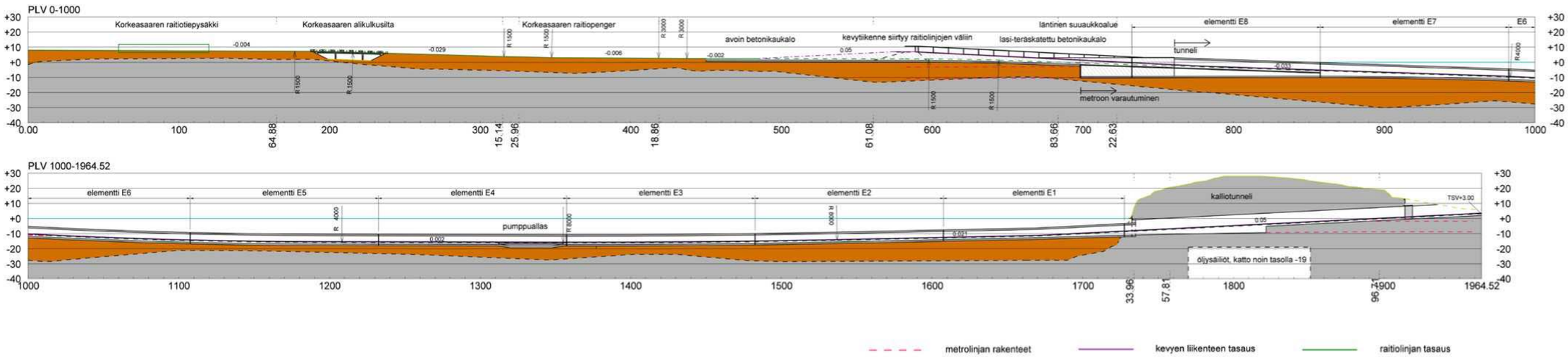


Figure 8.19. Length pruning. Pöyry 2008

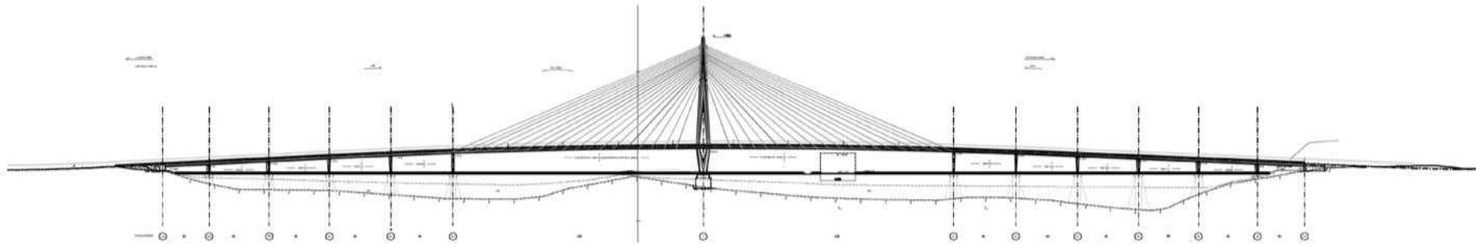


Figure 8.20. Gemma Regalis. Length pruning. WSP 2013.

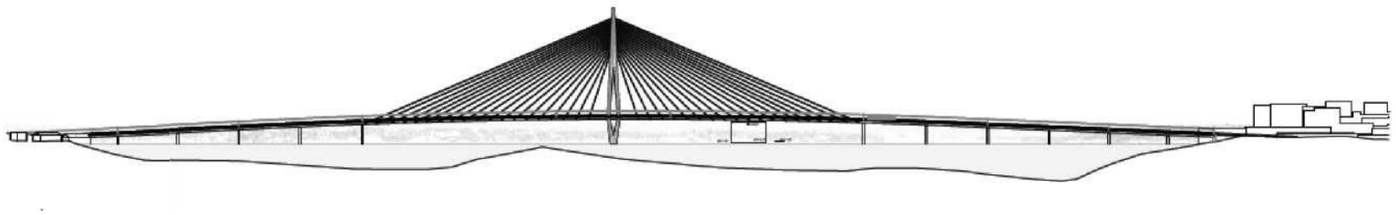


Figure 8.21. Gemma Regalis. Façade photo. WSP

2013.

9 In-use effects

This section describes the positive and negative impacts of the project options during the operation and assesses the options in relation to the objectives. The control code has been chosen for 2035, when the areas of the fishing port and the Kruunu Mountains are fully constructed.

Land use and town and country planning

Ve 0 Carriage buses for Herttoniemi metro station

The option does not have any significant urban or land-use effects on the metropolitan city. Liisankatu, the surroundings of the northern shore and the High Island will remain as they are today. The fishing port develops in accordance with the sub-scheme. The Sompa Island and Nihti remain functionally as a bag-back where there is no significant development of brick-and-mortar services or other activities due to the fact that the area has fewer nozzlesin transit. The lowest point in Nihdi is the distance of more than 1 km from the top of Nihdi to the most important day-to-day services. Similar areas are the existing tram 10 and 4 turning sites in Pikku Huopalahti and Katajanoka.

The role of the Large Room will remain subordinate to the Herttoniemiregional center, whose service provision will continue to complement the services providedby the LAA Jaslo. The increase in access traffic at the Herttoniemi metro station attracts new services to be located at the metro station, which will improve the supply ofservices in Kulosaaari, Hert toniemi and Laajasalo in relationto Easternkes. The existing and already emerging commercial services in theBroadtail will be maintained.

The Crounu Mountain may develop into a residential area where only local services are available. The Cruunu Mountain is a less attractive neighbourhood due to poorer hub-accessibility. It will not be possible to develop one piece of land-use activities in the region without congestion on existing transport routes. The objective of efficient land use requires the development of transport pathways.

The Tunnel of the Linnary Attorney's roads allows the condensationof the existing land around the Linnan lake roads. The manifold in the tunnel transforms Herttoniemi map and style intoa street area.

The Katjajack remains the periphery of the metropolitan area as it currently stands.

This option does not implement the rail link of the existing regional plan and the connection need for the 2nd phase country/municipal plan to be established. This option is incompatible with the metro or tram road connection marking of the existing zoning plan.

This option does not support the realisation of the vision of the zoning plan under development, which inter alia relies on mobility, in particular on the rail network and quality cycling corridors, and where the seaside and archipelagos are active.

This option is not inconsistent with the objectives setfor the use of land in the Kruunu Mountain.

Ve 1 Rail and light traffic link on bridges from the Kruund to the Kruunu Mountain

This option links the Lajasalo with a more solid part of the-immediate central urban structure of your metropolitan city. This option will increase the attractiveness and attractiveness of the entire Broadalo as a residential area through better central accessibility. The direct connection with the centre and Pasila reduces the dependency of the entire region of Laajasalo on the HerttoniemiCentre and strengthens the region's role as a gin part of an independent city.

The existing services in the Liisan street are better placed to survive and develop due to higher levels of mass and light-traffic on the street. Sea fountains on the northern shore-make it possible to develop port services and vehicle-parking, as well as wider recreation areas. The area is the urban gate of the empire centre. The fishing port is more connected to the centre than option 0 andhas a more diversified stream of services. The meadows form a flower area in the centre between the city of Mustikkamaa and the High Islands. It is possible to develop the provision of day-to-day services and restaurant and cafeteria services complementing other services in the fishing port.

Thepotential for land-use development in blackland and the High Island is growing. It is possible to develop more services (in particular zoos, restaurants and cafeteria) in the High Island, which significantly improves the multifunctionality of the area andits conservative use.

This option will allow the developmentof a more efficient man of the Kruunu Mountains into a diverse, concise and sustainable neighbourhood with good tram and light trafficfunctions in the centre and bus and passenger car connectionstowards Hert tonieme. The importance of the Mountainsas a route is increasing, allowing for more services tothe region, complementing and diversifying the services offered by the Lajasalo as a whole. Services are developing in particular on the main public and light traffic routes. A quick and clearlink with explosion is a positive thing.

The environment at the Herttoniemi metro station is evolving as an access connection, kenne and regional hub with new services.

The Katjajack remains the periphery of the metropolitan area as it currently stands.

The use of the extensive recreation areas of the Sherryland, the Korkein Island, the Kruunu Mountain and the Laajasago is increasing and diversifying. The Helsinki Park is a comprehensive and unique set ofurban recreation, with a strong link between the entire areas of the Gulf of Vanhan kaupunki and the back of the Kruunu Mountain. Without a central connection, Laajasalo's role in the Hel-zinc park is a bag-back, whichtends to dream from the centre and the north. Residents are significantly better placed to make trips between the Bay of Vahankaupungina and Laajasalo, the island of Vasikka and Finland.

The development of the High Island will receive new aid for rail transport options once the region enters the rail network. Thesolution for the bridge is designed to allow pedestrians and trams to run on the level of other movements and cycling (fast) is designed to run its own path separated from this level.

Option to implement the 2nd phase country/municipality plan to be established when the connectivity requirement is met. This option supports the achievement of the public transport objectives of the rail link and the generalformula of the current regional plan and the direct metro or rail direct line, although contradicting the content and alignment of their markings. This option strongly supports the realisation of the vision of the zoning plan under-development. In line with the vision, the East-West Recreational Function "Rail Route" will take place through the Broadsalo.

The sub-scheme of the fishing port may be refined by the Nihdi's deposition in thecontext of the decoupling in order to enable a rail connection. A different conditionimplements the sub-scheme of the Kruunu Mountain. The exchangeto do so does not conflict with the established residential plans of the fishing port and the Kruunu Mountains. The implementationof the exchange will require changes in the zoningplan in the Northern River Bank, the Terva Island canton,Nihd, Horäsa Ressa and the waters.

Ve 2 Rail and light traffic concrete concrete and bridge link from the Kruund to the Kruunu Mountain
Ve 3 Metro Kamppi-Laajasalo; rock and concrete tunnel and bridge link from Kruunha to Kruunu Mountain Bank

This option will have almost similar impacts onland use as in Option 1. This option links the Lajasalo with a more integral part of the perimeter of the main city's immediate central urban structure. This option will increase the attractiveness and attractiveness ofthe whole 'Broadsa lo' as a residential area thanks to thecentral accessibility of the reindeer. The direct connection with the centre and Pasila reduces the dependency of the entire Laajasalo on the-regional centre of Herttoniemi and strengthens the region's role as an independent part of the city.

The existing services of the Liisankanne are better placed to survive and develop due to higher levels of mass and light traffic. Sea fountains on the northern shore allow forthe development of hundreds of landscaping and vehicle parking, andthe wider recreation areas. The area is made up of a magnetic urban gate in the centre. The fishing port connectswith a stronger centre and offers more diversified-services. It forms a transit area between the city centre,Mus ladderland and the High Island. It is possible to develop the provision of day-to-day services and restaurant and cafeteria services complementing other services in the fishing port.

It is possible to develop new services (in particular zoos, restaurants and cafés) in the High Island, but slightly less than in Option 1 due to the trough of a space-taking tunnel.

This option will allow theKruunu Mountains to develop more drastically into a diverse, concise and sustainable-residential area with good tram and lighttea connections to the centre and bus and passenger car connections towards Herttoniemi. The importance of the Krounu Mountains as a transit route increases, allowing more services to be provided to the region, complementing and diversifying the services offered by the Laajasalo. Services are developing in particularon the most important routes for collective and light traffic. The development of new housing and services in the Kruunu Mountain area (HEL2011-004059) is not possible as much as in Condition 1due to restrictions on tunnel structures.

The environment at the Herttoniemi metro station is evolving as an access connection, kenne and regional hub with new services.

The Katjajack remains the periphery of the metropolitan area as it currently stands.

The use of the extensive recreation areas of the Sherryland, the Korkein Island, the Kruunu Mountain and the Laajasago is increasing and diversifying. The Helsinki Park is a comprehensive and unique set ofurban recreation, with a strong link between the entire areas of the Gulf of Vanhan kaupunki and the back of the Kruunu Mountain. Residents are significantly better equippedto make excursions between Keskustan-Vanhankaupunginlah and Laajasalo, Vasikka Island and Finnishlinna.

The development of the High Island will receive new aid for rail transport options once the region enters the rail network. Thesolution for the bridge is designed to allow pedestrians and trams to run on the level of other movements and cycling (fast) is designed to run its own path separated from this level.

Option to implement the 2nd phase country/municipality plan to be established when the connectivity requirement is met. This option supports the achievement of the public transport objectives of the rail link and the generalformula of the current regional plan and the direct metro or rail direct line, although contradicting the content and alignment of their markings. This option supports the achievement of the vision of the zoning plan under development. In line with the vision, the East-West Recreational link "Rail Route" takes place through Largesalo. The tunnel solution only partially implements the objectives of marine recreation.

The sub-scheme of the fishing port may be refined by the Nihdi's deposition in thecontext of the decoupling in order to enable a rail connection. A different condition-implements the sub-scheme of the Kruunu Mountain. The exchangeto do so does not conflict with the established residential plans of the fishing port and the Kruunu Mountains. The implementation ofthe exchange will require changes in the zoningplan in the Northern River Bank, the Terva Island canton, Nihd,Horäsa Ressa and the waters.

This option will link the stock to the immediate central urban structureof the city as a more integral part of the city. This option will increase the attractiveness and the elevation of theBroadsalo as a whole, thanks to better central accessibility. Direct access to the centre reduces the dependency of the entire Laajasalo on the regional centre of Herttoniemi and strengthens the region's role as an independent part of the city.

The Liisankatu and the Northern Bank will remain as they are today. The fishport develops in accordance with the sub-scheme. The Sompa Island and Nihti remain functionally a bag-back, where there is no significant development of brick-and-mortar services or other activities due to the fact that the area has less transit traffic. Huonoimmil laan, atthe top of Nihdi, has a journey of more than one kilometre to the most important daily services. A similar type of area is the 'ny pen' tram 10 and 4 turning points in Pikku Huopalah-dessa and Katajanoka.

The development of new activities in the High Islandis less likely than for options VE 1 and VE 2. With the opening of the metro tunnel, Palosari becomes built and limits its current use.

This option makes it possible to developthe Kruunu Mountains' power to become a diverse, concise and sustainableresidential area with a good metro connection to the centre and bus and passenger car connections towards Herttoniemi. The services of the Mountains of the Cruun are developed in connection with the metro station. It is not possible to develop as much new land use as under Option VE 0 and VE 1 due to the constraints on tunnel structures and metro andthe possibility of metro-induced-noise.

The services of the Broadcasting Room would focus on the joint work of the new metro stations. The metro link requires a more efficient and intensivemain land use throughout the area of Largesalo in order tobe depleted.

The importance of Herttoniemi as a regional hub and an access point is less important than in Options VE 0, VE 1 and VE 2, as the parallel metro connection with Lajasalo is more competitive with Herttoniemi metro. The positionof Laajasa loyal would become a fasterconnection to the centre for the inhabitants of Laajasalo, Vartiosaaariand Santa Hamina.

More efficient public transport connections to the centre willalso be possible to list a part of the population without a car, such as theliving of van hulls.

The KAMP centre would further strengthen the newmetrose man-connection. The combined effect of the new metro and Pisararada stations would clearly shift the centre's focus to Kampp. The new metro station on the Esplanade-reinforces the importance of the areaas the main commercial na region of Helsinki (Central Business District). The Katajanoke will remain the periphery of the conurbation, as it is currently the case, and the current passenger terminal wouldnot benefit hardly from the metro line, as Katajanoka has no status.

The metro connection with the bridge would increase the recreationaluse of the Kruunu Mountain area from the fishing port to the High Island, but less from the centre due to the lack of a bridge to the Tervau Island. The Helsinki Park makes it possibleto thwart a comprehensive and unique urban recreation, with a strong link between the entire areas of the Bay of Vanhan and the Kruunu Mountains. The use ofthe extensive recreation areas of the land, the High Island, the Kruunu Mountain and the Broadsalon is increasing and diversifying.

Under Option 3, the deposition of the metro Metro from the bridge in the Kruunu Mountain is causing a long rock surgery around the residential area of the Kruunu Mountain. The Betonitunnel section for the Bay of Haakon should be built in parallel with the construction of housing. Subsequent construction requires a construction around the tunnel of about 40 m over a distance of 200 m in the centre of the Kruunu Mountains aroundthe Bay of Haakon Square. The reservation would have a significant negative impact on the quality of the construction of the residential area.

This option implements the rail link of the existing regional plan, the connection requirement of the 2nd phase province

plan to be establishedand the existing zoning plan. This option is incompatible with the current sub-scheme of the Kruunu Mounu Mountain andthe already whipped residential plans. This option supports the achievement of the vision of the zoning plan under development.

The metro link implements a rail-based network city.

The implementation of this option requires a separate underground urban development plan for the metro. No provision has been made for the metro station and the necessary traffic arrangementsat the Kruunu Mountains in accordance with the established plans of the Kruunu Mountain. The implementation of this option will require changes in the layout of the underground and above-ground structures required by the metro in the whole han area between Kamp and Kruunu Mountain.

The entrances to metro stations and air balancing shafts-change the current cultural historical areas in the metro-city and Katajanoka.

Ve 4 Metro Kamppi-Laajasalo; rock and concrete tunnels

The land use impacts of the option arethe same as for option 3. The High Island remains as it stands and the Kruunu Mountain is subject to less restrictionsthan Option 3 due to a deeper tunnel.

The metro link would increase recreational use in the Cruunu Mountain area from other areas. However, Helsinki Park's maritime recreation link between the centre and Laajasalo is weaker than Options VE 2 and VE 3 due to the tunnel connection.

This option implements the rail link of the existing regional plan, the connection requirement of the 2nd phase province plan to be establishedand the existing zoning plan. This option is incompatible with the current sub-scheme of the Kruunu Mounu Mountain andthe already whipped residential plans. This option supports the achievement of the vision of the zoning plan under development. The metro link implements a rail-based network city.

The implementation of this option requires a separate underground urban development plan for the metro. No provision has been made for the metro station and the necessary traffic arrangementsat the Kruunu Mountains in accordance with the established plans of the Kruunu Mountain. The implementation of this option will require changes in the layout of the underground and above-ground structures required by the metro in the whole han area between Kamp and the Mountain Kruunu.

Ve 5 Metro Kamppi-Laajasalo; rock tunnel

The land use impacts of the option arethe same as for option 3. The High Island remains as it stands and the Cruunu Mountain is not subject to land use restrictions.

The metro link would increase the recreationaluse of the Kruunu Mountains area from other areas. However, the Helsinki Park's maritime recreation link between the centre and the Laajasalo isno less than option VE 2 and VE 3 due to the tunnel connection.

This option implements the rail link of the existing regional plan, the connection requirement of the 2nd phase province plan to be establishedand the existing zoning plan. This option is incompatible with the current sub-scheme of the Kruunu Mountains and the existing residential plans. This option supports the achievement of the vision of the zoning plan under development. The metro link implements a rail-based network city.

No provision is made for the substation of the Kruunu Mountains and the necessary traffic arrangements in the Kruunuvuorenran- nann. The implementationof this option requires a new underground urban development plan for the implementation of the underground and above-ground structures required by the metro throughout the project area between Kamp and Kruunuvuo.

Ve 6 Water traffic from Crounu Mountainside — Central

This option links the Lajasalo to the immediate centre-tight urban structure of thecity, but less than Options VE 1 to VE 5 due to a slower interchangeable link.

The Liisankatu and the Northern Bank will remain as they are today. The traffictthrough the southern part of the port is lower and the region's role as a key point for public transport and services is lower than for options VE 1 and VE 2. The development of new functions in the High Island is unlikely to be as high as under options VE 1 and VE 2.

The services of the Kruunu Mountain are developing in connection with the ferry terminal in the Bay of Haakon. The second position of theHaaakon Bay of Station 2 requires more land than the ramps of other options, the terminal of the plan and its traffic arrangements.

The environment at the Herttoniemi metro station is evolving as an access connection, kenne and regional hub with new services.

This option improves to a certain extent the accessibility of recreational areas in the Kruunu Mountains from other areas andimproves connections within Helsinki Park.

The extension of Katajanoka's ferry terminal would allow for an increase in the provision of services in the region.

This option implements the connection need for the 2nd phase country/municipal plan to be established. This option is incompatible with the rail linkden of the current regional plan and the direct metro or railway line of the zoning plan.

This option supports the achievement of part of the vision of the zoning plan under development. The ferry connection does not directly contribute to the creation of a network city based on rail links.

This option is incompatible with the sub-generalformula of the Kruunu Mountains and with the already established residential plans of the Kruunu Mountains and requires changes to these in the Bay of Haakoni. The implementation of this option willrequire town and country planning of the current Katajanoka ferryterminal site.

Ve 7 cableways Hakaniemi-Kruunu Mountain

This option links the Kruunu Mountain to a more integral part of the periphery of the city's immediatecentre-town town. This option will increase the queuing and attractiveness of theKruunu Mountains as a residential area thanks to better access to the centre. The Broadband is indirectly connected to the hub.

The Liisankatu, the Northern Bank and the Tervasaari will remain the roughat present.

The new public transport interconnection in Hakaniemi isa strong guarantee of its role as a key service and public transport hub together with Pisararada. The centre of gravity ofthe publishing activities in Helsinki would be strongly extended toHakanie me. The terminal building allows the development of new services in the region. The new Terminal Rail Field in Niht will allow the development of newservices.

While it is possible to develop new services in a ter-minal building in the High Island, the area is likely to have fewer opportunities to locate new activities than Option 1 due to smaller on-site fillings. On the Kruunu shore, the local services related to this option would be mainly located in the terminal building.

The Köysira creates a land-use restriction (construction, height and distance limit), which limits future land-use development in Hakaniemi, the top of the Sompasaari, Nihd, the High Island and, in part, the Kruunu Mountain shore. In the Kruunu Mountain, the cableway, terminal, terminal traffic arrangements, basketroom and control station limit the development of land use in the Kruunu Mountain and the Bay of Haakon more than Option 1.

The environment at the Herttoniemi metro station is evolving as an access connection, kenne and regional hub with new services.

The Katjajack remains the periphery of the metropolitan area as it currently stands.

The use of the extensive recreation areas of the Sherryland, the Korkein Island, the Kruunu Mountain and the Laajasago will increaseand diversify. Helsinki Park has the potential to develop a comprehensive and unique urban recreation, with a strong link between the entire Bay of Vanhan Town and the areas of the mountain-backed area. Residents are significantly better placed to make excursions between Keskustan-Vanhankaupun-Ginlahti and Laajasalo, Vasikka Island and Finnish Castle.

This option implements the connection need for the 2nd phase country/municipal plan to be established. The option is tosupport the achievement of the mass lanes of the rail connection of the existing regional plan and of the general plan for the direct metro or railway line, although incompatible with the content and alignment of their markings. This option supports the achievement of the vision of the zoning plan under development.

This option is at odds with the sub-general plans of the fishing port and the Kruunu Mountain beach. The implementationof this option will require a change of town planning inHakaniemi, Me rihaa, top Hanasaari, Nihd, High

Ve 8 Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain

the Crown—

The effects of the option are similar to those of substitution-condition 1. The promotion of passenger car transport is geared more strongly to large shopping centres in the centre, the fishing port, Herttoniemi and theEast Centre.

The growing passenger car traffic in the city significantly reduces the quality of the urban environment and did not support the development of the stubbleand the ecological urban environment in differentways in Liisankadu, the North Bank and the fishing port. The link between vehicle traffic requires wider street and pen-ger arrangements, thus depriving the Northern Bank of the possibility ofdesigning the urban environment as a holistic urban port and a port in the city. The streets in the regions are less well placed to developmy services — in particular terrace and cafeteria activities. In the area of the fishing port, the volume of vehicle traffic is so high that the street space is insufficient in many sections of the street. In addition, springsof cross-border areas are congested in such a way that queues reduce comfort.

Passenger car traffic and the resulting noise significantly reduce the use of Mustikkamaa and the High Islandfor scaring and recreation.

The absence of a tunnel for the runways restricts part of the development of the land use of the Linnanlantern and Herttoniemi metro station, etc.

The Katjajack remains the periphery of the metropolitan area as it currently stands.

The noise caused by car traffic undermines the development of the Helsinkipuis t as a maritime recreation area and the recreation value of the bridge itself, but allows for better joint activitiesin the extensive recreational areas of Mustikkamaa, the High Island, theKruunu Mountain and the LAA.

This option implements the connection need for the 2nd phase country/municipal plan to be established. The passenger car connection of the option does not support the achievement of the public transport objectives of the rail link in force in the existing land-municipal plan and of the direct metro or rail lineof the zoning plan. This option is at odds with the overall developmentof a robust vision. The link between rail and light traffic contributes to the development of a networked public transport-basedbeauty structure, but the promotionof car traffic in the areas of the city, fishing port and Laajasalo does not significantly contribute to the realisation of thevision.

This option is at odds with the sub-general plans of the fishing port and the Kruunu Mountain beach. This option may require the extension of street areas in the housing plans ofthe fishing port and the Kruunu Mountains at the expense of the land use reserved for housing. In addition, inKa port, part of the station pland area has already been-built or built on roads. The implementation of this option will require changes in the zoning plan in the North Bank, the Terva Islands, Nihd, the High Island and the Kruunu Mountain beach and the waters.

9.2 Transport

9.2.1 Transport impact assessment methodology

The transport effects have been assessed on the basis of the traffic forecasts based on the HELMET models operated by-HSL. Each option has been the subject of a roadmap. Comparison options have been compared with thecurrent baseline (VE 0, connection buses for Herttoniemi metro station).

Railway options (VE 1 and VE 2) and metro options (VE 3, VE 4 and VE 5) are similar in terms oftraffic. Public transport lines and traffic are similar in tram road options, as are metro options. There is a different type of physical link between the maincity and the Kruunu Mountain. Therefore, the transport impact assessments have one tramway and one metro option. The transport impacts include the following options:

9.2.2 Number of passengers

Under the baseline option VE 0 in the transport impact

- Ve 0 connecting buses for Herttoniemi metro station
- tramway options
- metro options
- waterborne transport Cruunu Mountain Coast — Central
- cableway Hakaniemi-Kruunu Mountain
- vehicle, tramway and light traffic connection at bridges betweenKes kusta and Kruunu Mountain.

Transport impact assessments include impacts on travelcosts and traffic volumes, travel orientations, changes in transport patterns, accessibility changes and transport performance reviews.

assessment, passengers will go to Ma on theHerttoniemi metro by buses and switch to the metro. The current bridge in the Broadband exceeds just under 3 600 passengers. The tram-car eh-dossa would exceed approximately 3 500 passengers and the metro would carry more than 3 300 passengers. More than 1 100 people would travel on the Bussier and less than 1 500 passengers would use the cableway. The combined tram and vehicle bridge would carry 3 200 public transport *passengers (Figures 9.1 to 9.6).*

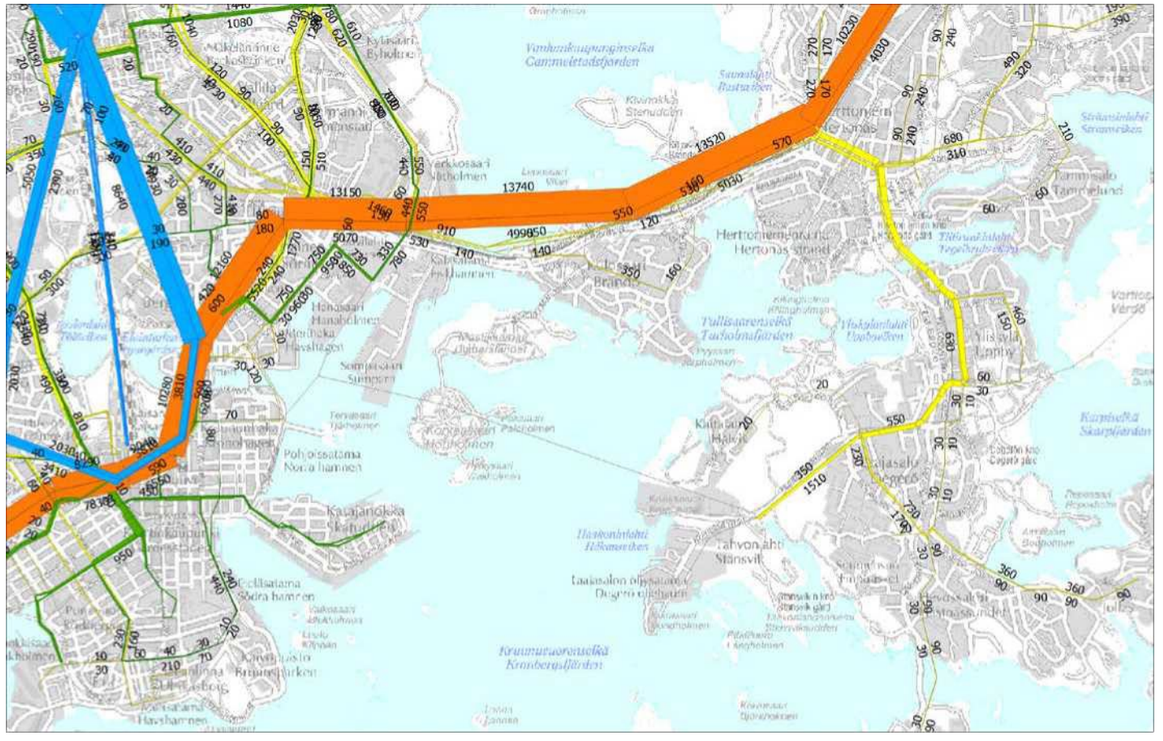


Figure 9.1. Number of passengers in the morning peak hour in 2035 under option

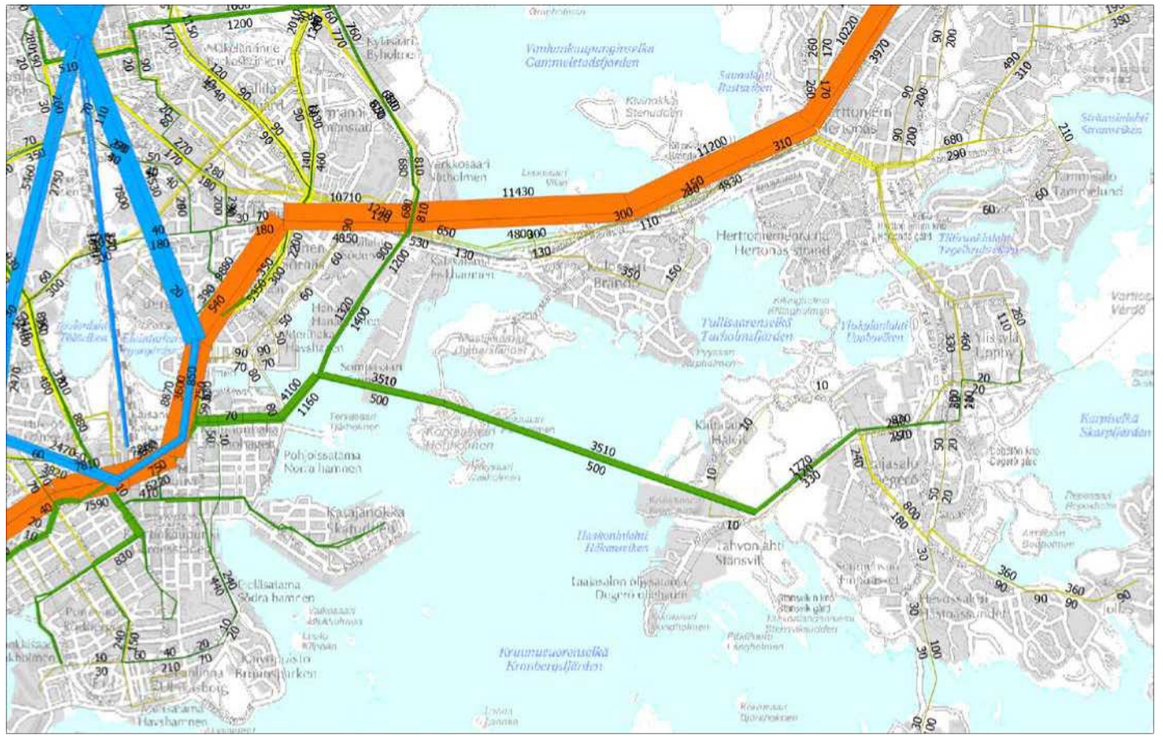


Figure 9.2. Number of passengers in 2035 morning peak hour under tramway.

Figure 9.3. Passenger numbers in 2035 morning peak hour under metro.

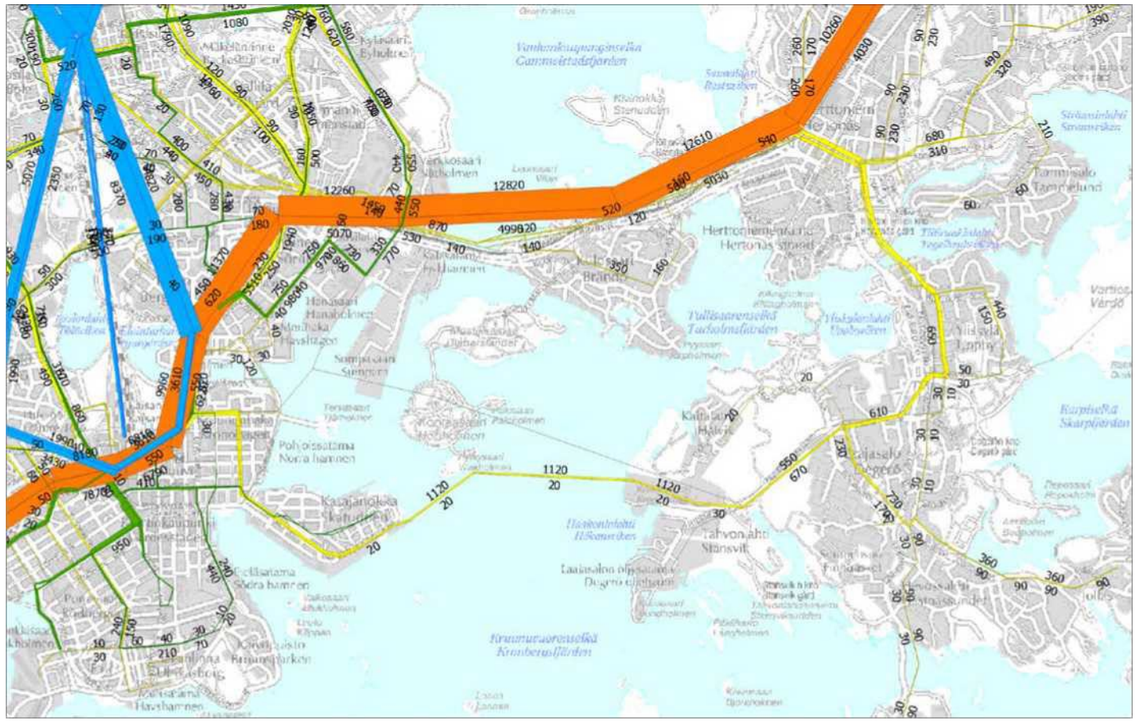


Figure 9.4. Number of passengers in 2035 morning peak hour under the option of bus bridge.

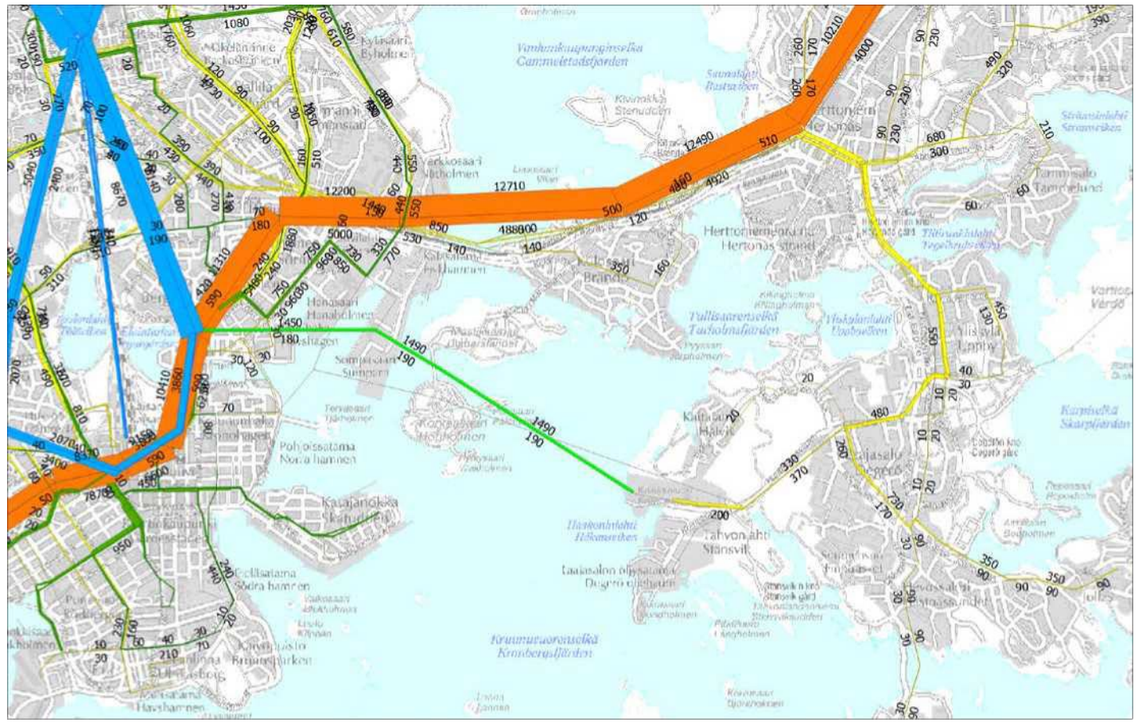


Figure 9.5. Number of passengers in 2035 morning peak hour under the option of a cableway.

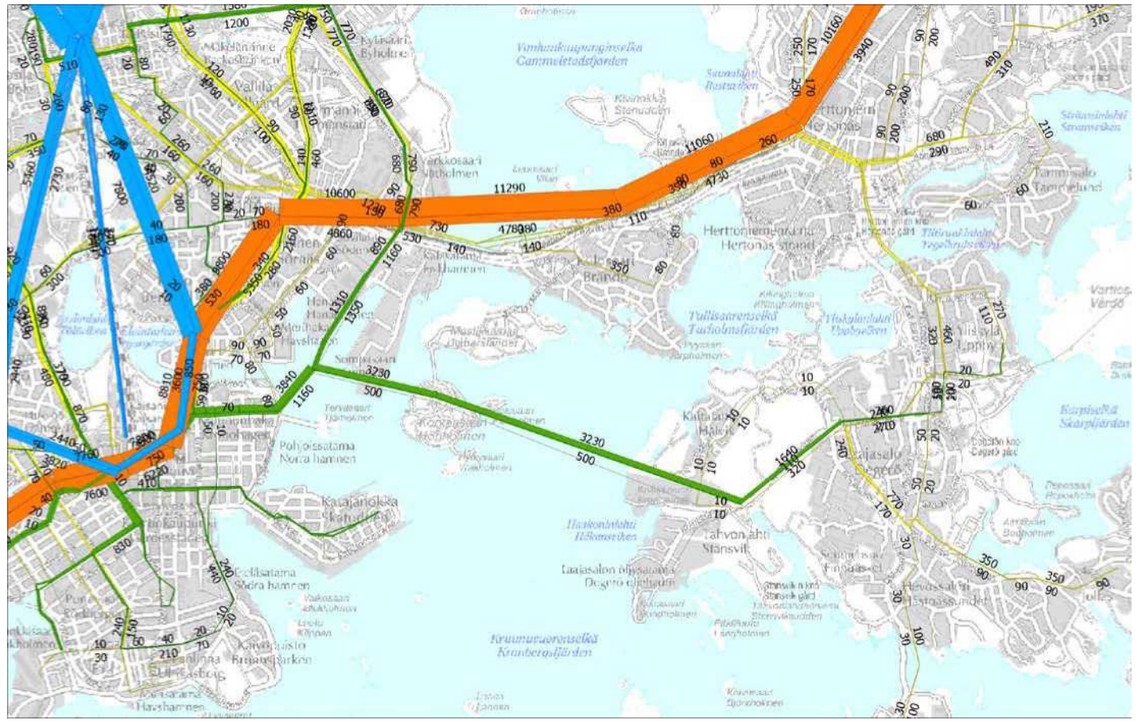


Figure 9.6. Passenger numbers in 2035 morning peak hour under the tram and vehicle bridge option.

Under the tram-way option, the number of passengers in the congested direction is reduced by 2 300 persons in the metro in 2035, according to forecasts (*Figure 9.7)*. Passengers will be added to the Sompa Island trams and to the new tram shaft in Kruunhaa. The option is to move a few hundred droplets ora way to change rail at a road station insteadof Hakaniemi.

Under the Metro option, the number of passengers going to the centre in Kulosaaari will be reduced by less than 2 200 persons in the morning peak hour in 2035according to roads (*Figure 9.8)*. Additional passengers will come to the Kamp station.

The bus ferry option will reduce thenumber of passengers going to the centre in the metro by about 900 morning peak hours in the Kulosaaari in 2035, according to projections *(Figure 9.9)*. By bus, the passengers would continue their journey to the railway station via Kruununha. The number of users of the Nelose tram-watch line would decrease somewhat.

Under the Köysway option, the number of passengers travelling to the centre on the metro will be reduced by abundant 1 000 persons in the morning peak hour in 2035- according to roads (*Figure 9.10)*. Additional passengers will come to Haka's mite station.

Under the rail-vehicle bridging option, the number of public transport passengerstravelling to Kulosaare will be reduced by 2 450 persons in the morning in 2035, according to forecasts (*Figure 9.11)*. Passengers will be added to the Sompa Island trams and to the new tram route in Kruunhaa. In the alternative,a few 100 drop-over passengers switch from Hakaniemi to the railway station.

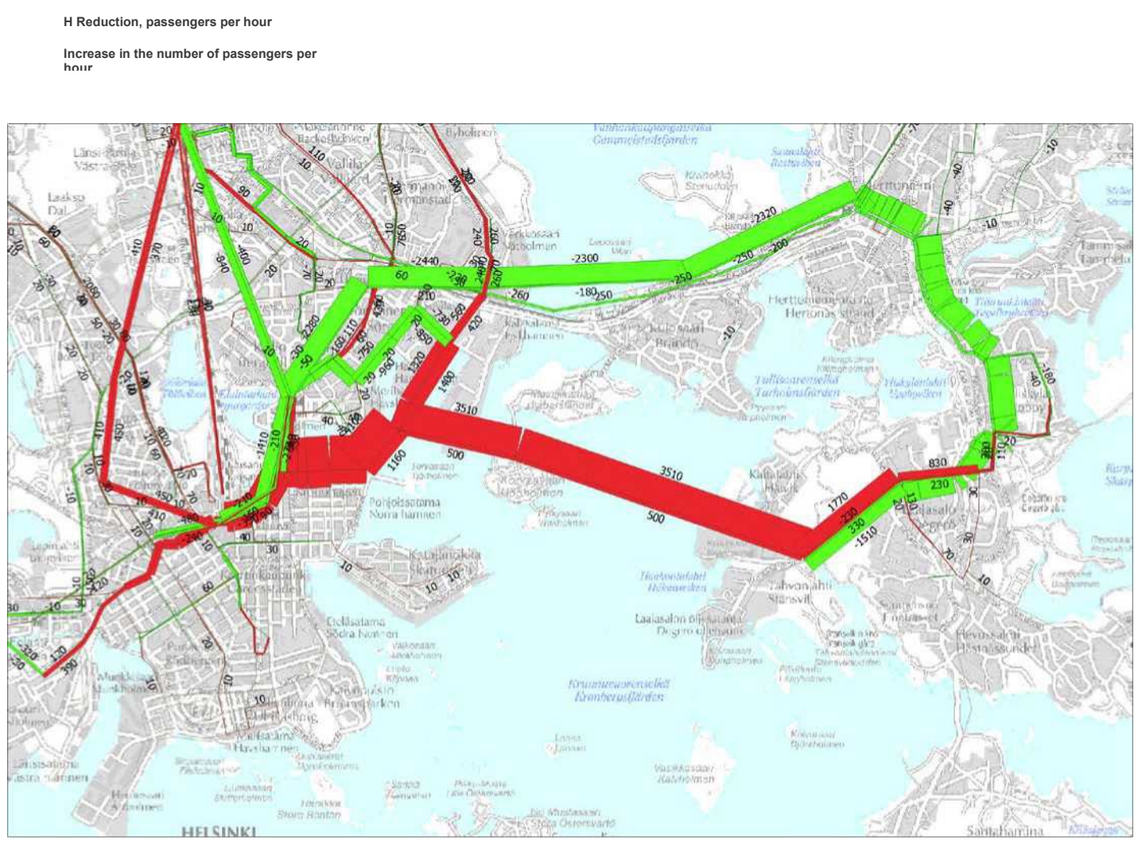


Figure 9.7. Difference in number of passengers in 2035 morning peak hour under the tram-hour option compared to

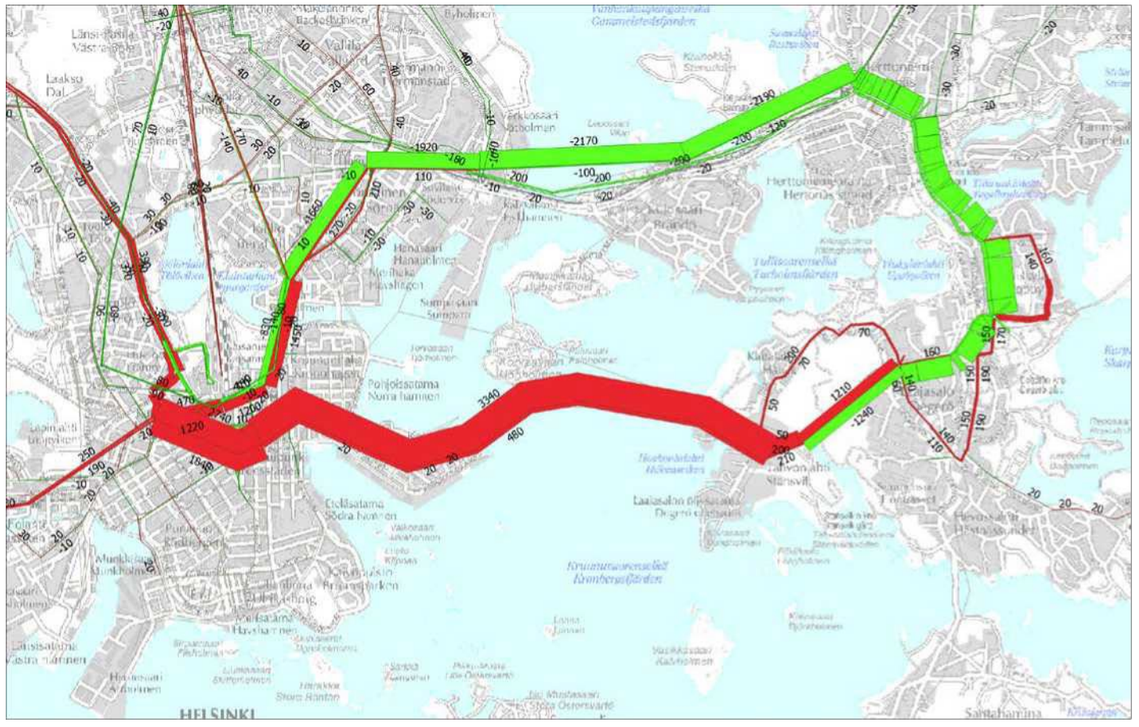


Figure 9.8. Difference in number of passengers in 2035 morning peak hour under the metro option compared to option 0.

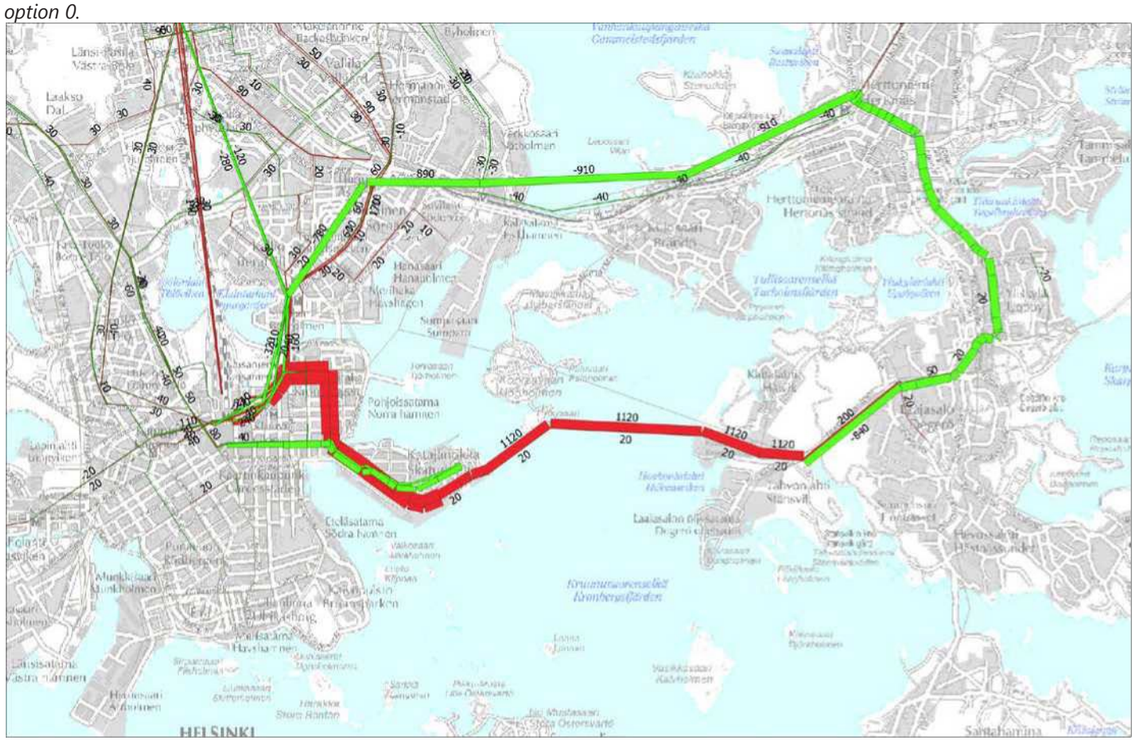


Figure 9.9. Difference in number of passengers in 2035 morning peak hour under the bus bridge option compared to option 0.

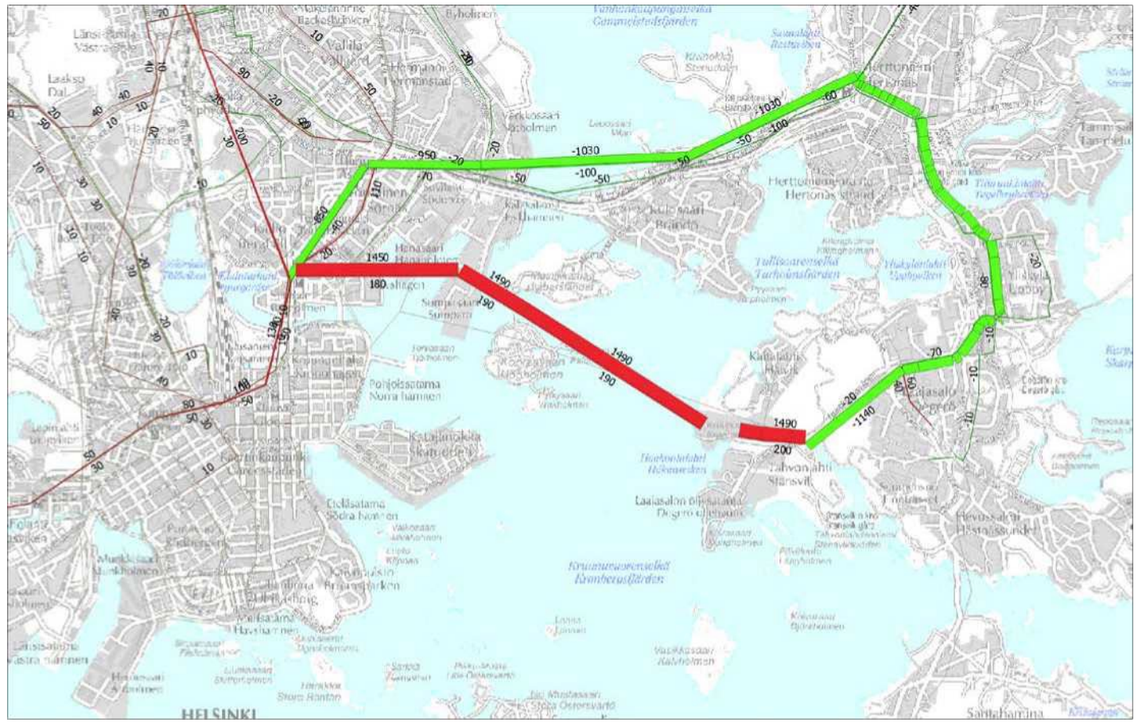


Figure 9.10. Difference in number of passengers in 2035 morning peak hour under the option of a cableway compared to option 0.

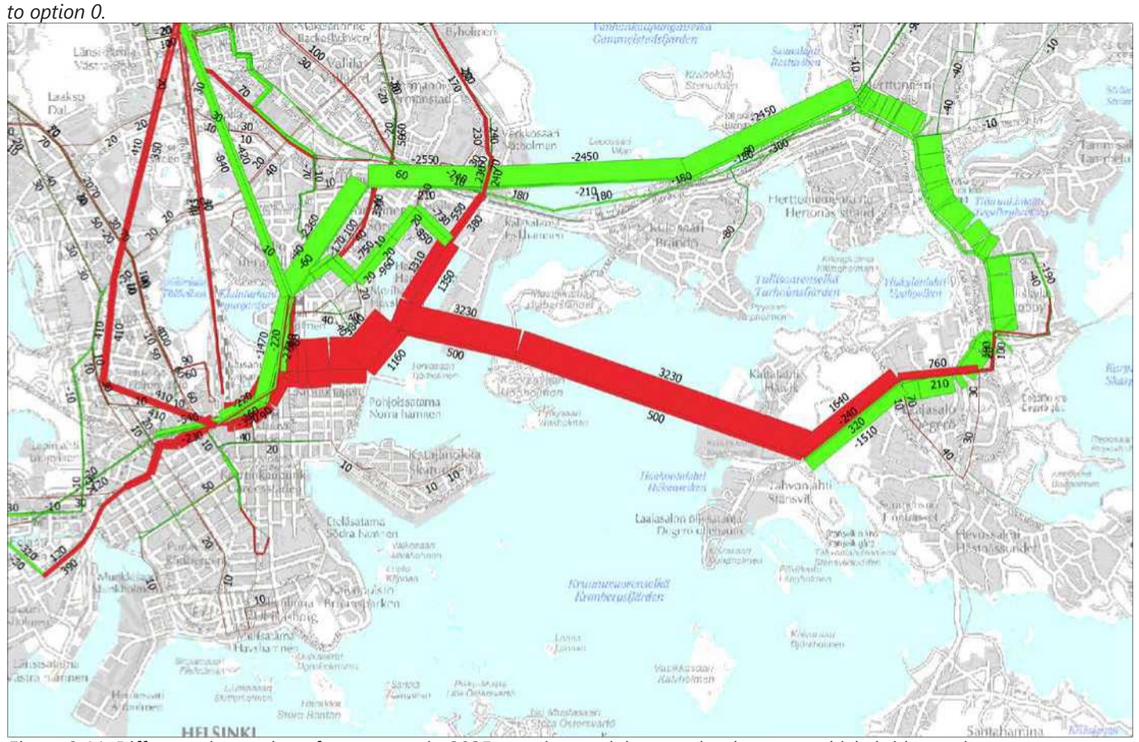


Figure 9.11. Difference in number of passengers in 2035 morning peak hour under the tram-vehicle bridge option compared to option 0.

Traffic volumes

The bridge between the Broadband and Herttoniemi will exceed approximately 2 500 vehicles in the morning peak hour in 2035 in the direction of congestion, according to forecasts. 4 350 vehicles in the morning peak hour (*Figure 9.12) are driven towards the centre on the bridge of the blossary.*

The tram option will reduce the number of cars congested on the Kulosaar Bridge in more than 150 aa-hour hours. The bridge between the ladder and Herttoniemi is 330 fewer vehicles *(Figure 9.13)*.

The metro option will reduce the number of cars running in the congested direction of the Kulosaar Bridge by more than 130 morning falls. On the bridge between the ladder andHerttoniemi kul 370 fewer vehicles *(Figure 9.14)*.

In the case of the Köysway option, the number of cars passing through the Kulosaaari Bridge will be reduced by more than 50 morning peak hours. The bridge between the ladder and Herttoniemi is less than 200 vehicles *(Figure 9.16)*.

The brush ferry option will reduce the number of cars passing through the Kulosaar Bridge in more than 10 morning peak hours. The bridge between the ladder and Herttoniemi is less than 60 vehicles *(Figure 9.15)*.

Under the rail-vehicle bridge option,the number of peak openings on the KulosaIsland bridge is about 330 morning peak hours. The bridge between the Broadband and Herttoniemi has less than 800 vehicles. There will be a decline in the number of mobile vehicleson the Rantat road between 200 and 450 vehicles in their direction. Under the option, the Sompa Island street network consists of a through-link fromthe lake Ka to Kruunhaka. The number of vehicles in the connection increases by 700-800 vehicles in their direction per hour of shredder threat. Traffic on the Hermann coastline is increasing by 200-320 vehicles in their direction. There are less than 1 200 vehicles entering the crunch in the direction of congestion. Option Limaises on-the Kruununha road network traffic volumes of up to 400 vehicles on the most congested connections. The option does not include four entries forthe Linnary lantern, which means that the traffic volume on the runway increases by 100-340 vehiclesper hour of *shredder (Figure 9.17)*.

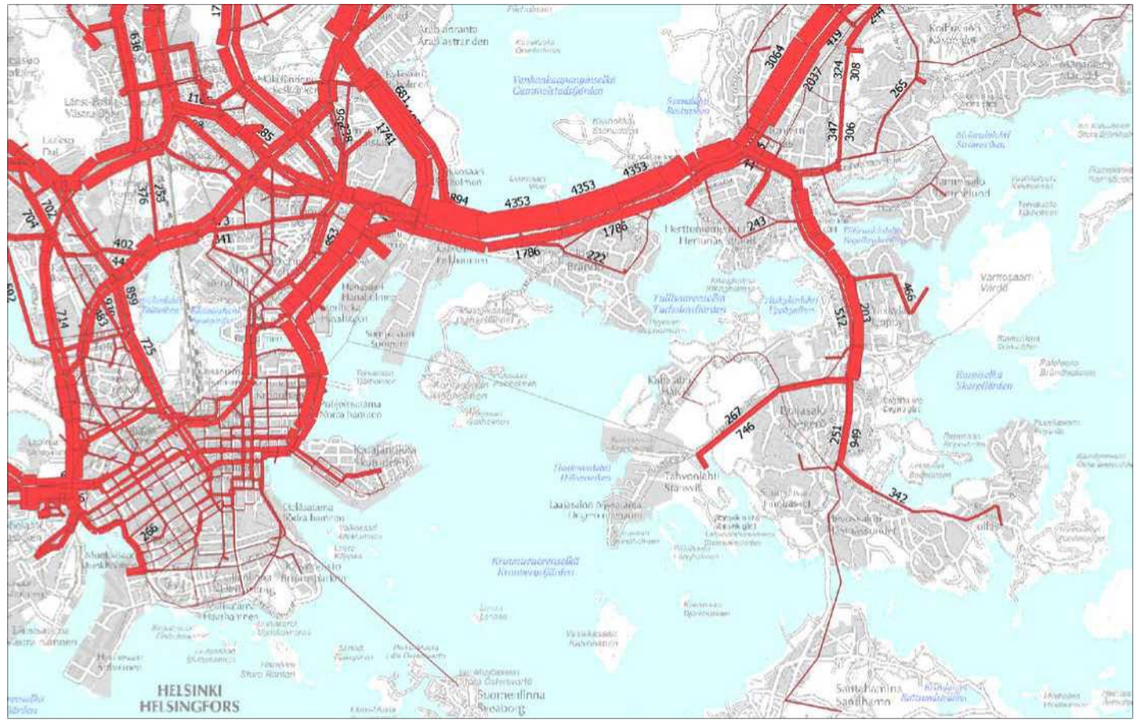


Figure 9.12. Traffic in 2035 morning peak hour under option VE 0.

Vehicle per hour (AHT)

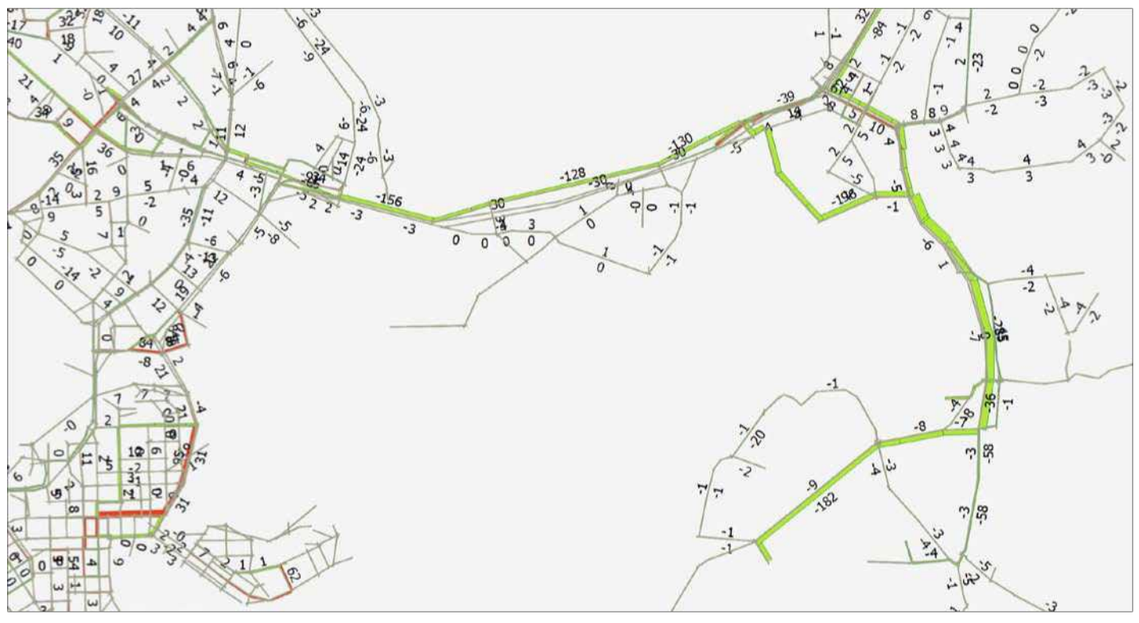


Figure 9.13. Difference in traffic volume in 2035 morning peak hour under the tram-hour option compared to option 0.

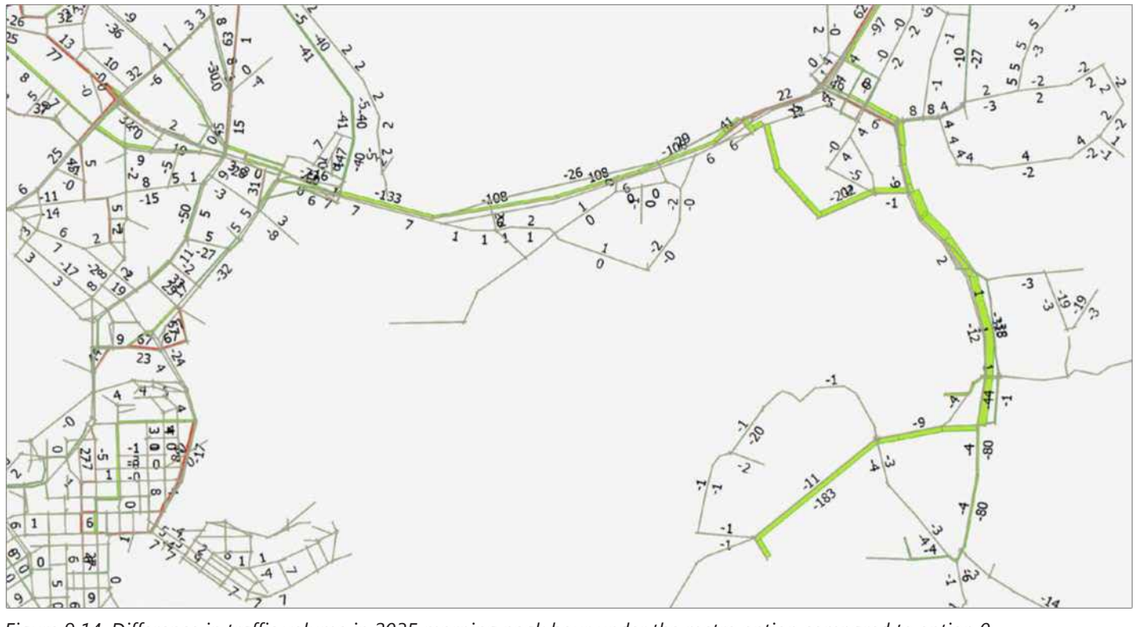


Figure 9.14. Difference in traffic volume in 2035 morning peak hour under the metro option compared to option 0.

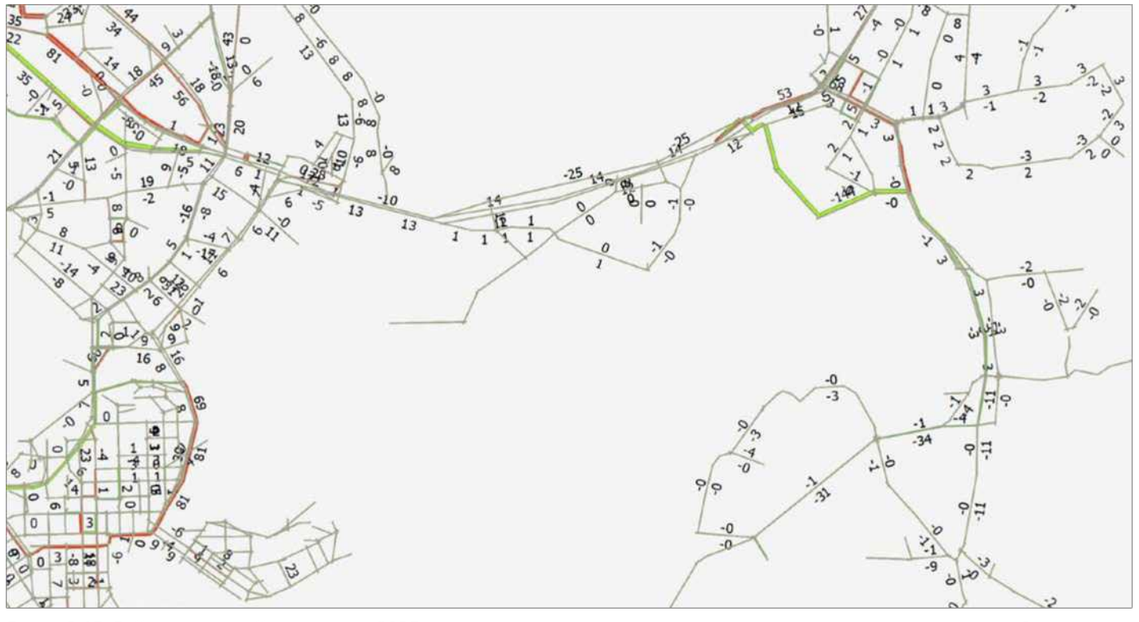


Figure 9.15. Difference in traffic volume in 2035 morning peak hour under the bus bridge option compared to option 0.

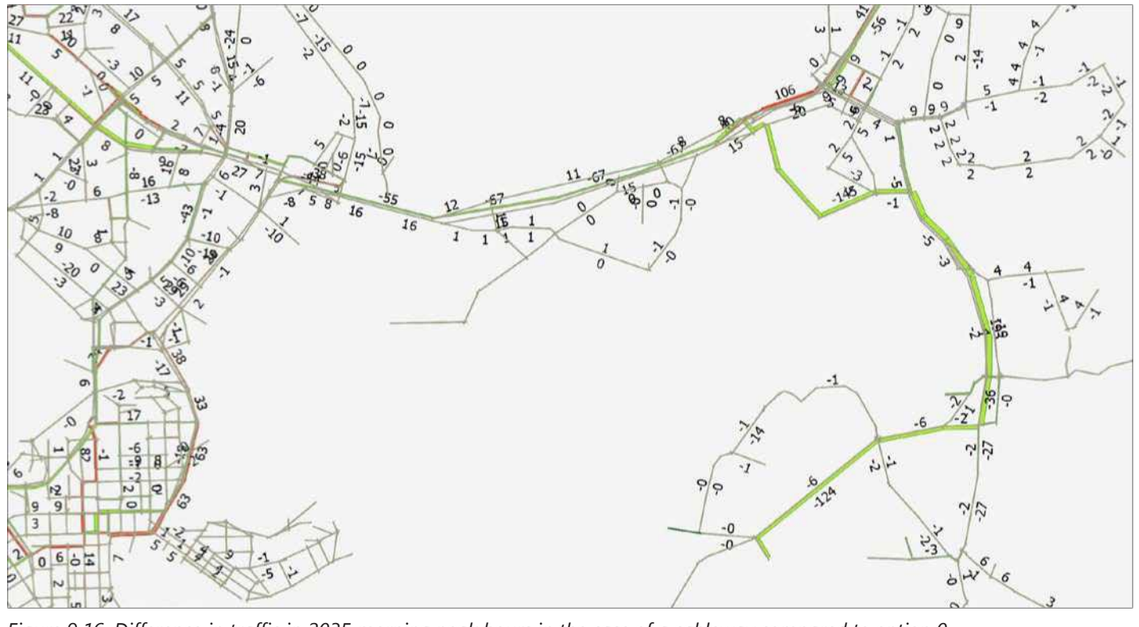


Figure 9.16. Difference in traffic in 2035 morning peak hours in the case of a cableway compared to option 0.

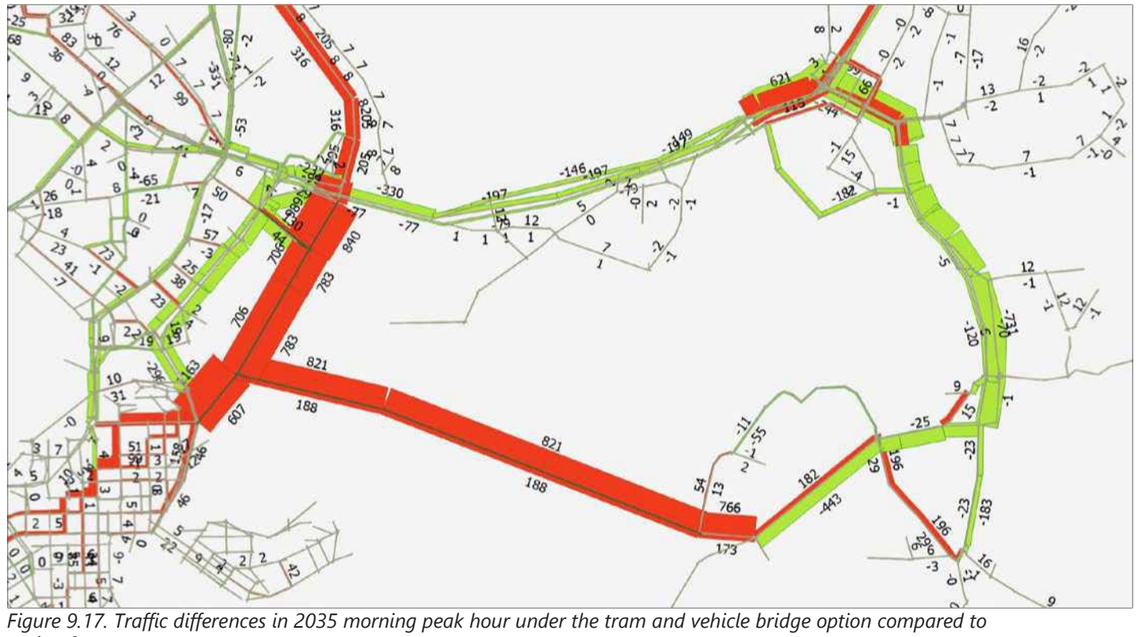


Figure 9.17. Traffic differences in 2035 morning peak hour under the tram and vehicle bridge option compared to option 0.

9.2.4 Public transport routes in the lagoon

In the baseline, the morning peak morning trips of the Laajasalo are mostly directed towards the centre. Of the approximately 3 500 journeys over the Bridge of the Bridge, less than 2 500 journeys are made on a metro to the centre and about 400 journeys towards the East Centre. The bus travels around 300 passengers to the centre *(Figure 9.18)*.

Under the tram option, almost all public journeys to the metropolitan area (3 500) are carried out by means of a tram. There are 150 metro passengers on the Kulosaari Bridge towards the centre and 340 towards the East Centre. Tram is used to continue 650 journeys from the Broadbasin towards the fishing port, of which approximately 500 passengers will continue towards Pasila *(Figure 9.19)*.

Under the Metro option, the majority of incoming public-transport trips to the metro town (3 300) will take place on the new metro line. There are 280 metro passengers on the Kulosaari Bridge towards the centre and 340 passengers travelling to the Eastern Centre. Almost 600 passengers continue on the droplet in the direction of Pasila *(Figure 9.20)*.

Under the bus ferry option, far less than half ofthe public transport journeys to threshing are carried out by bus ferry with over 1 100 passengers. There are1 500 metro passengers per centre and 240 passengers on buses. There are 400 trips in the East Centre. The droplet in the direction of Pasila continues 350 passengers *(Kuva 9.21)*.

In the case of a cableway, more than half of the public journeys to the metropolitan area (1 650) are carried out by cableways. There are 1 300 met-ro passengers, 200 bus passengers and 380 passengers towards the centre on the Kulosaari Bridge towards the centre. On the droplet in the direction of Pasila,then take more than 600 passengers *(Figure 9.22)*.

Under the rail-vehicle bridging option,all public transport trips to the metropolitan area (3 200) are carried out by tram. There are 150 metro passengers on the Kulosa Island bridge towards the centre, 330 in the eastern direction. Tram from the Broadhouse to continuewith 600 passengers from Kalasata in the direction of the man, of which approximately 400 passengers travel andcontinue towards Pasila *(Figure 9.23)*.

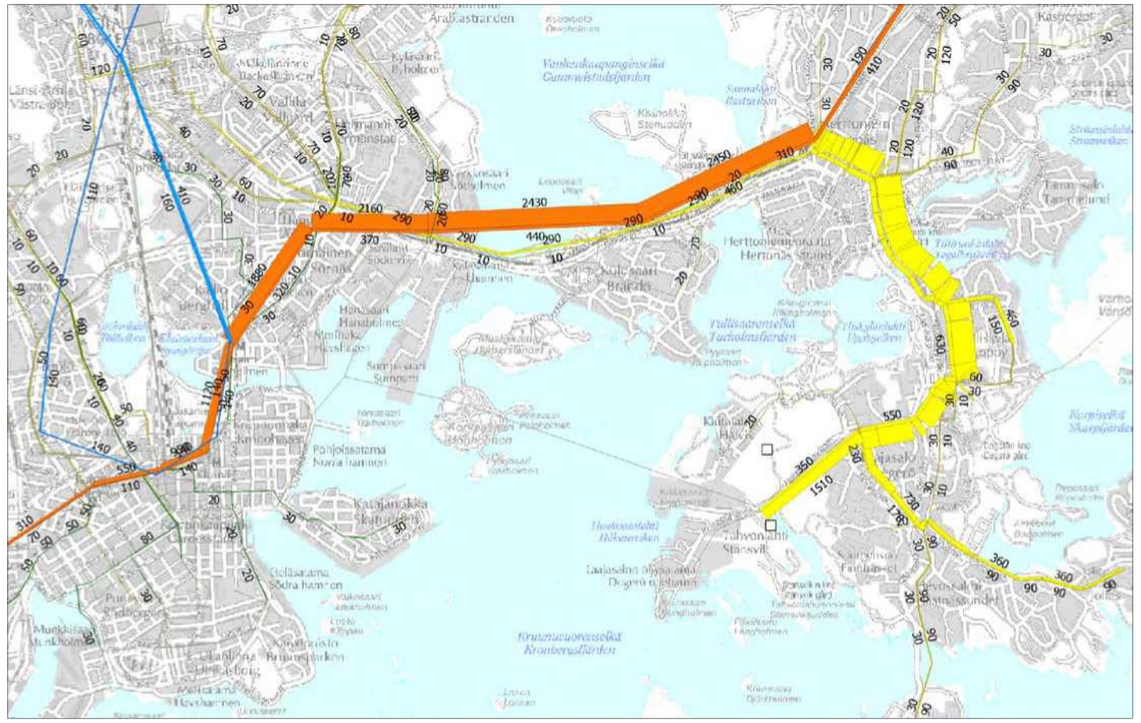


Figure 9.18. Large-scale public transport routes in 2035 for morning peak hours under option VE 0.

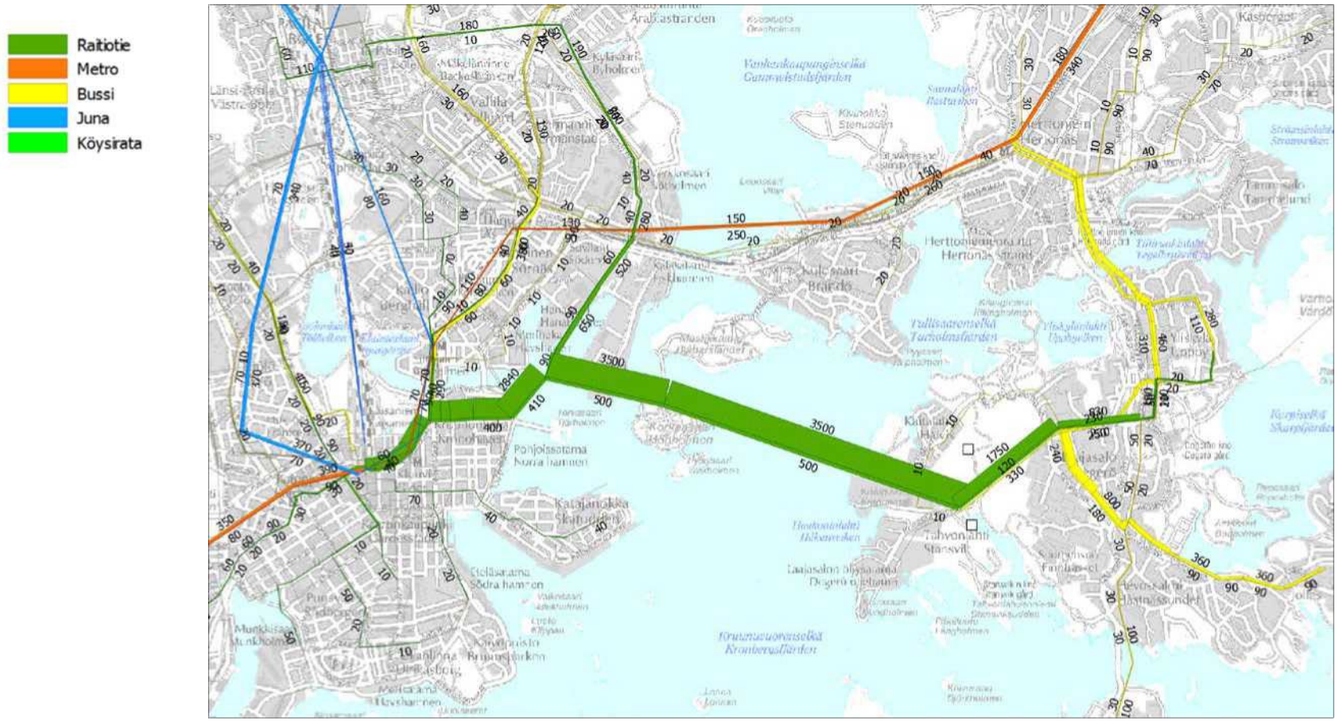


Figure 9.19. Large-scale public transport routes in 2035 morning peak hour under tram.

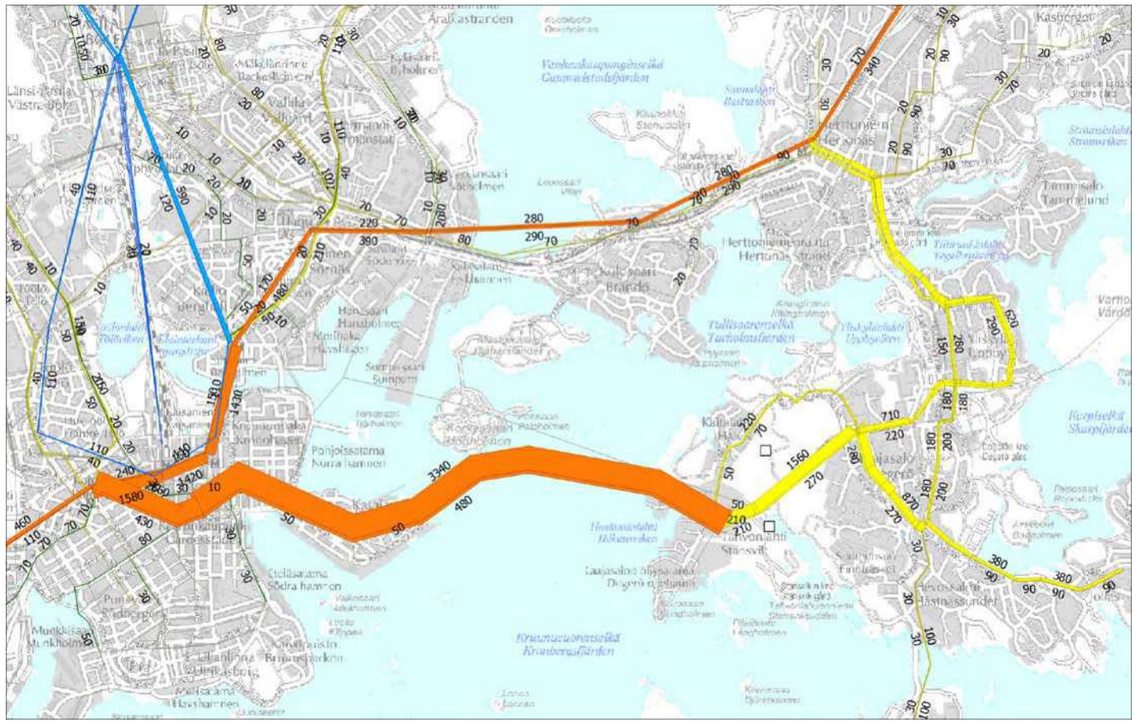


Figure 9.20. Large-scale public transport routes in 2035 morning peak hours under the metro option.

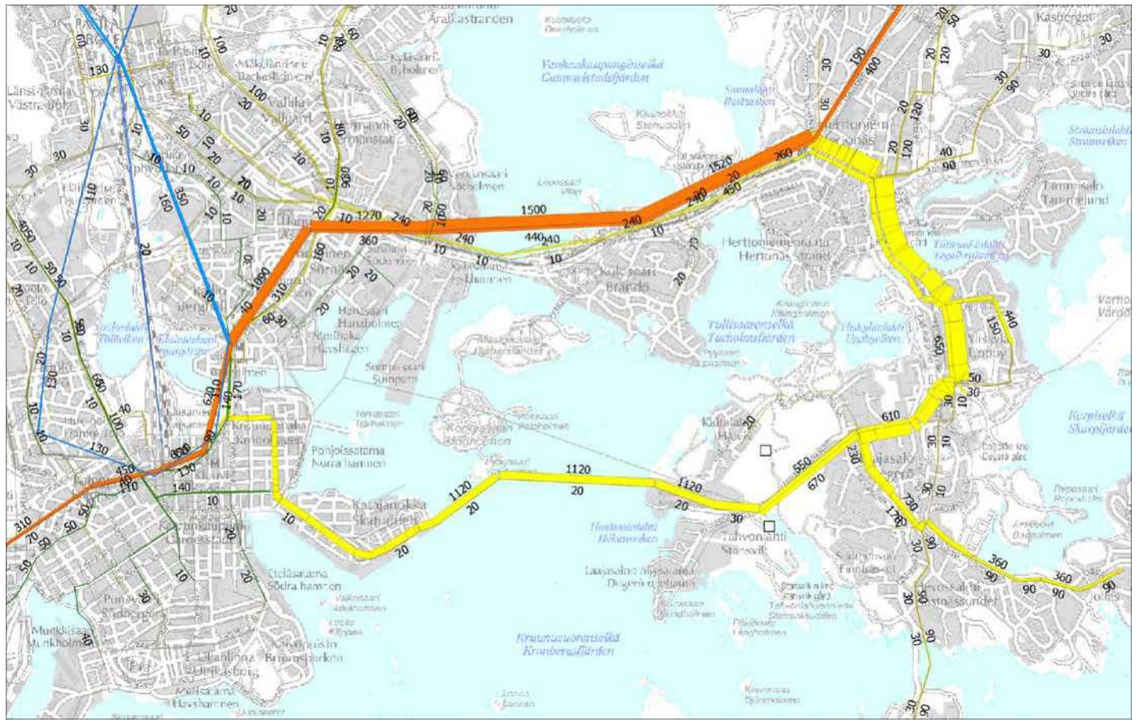


Figure 9.21. Large-scale public transport routes in 2035 morning peak hours under the option of bus bridge.

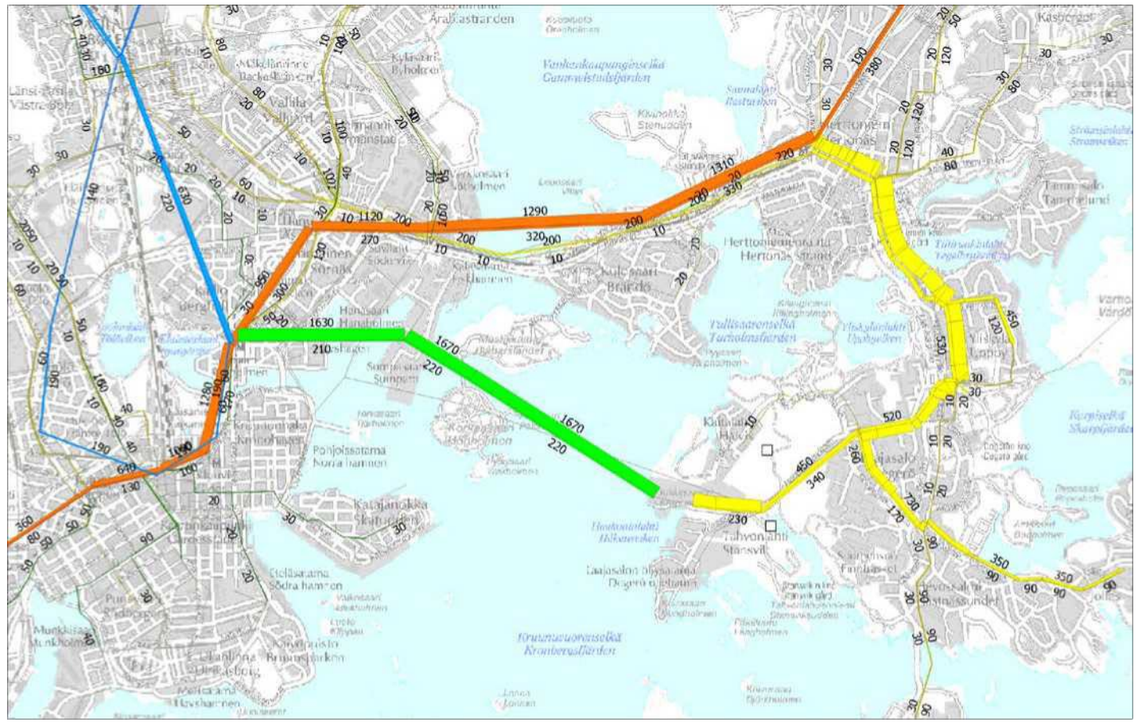


Figure 9.22. Long-distance public transport routes in 2035 morning peak hours with a cableway.

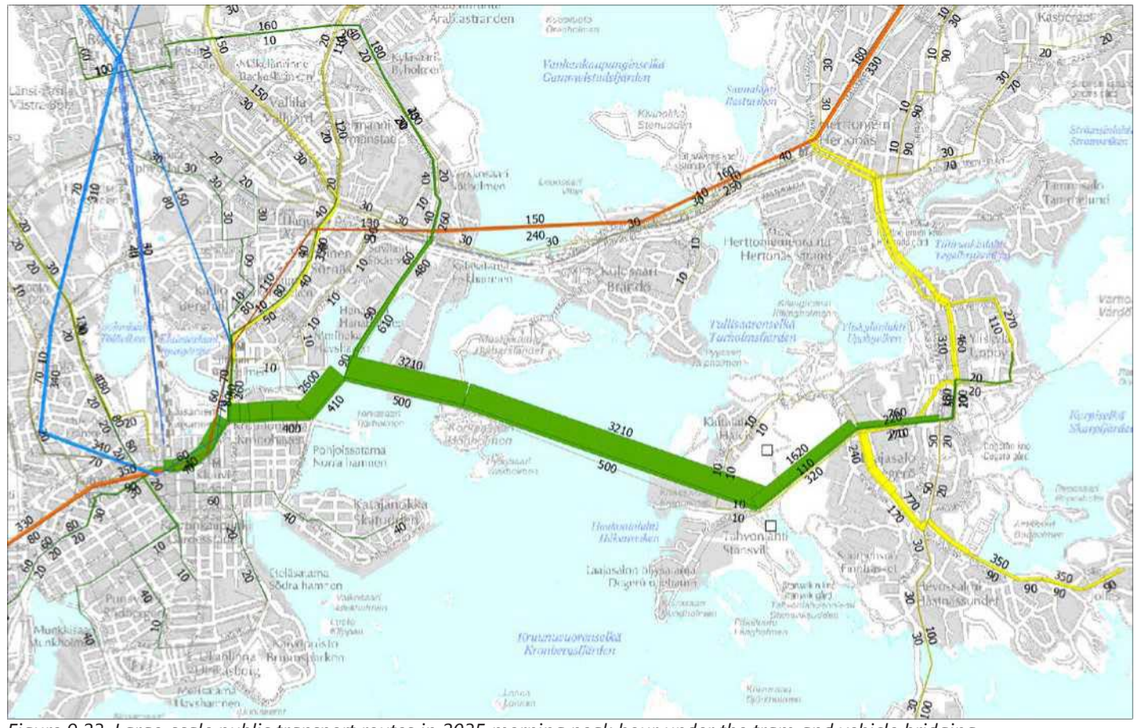


Figure 9.23. Large-scale public transport routes in 2035 morning peak hour under the tram and vehicle bridging option.

9.2.5 Changes in the direction of public transport journeys in the lagoon

The number of trips from the Broadband to other regions was analysed by comparing the benchmark exchange and the baseline option. As a result, it will be seen to which areas the number of public transport journeys is increasing.

The tram option increases the amount of publictransport journeys, in particular to Kruunhaka and Kaisaniemi *(Figure 9.24)*, as well as to the fishing port, the Routh Bay, the Waste Island andPa Sila. There will be a slight decrease in the number of commuter journeys in the Herttoniemi region.

The Metro option increases the number of public transport journeys, in particular in the Kaisaniemi, Kamp and otherCore Centres, as well as in the *Yetkäsaari (Figure 9.25)*. There will be a slight decrease in the number of trips in the Herttoniemi region.

The Buss ferry option increases the tailor-madeuse of public transport journeys, in particular in Katajanoka and, to a limited extent, in the eastern parts of *Kruununha (Figure 9.26)*.

The Köysway option increases the use of public transport in Ruoholahti and *Kaisaniemi (Figure 9.27)*.

The rail and vehicle bridge option increases the number of public transport journeys, in particular to Kaisaniemi and Kruununhaka, the fishing port and the *Take Islands (Figure 9.28)*. There is also a general increase in the number of journeys inthe Punga, including Pasila. There will be a slight decrease in the number of commuter journeys in the Herttoniemi region.

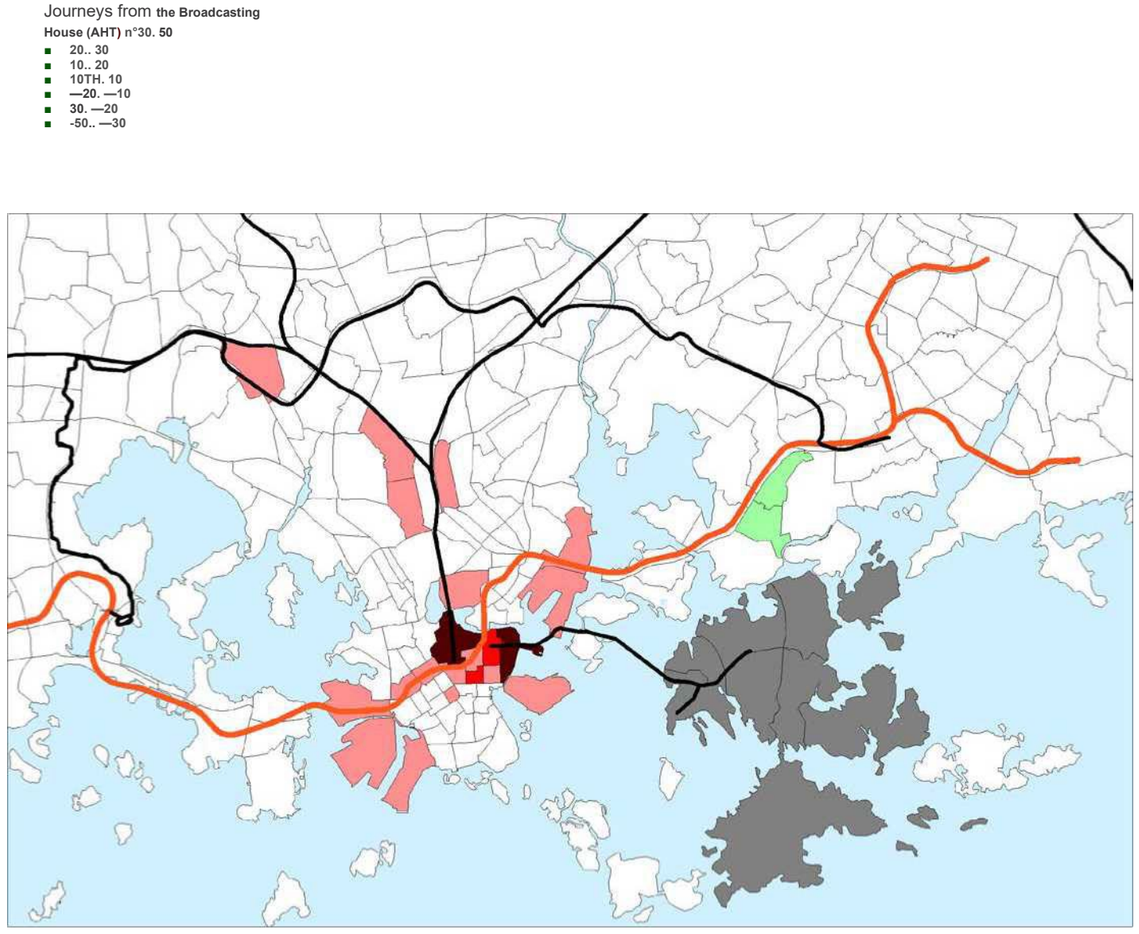


Figure 9.24. Change in the number of round trips in 2035 for the morning peak hour in the case of tramways compared to option 0.

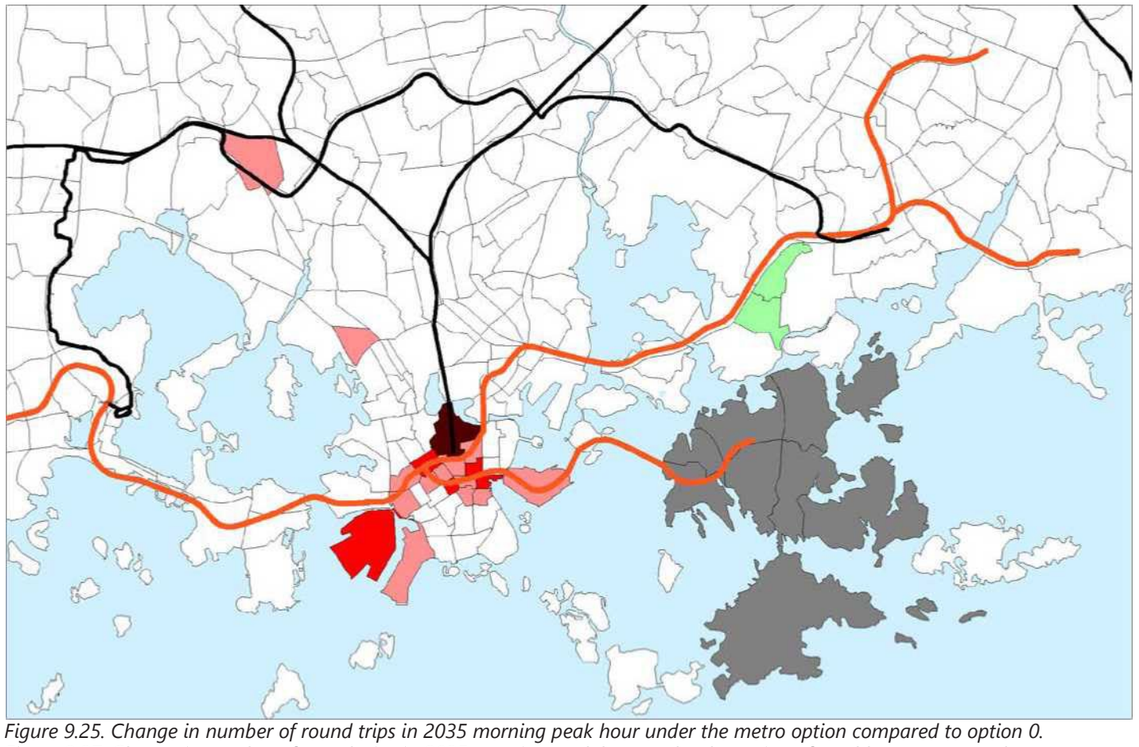


Figure 9.25. Change in number of round trips in 2035 morning peak hour under the metro option compared to option 0.

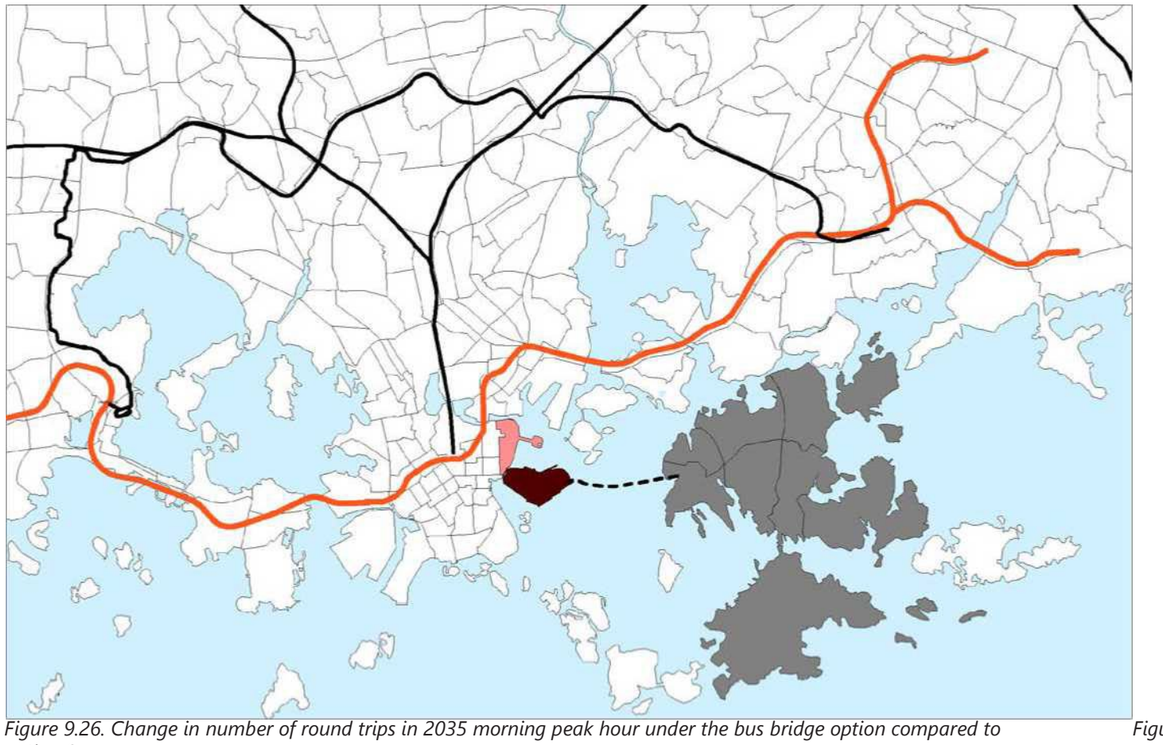


Figure 9.26. Change in number of round trips in 2035 morning peak hour under the bus bridge option compared to option 0.

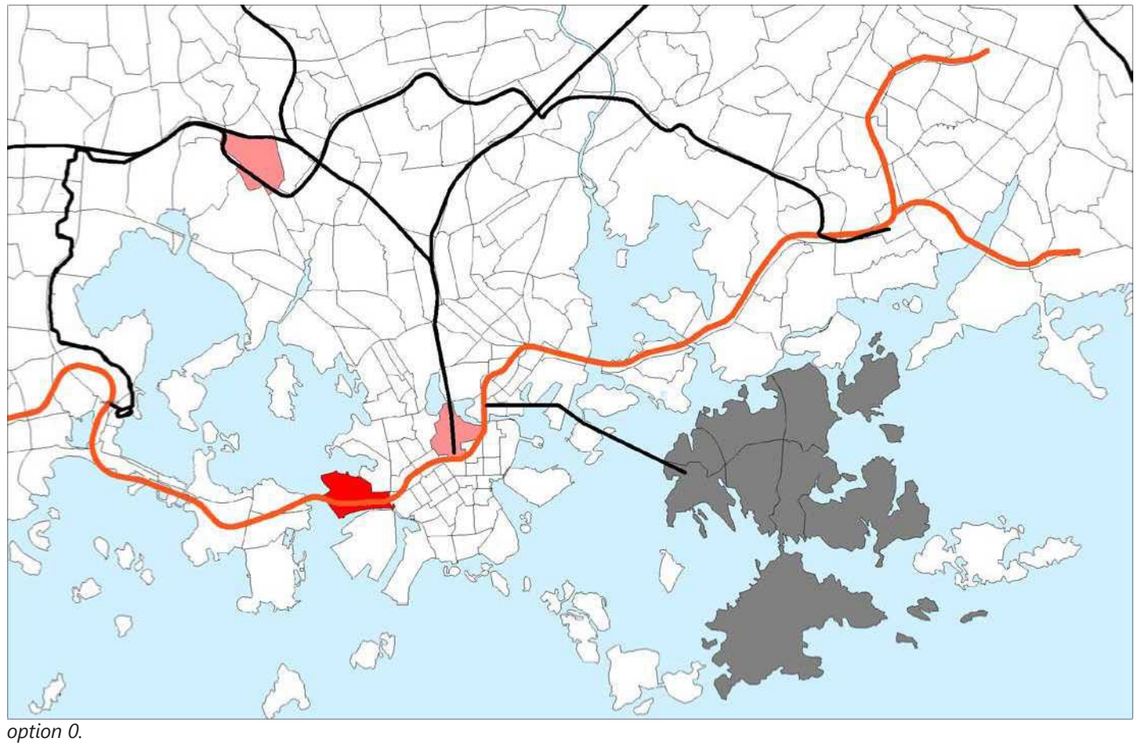


Figure 9.27. Change in number of round trips in 2035 morning peak hour under the option of a cableway compared to option 0.

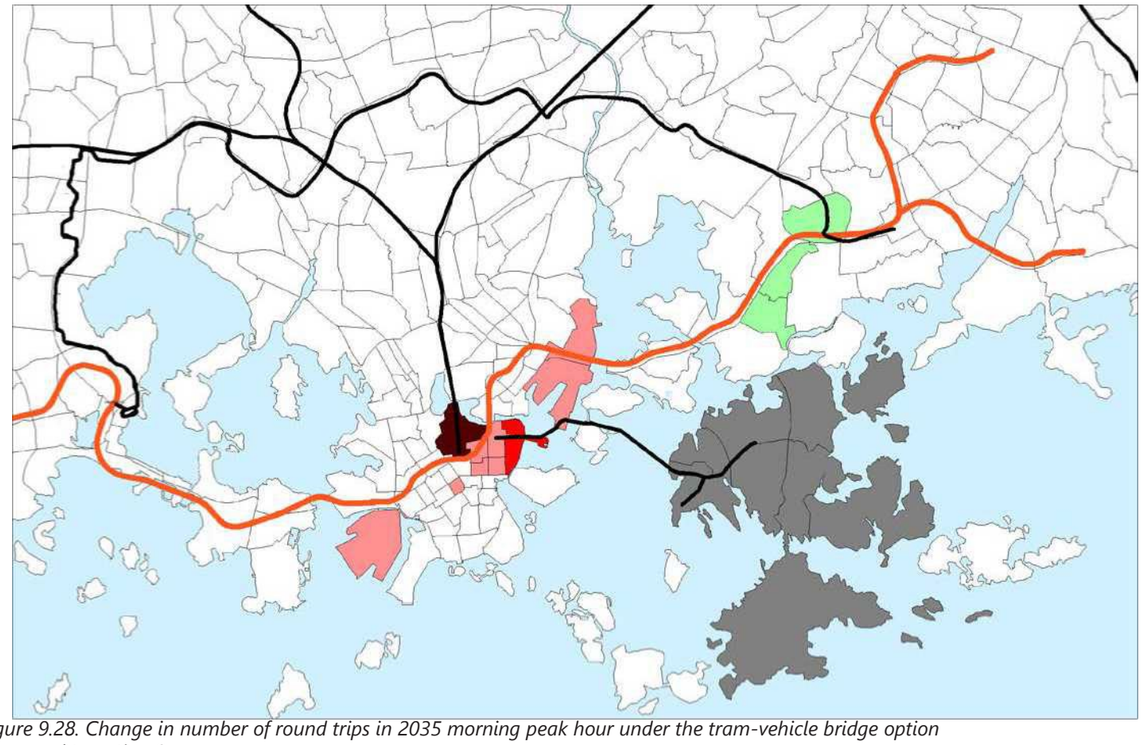


Figure 9.28. Change in number of round trips in 2035 morning peak hour under the tram-vehicle bridge option compared to option 0.

9.2.6 Changes in mode of transport

Changes in the mode of transport reflect well the changesin travel caused by the mass movement system. A faster public transport connection attracts moretravellers.

The tram option increases the unsafe use of public transport inthe western part of the *Laajasavo (Figure 9.29)*. The proportionof field use is also increasing in Kruunhaa. Earlier changesare taking place in the area of the Isle of Wetkäsaari andthe proportion of public transport users in one city of Kaart would decrease somewhat.

The Metro option increases the use of public transportin the western part of Laajasalo and increases its use in the eastern part of *Laajasalo (Figure 9.30)*. There will be no customary changes in the calf city.

The bus ferry option slightly increases the use of public transport in thewestern part of Laajasalo and *Katajanoka (Figure 9.31)*. There will be no change of way in the herd city. On the basis ofmodel reviews, the proportion of public transport users in the city of tin would decrease somewhat.

The Köysway option increases the use of public transport in the westernpart of the LAA. In the city of Kaart, the share of public transport users would decrease somewhat on the basis of *model reviews (Figure 9.32)*.

The rail-vehicle bridging option will slightly increase the use of public transport in the western part of Laajasalo and in the West Island. In Kruunha, the share of public transport users is increasing. The share of public transport users in the southern parts of the metropolitan city, Ruo-Helsinki, Sörnäis, Keilaniemi, eastern parts of Laajasalo and East Helsinki will decrease somewhat *(Figure 9.33)*.

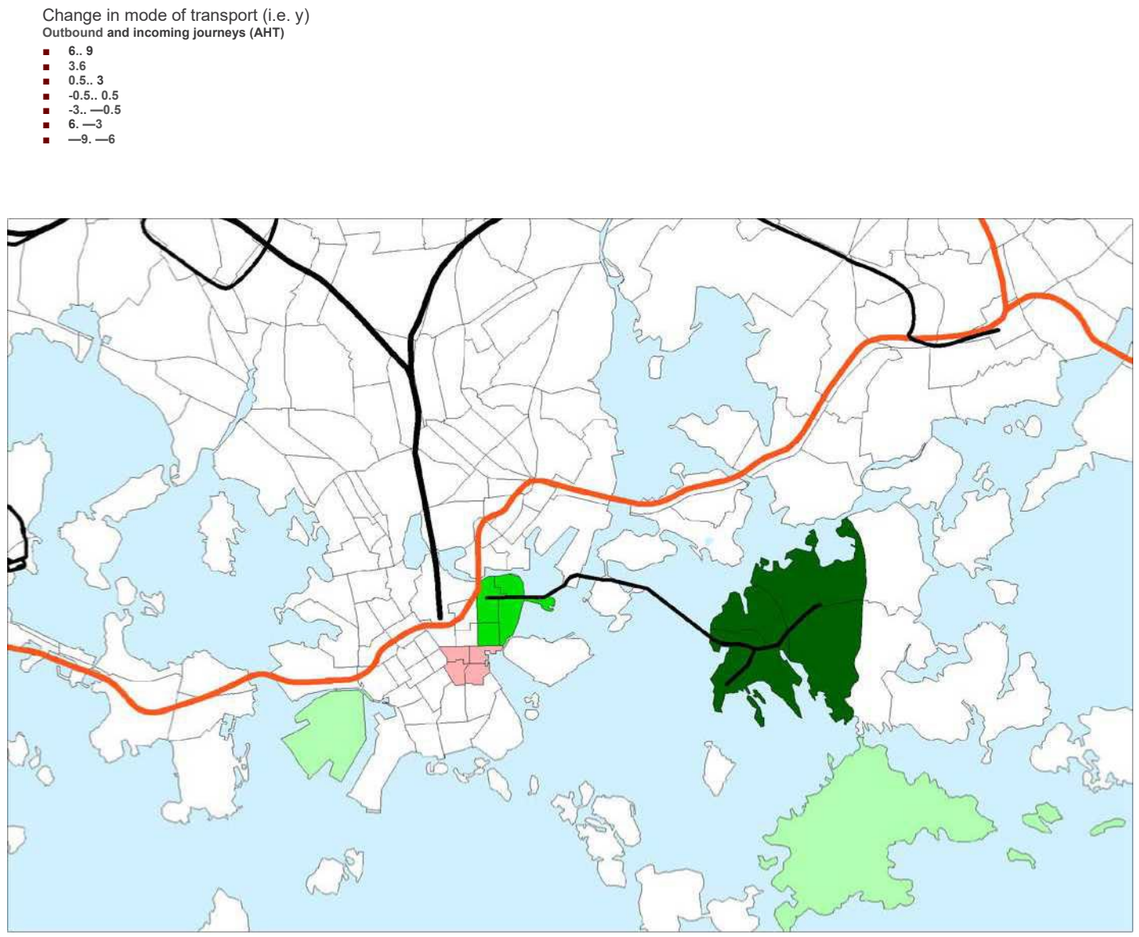


Figure 9.29. Change in percentage points in 2035 morning peak hour for tramways compared to option 0.

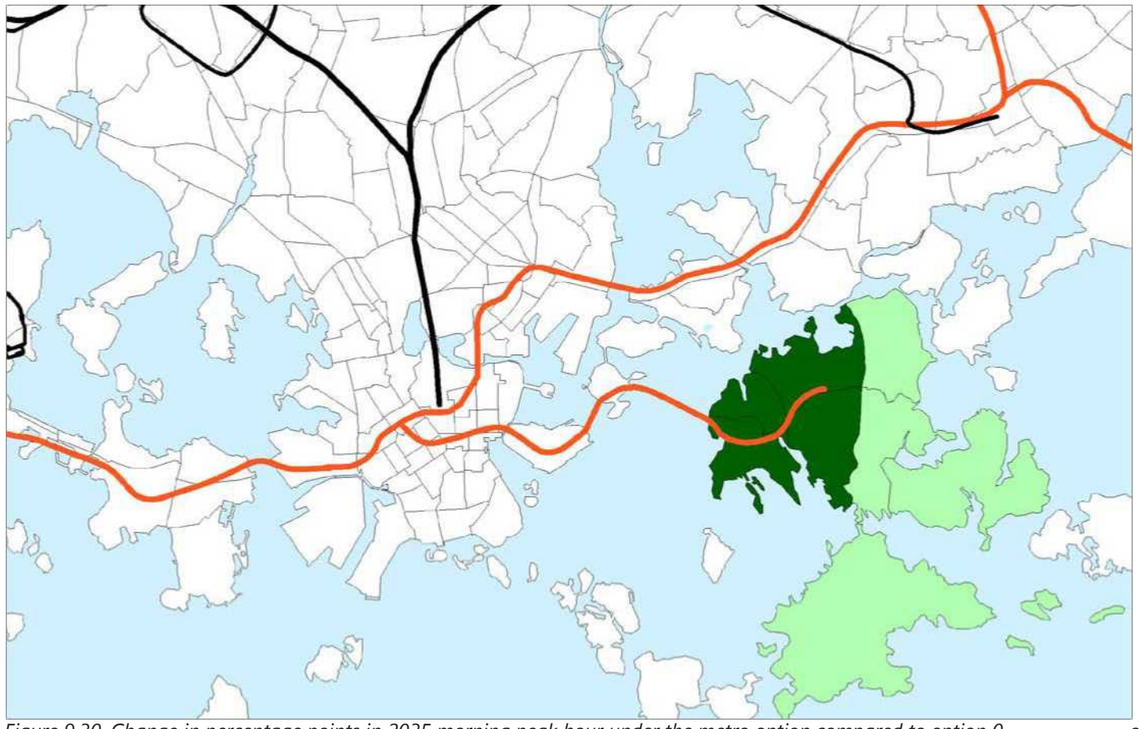


Figure 9.30. Change in percentage points in 2035 morning peak hour under the metro option compared to option 0.

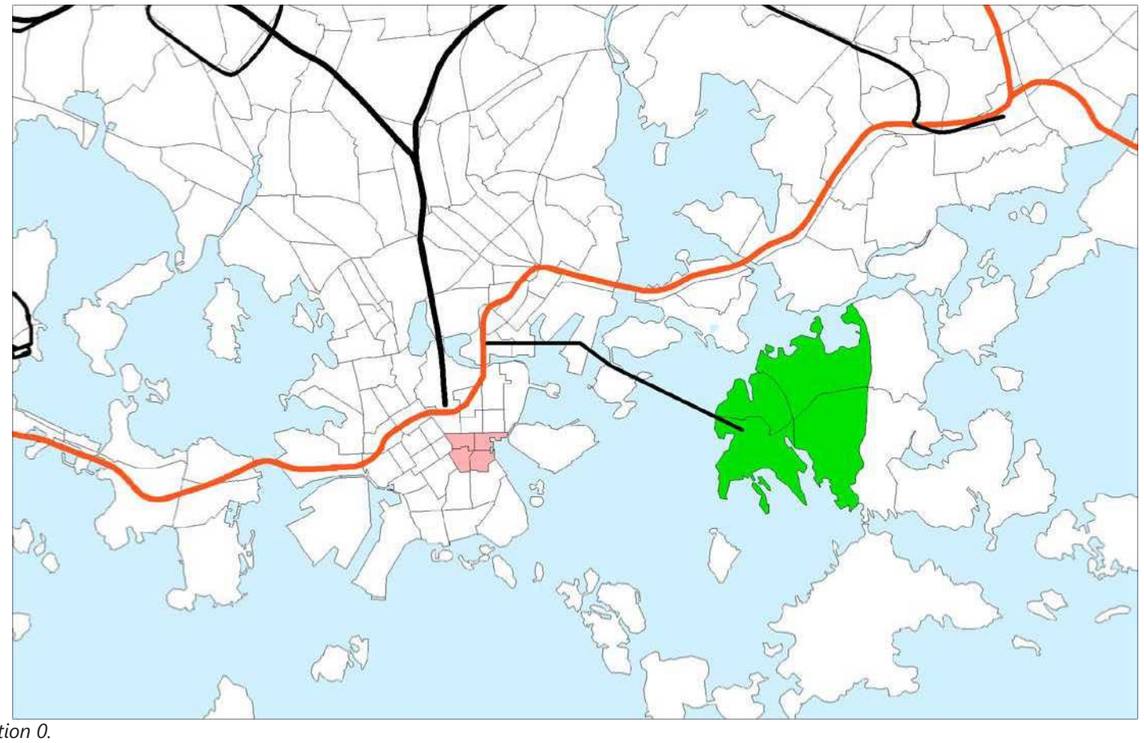


Figure 9.32. Change in percentage points in 2035 for the morning peak hour under the option of a cableway compared to option 0.

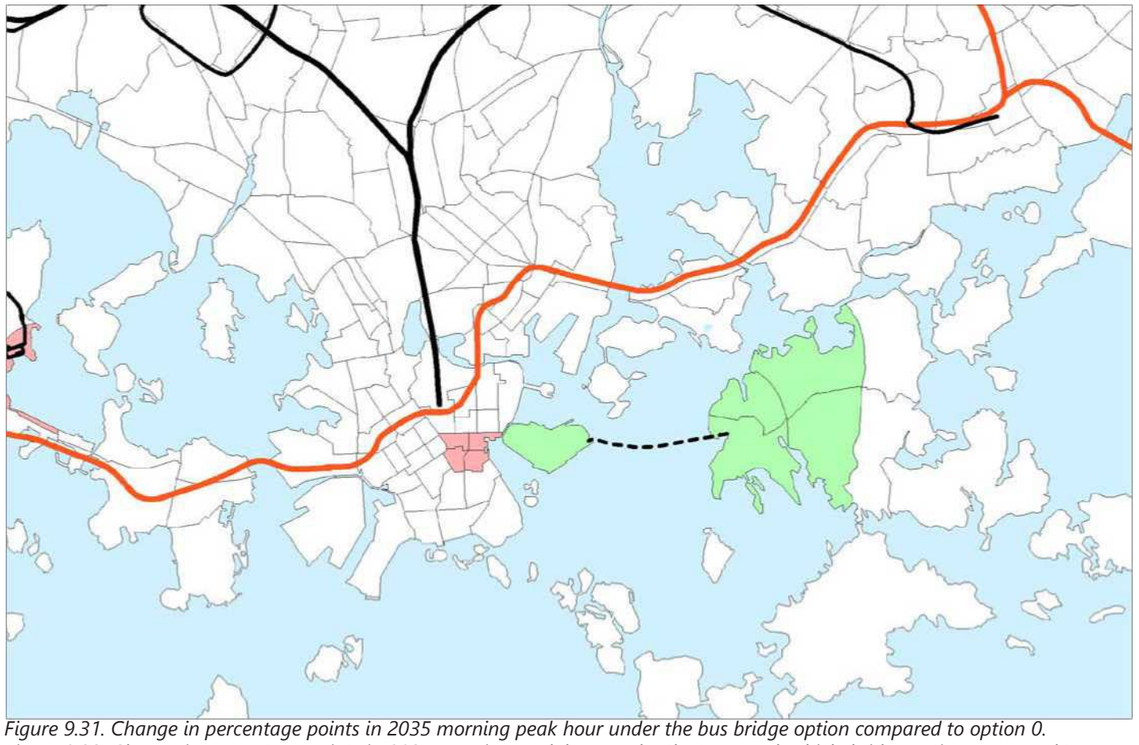


Figure 9.31. Change in percentage points in 2035 morning peak hour under the bus bridge option compared to option 0.

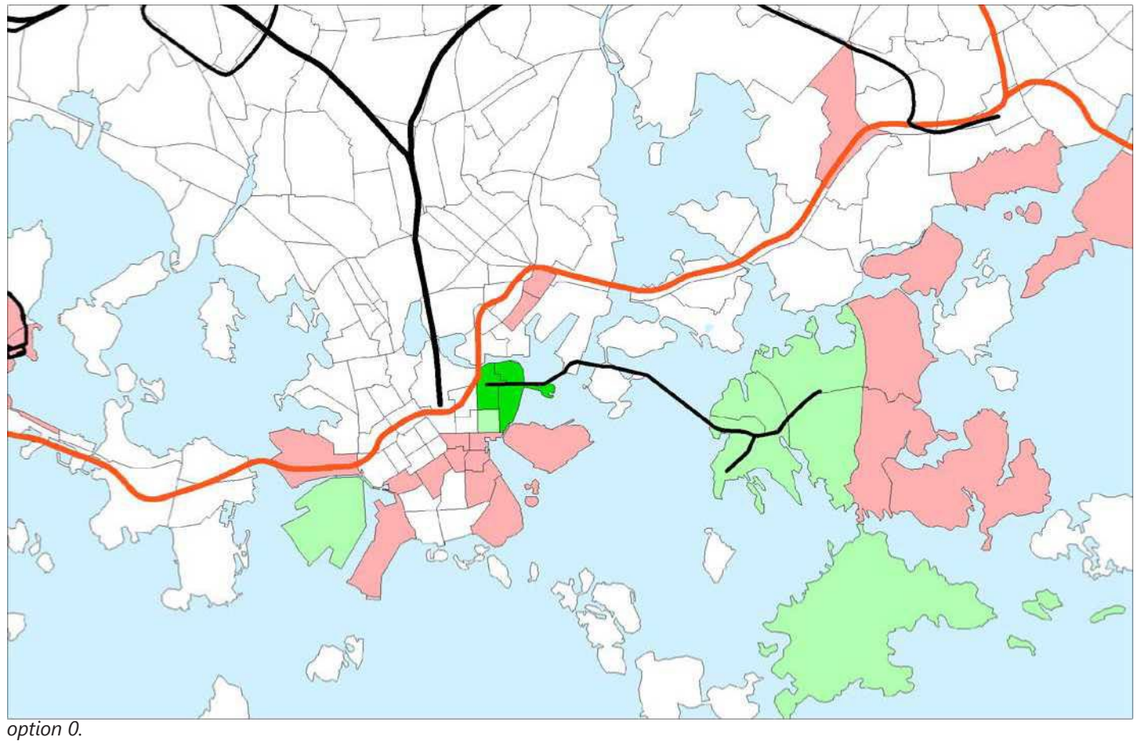


Figure 9.33. Change in percentage points in 2035 morning peak hour under the tram and vehicle bridge option compared to option 0.

9.2.7 Accessibility assessments

The accessibility created by the different systems has been-examined in this paragraph. The analysis has been carried out by calculating thevalues of the wetability for journeys departing fromthe Kruunu Mountain. The accessibility figure is based on weighted public transport travel time. The different components of the round trip (walking, waiting, equipment features and on-board time) have been weighted according to the perceived difficulty of the parts of the journey. The accessibility figure is the weighted sum of these components. Weights have been used in accordance with thelayout model with weights. The accessibility figure is also known as a travel help.

In baseline VE 0 *(Figure 9.34)*, public transport can be seen-from the area of Kruunu Mountainta marked with an asterisk. A change in accessibility has beenobserved on the slide surface. The darker green area is more smoke-friendly. The tracktraffic tea positions stand out as slightly darker areas of their environment.

The rail wagon option generally improves the accessibility of the main city through collective transport. The biggest improvement is to travel to Sompa Island and *Kruununha (Figure 9.35)*.

The metro option is the most important way of improving the accessibility of themetropolitan city through collective transport. The biggest improvement is in the city of Kaartin and Kamp, but accessibility improves inthe whole area of the *niche (Figure 9.36)*.

The Buss ferry option significantly improves the accessibility of Katajanoka and slightly the western part of *Kruununha (Figure 9.37)*.

The Köysway option will improve Sompa Island's-accessibility through mass transport. There is also a slight improvement in accessibility in Hakaniemi and Pasila

The option of a bridge between tram and vehicle traffic will-generally improve the accessibility of the metropolitan city with amass movement. The biggest improvement is to travel to Sompa Island and *Kruununha (Figure 9.39)*. The accessibility of the option — changes in collective transport are the same as the tram option.

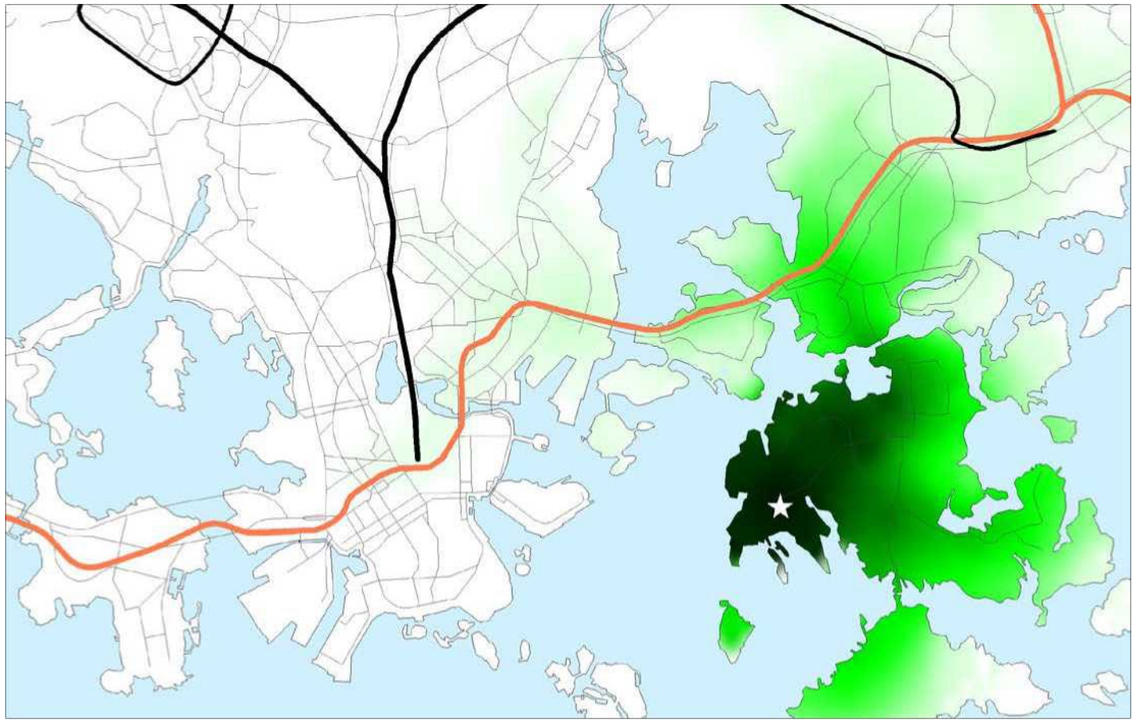


Figure 9.34. Accessibility of different regions for public transport departing from the Cruunu Mountain in 2035 for the morning peak hour under baseline VE 0.

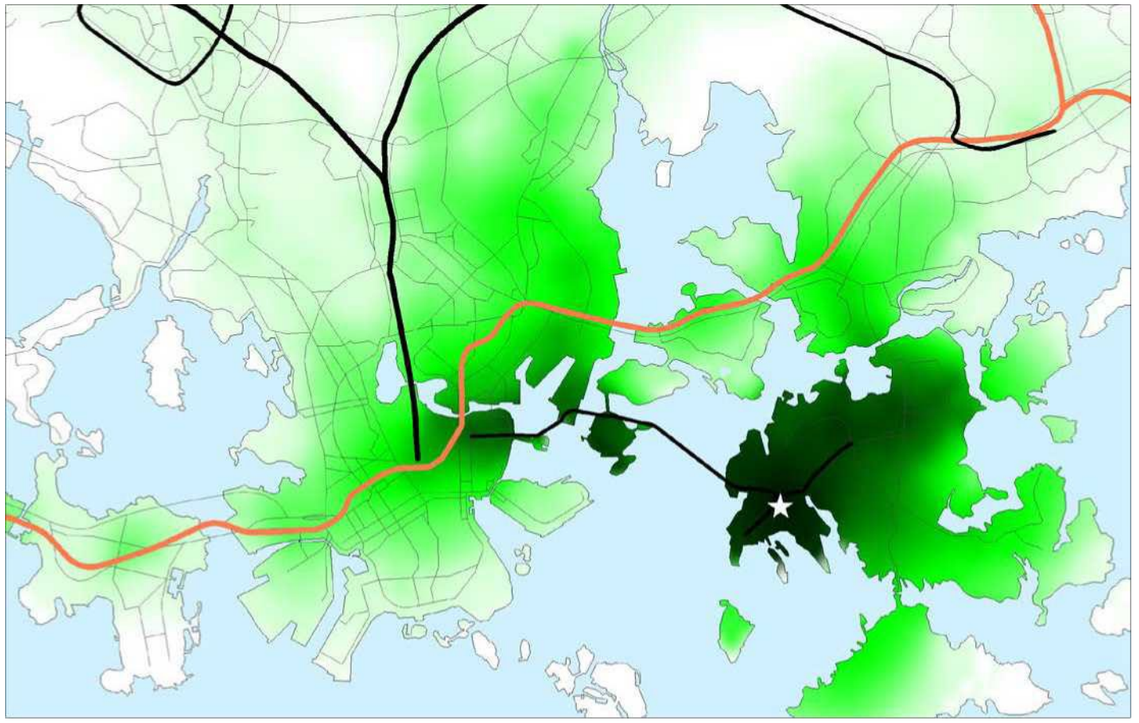


Figure 9.35. Accessibility of different regions for public transport journeys from the Cruunu Mountain in 2035 for the morning peak hour in tram-hours.

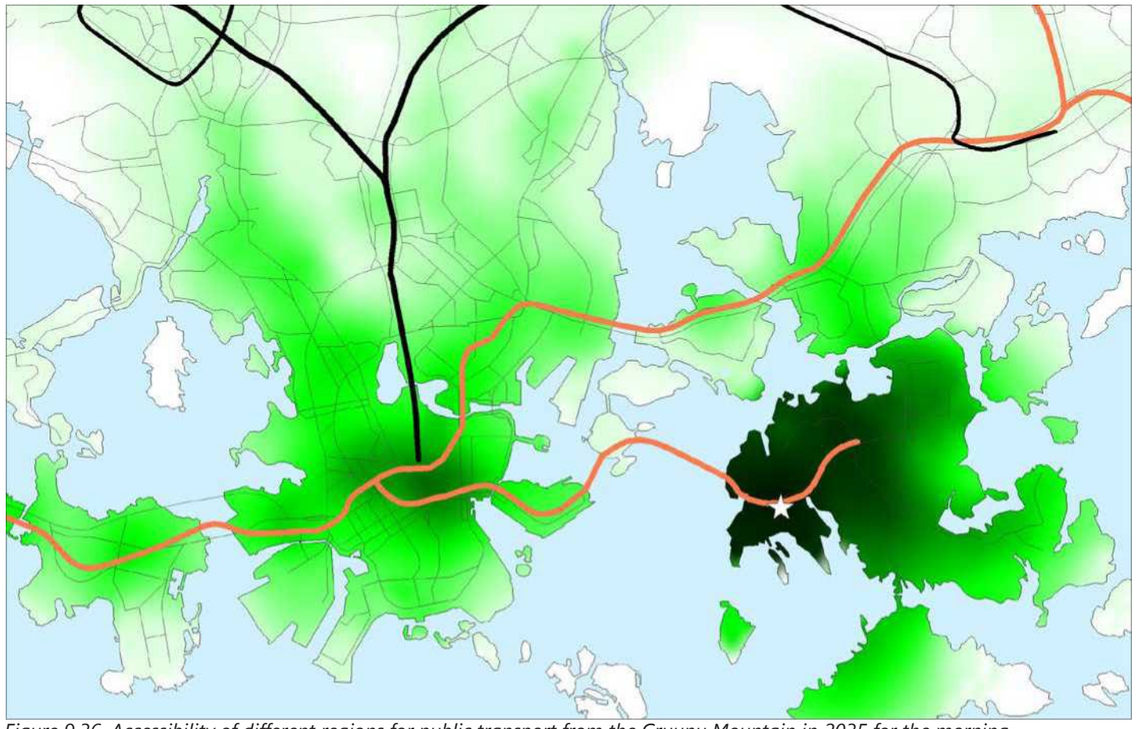


Figure 9.36. Accessibility of different regions for public transport from the Cruunu Mountain in 2035 for the morning peak hour under the metro option.

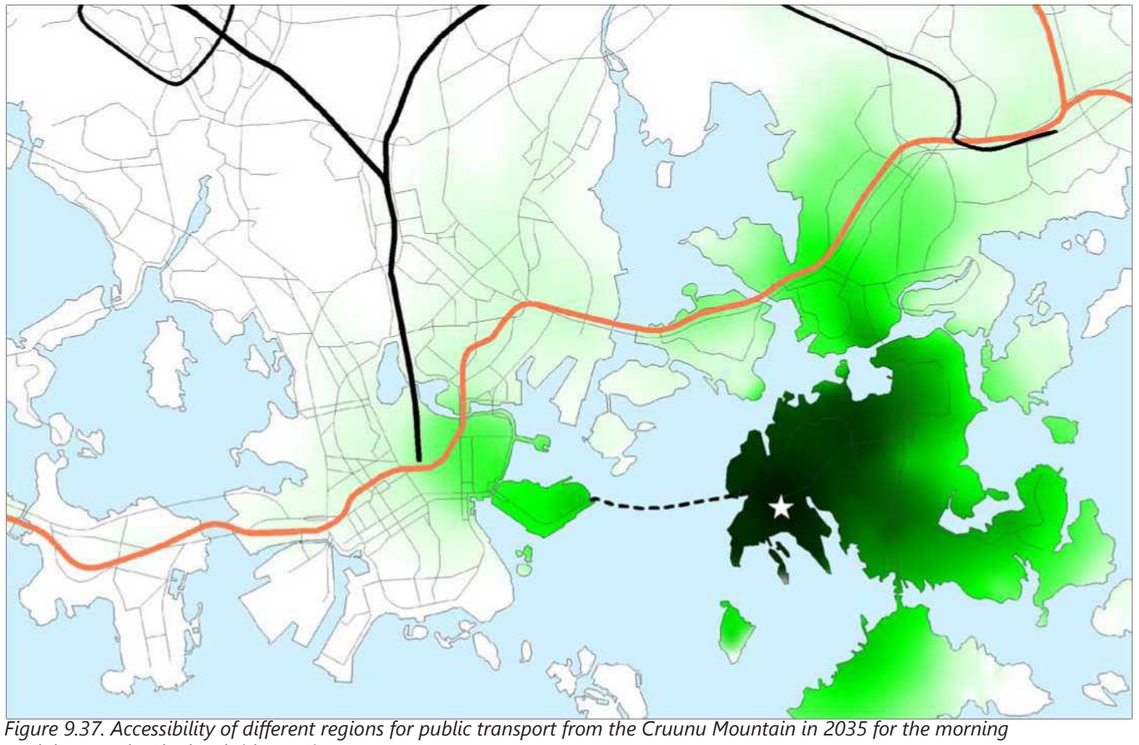


Figure 9.37. Accessibility of different regions for public transport from the Cruunu Mountain in 2035 for the morning peak hour under the bus bridge option.

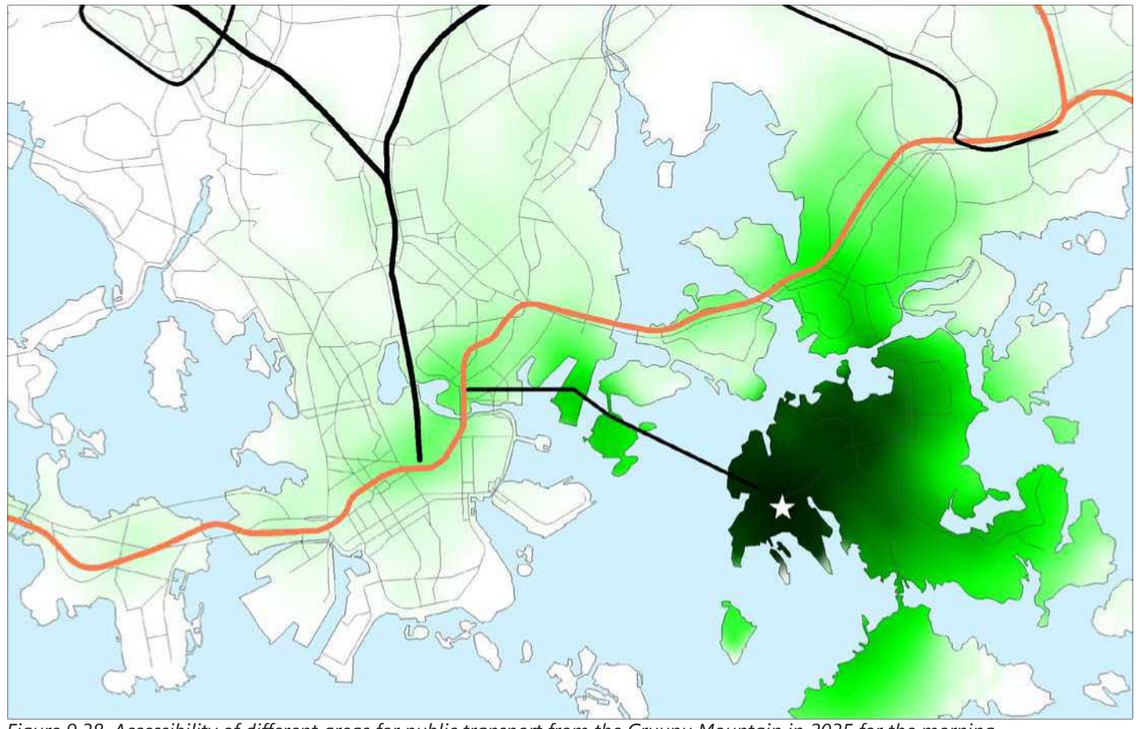


Figure 9.38. Accessibility of different areas for public transport from the Cruunu Mountain in 2035 for the morning peak hour in the cableway option.

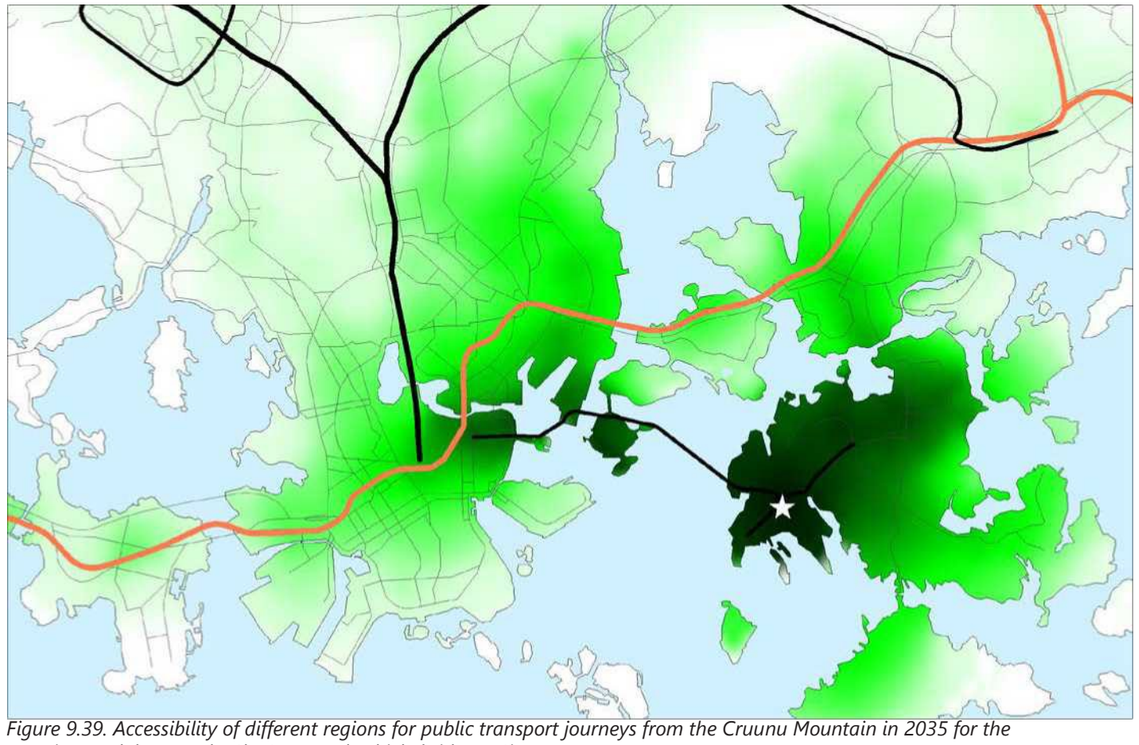


Figure 9.39. Accessibility of different regions for public transport journeys from the Cruunu Mountain in 2035 for the morning peak hour under the tram and vehicle bridge option.

9.2.8 Fitness Checks of the Vehicle Bridge Option

The functionality studies looked at the morbidityof vehicle traffic in the areas of the Kruunu shark, Herttoniemi and the fishing port, which werepreviously assessed as critical in the tram and vehicle bridges.

The performance reviews assessed the performance of the interface considered during the peak hours in the morning comparedto condition 0. The traffic figures in the situation under review are based on the traffic forecasts for 2035.

An adequate level of service can be achieved on the junction between the Liisankadu and the northern bank, even though passenger cars are allowed on the Laajasalo Bridge. However, the effects of the vehicle bridge are also reflected in other connections to Kruunha and may require tampering with laneand access arrangements. On the basis of the traffic forecast, the motor vehicle will shift the traffic-flow from the Union street to the North Bank and theEspla nad during the morning peak hours.

When the fishing port's land use takes place along the-Hermann coast off the centre of the fishing port, theability to navigate the street network is moderately weak due to the scarcity of street space. As a result, traffic from the vehicle bridge to the Hermann stretch makes the fishing port's street network congested. Congestioncontinues throughout the morning peak hours.

In Herttone, traffic at the junction of the Linnan-Bangway will be reduced as part of the traffic using the eastern waterway switches to the vehicle bridge. The vehicle-Bridge option will improve the loading rate of the connection between the eastern fairway and the Linnanrakator highway.

The study assesses the interfaces to be considered mainly on the basis ofthe directional load factor of the connection.

Joining Herttoniemi

The reviews have compared the performance of the junction with the eastern waterway in the forecasting situation (VE 0), where a tunnel for the Lin pine builderhas been built, but no road-eu bridge to Kruunhaka has been implemented and the alternative where the tunnel has not been completed has been implemented but the vehicle bridge has been implemented.

Both of the options studied will reduce the load on the connection between the eastern fairway and the Linnanrakentajantie. The junctionconstruction tunnel improves the load factor of the junction slightly more than the vehicle bridge option. Option VE 8, where the vehicle bridge has been implemented,the connection to the eastern waterway is characterised by an instantaneous queue, but the queue does not largely exceed lane lengths. On the basis of these reviews, the connection will function well/satisfactoryly in the forecasting situation, which hand-held the vehicle bridge without the Tunnel of the Linnan Constructionajants.

Joining a fishing port

The capacity of the transport network of the fishing port is very limited inrelation to the use of land in the area. EIA VE 8 is abridge option for the wide-shelf track alternatives, where the vehicle traffic arriving from the Broadhouse is linked to the fishing port's street network to Hermann's coastal road and to the Trannel. The connectionsbetween the workajankatu and the Leonkatu road of Herma ni are to be carried out as circular connections. On a temporary basis, connections take the form of light-controlled nectar interfaces. In this case, the functionality of the connections will be examined together with the vehicle bridge option when the connection is still light controlled. The conveyance of light-controlled interfaces on Her Mann's coastline is significantly better than the one-band circular connections (reported in connection with irrigation atthe fishing port centre in 2013).

In the reviews, there is a significant queue for transport in theinterchange VE 8. In a forecast scenario, traffic cannotbe slipped through the Hermann shoreline. Delays per direction and queues increase exponentiallythroughout the peak hours. During the morning peak hours of the Sompa Island, traffic enteringthe Sompa Island is loaded by the junctions of Herma Nile and the load factor is very high.

Accession to the Kruunhaka

The commuter/vehicle bridge is linked to the North Bank at Liisankadu. The new connection shall be light controlled and have sufficient lane capacity. A tram passes through the interface (bridge/Liisankatu) and has been taken into account in the simulation of the connection arrangement(s) for light control.

In the current situation, the traffic volume of Terva Island related to the Northern Bank is very low and its traffic does not significantly harm the flow of traffic on thenorthern coast. The operation of the connection was reviewed in the forecasting context with traffic volumes in 2035. In the case of a check, approximately 1 170 vehicles arrive in the morning throughthe bridge to the northern track during the fall.

Effects of possible construction of Santahamn and Vartiosaaari

A transport assessment was made of the situation (sensitivity) in which Santahamina and Vartiosaari will be livingin 2035. Santahamina was estimated to have 21 000 inhabitants and the Vartiosaaari 7 000 inhabitants. The amounts were added to previous forecasts.

Under standard option VE 0 passengers go to Herttoniemi metro station using buses and switch to metro. In the direction of the centre of the Bridge Bridge, more than 6 100 passengers cross the morning peak hour, of which 780 are VartiosaResta and 2 050 from Santahamina. In the case of the KulosaIslands, metro would have almost 17 000 passengers in the centre. In the case of automatic metro equipment, this means a minimum frequency of two minutes, i.e. the computational 'ka' pasity ofthe metro. Passenger numbers vary and forecasts are uncertain. The projected number of passengers means that the trophic-system's capacity is exceeded in the direction of Largesalo. Similarly, the capacity of the bus system in the direction of Laajasalo is unlikely to be sufficient to accommodate travel- and volume.

The projected number of passengers in Santahamina will require new rail solutions. In practice, a new rail connection must be built in Santahamina as a metro or a high-speed railway. As the centre's tram capacity would not be sufficient for the required number of trams, a high-speed rail connection should be built in the tunnel. In this case, the tunnel is likely toslide from the High Island after the Kruunu Mountain bridge. The line would continue in Kampp.

The metro-line link would probably beconstructed at an earlier stage as a rock metal (VE 5) from which the line would continue to Santahamina. Metro lines would make itpossible to maintain public transport in Santahamina fromthe Kruunu Mountain Bank to Santahamina.

Under the tram-wagon option, the Kruunu sleeve would exceed around 7,100 passengers during the aa hrs and the metro would travel with more than 5 300 passengers and 1 800 trams.

The following figures show the number of passengersand the number of boats in the case of Santahamina and

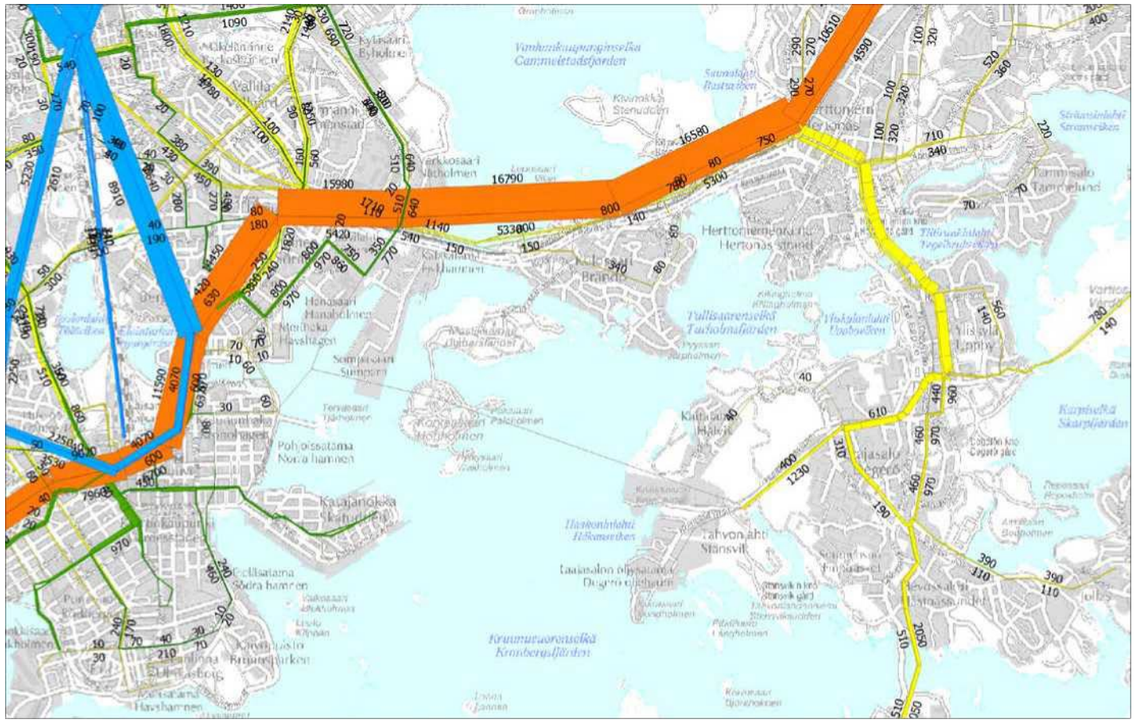


Figure 9.40. Passenger numbers in 2035 under option 0 of Santahamina and Vartiosaaari (no new public service).

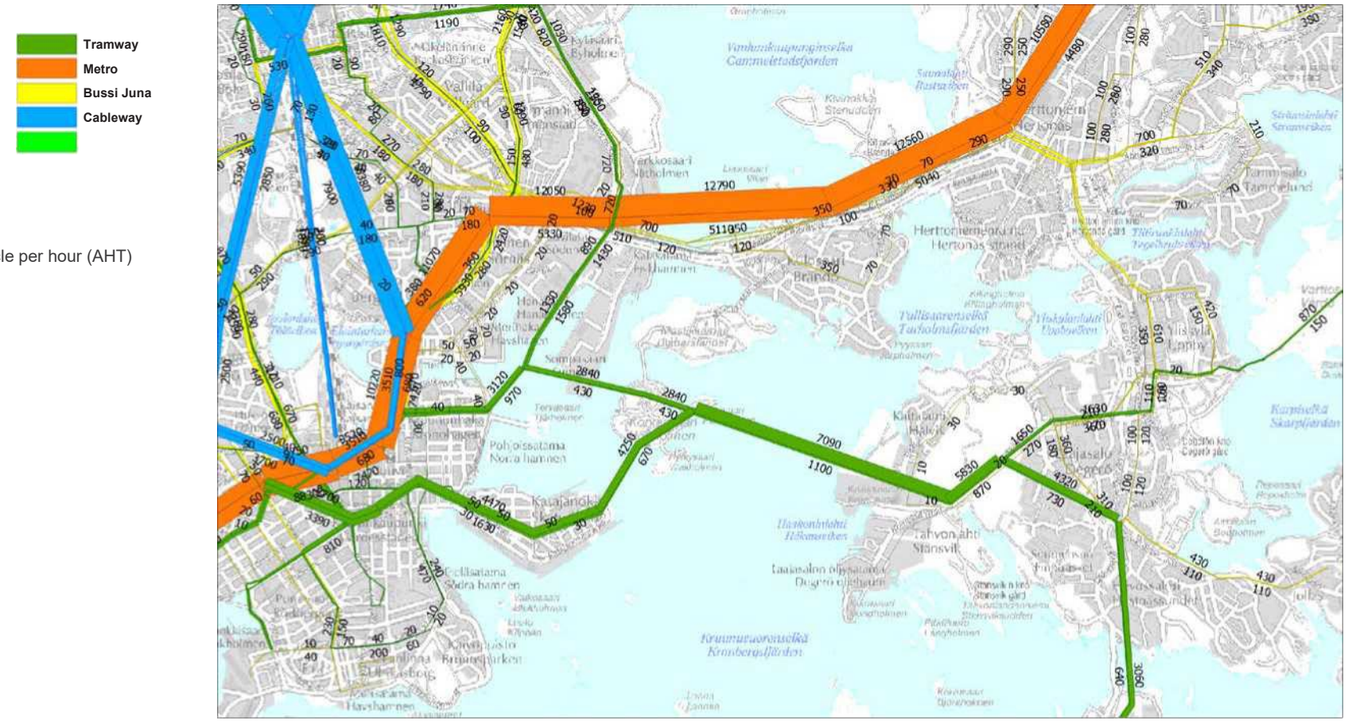


Figure 9.41. Passenger numbers in 2035 in the case of Santahamina and Vartiosaare by a quick-track

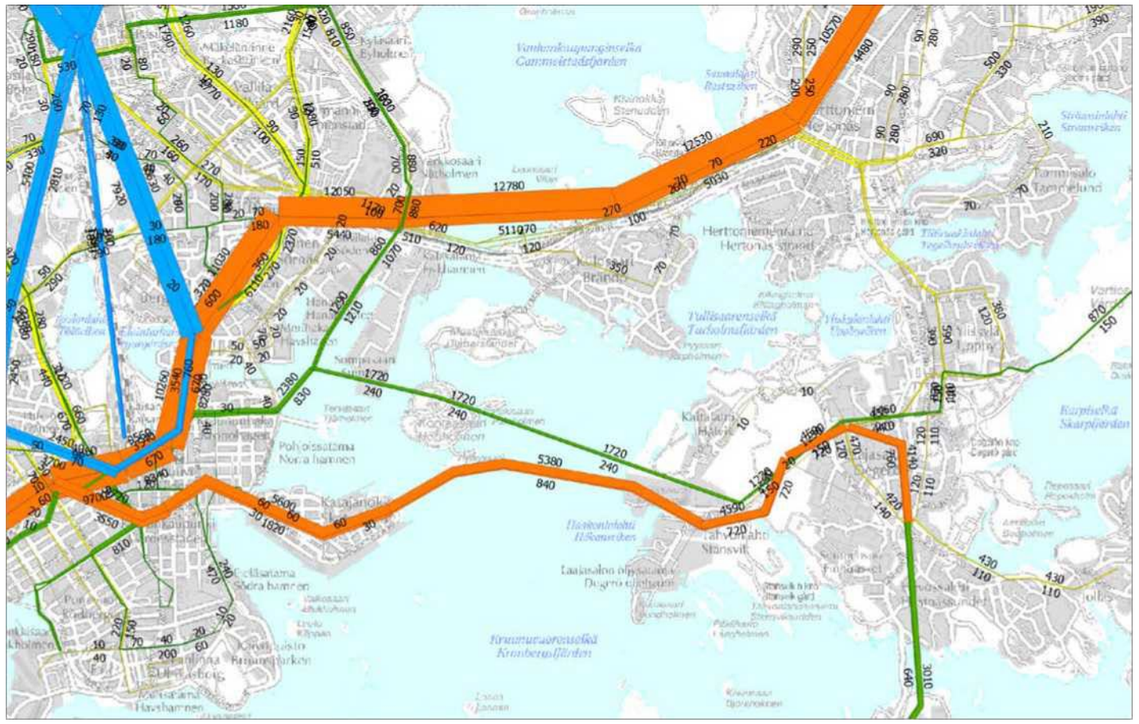


Figure 9.42. Passenger numbers in 2035 under the sub-option of Santahamina and Vartiosaare under metro.

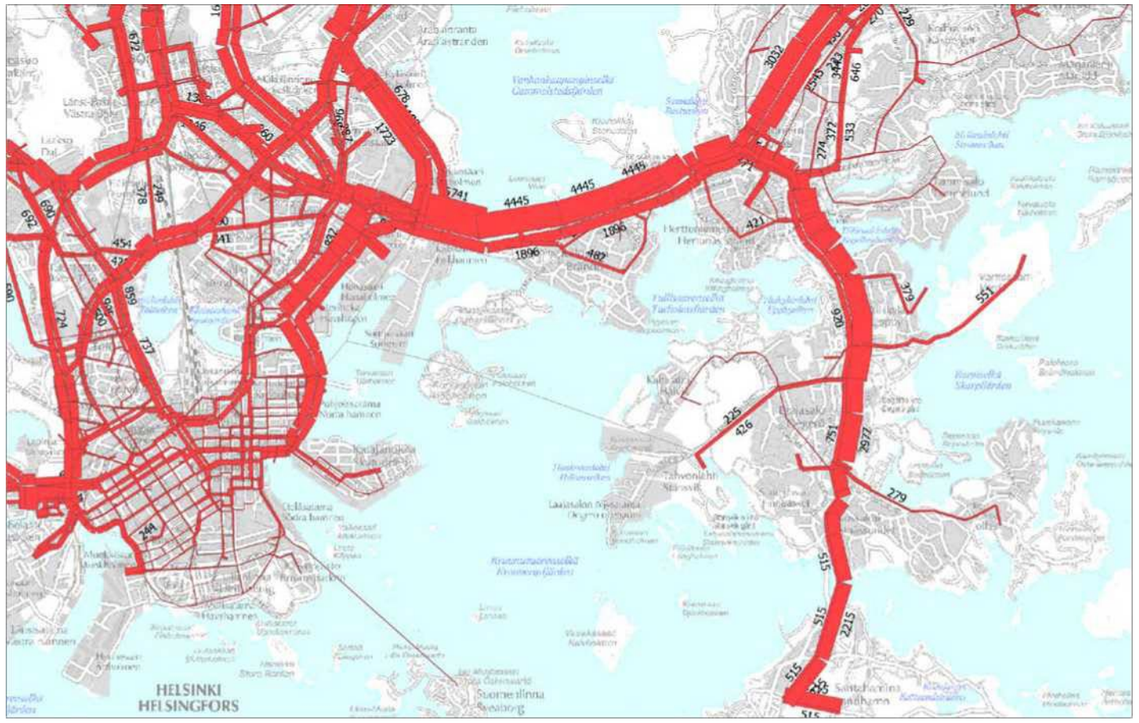


Figure 9.43. Number of vehicles in the morning peak hour in 2035 under option 0 of Santahamina and Vartiosaaari.

Figure 9.44. Number of vehicles in the morning peak hour in 2035 in the tram alternative for Santahamina and Vartiosaaari.

Figure 9.45. Number of vehicles in the morning peak hour in 2035 under the metro alternative of Santahamina and Vartiosaaari.

Transport effects of the transport of fuel at the Hana Islands power plant

A decision on the extension of the power plantin Hanasaari will be taken at this point in 2015. The fuel transport of the-Hanasaa ren power plant will now have an impact on the feasibility of the options to be assessed.

The Hanasaari power plant has two options:

- A new multi-fuel power plant will be built in the Vuosaare and the Hana Islands will be wound up. In this case, the plant will continue to operate until early 2020. A peak heating plant using oil will remain in operation in the energy supply area even if the power plant is dismantled. The low burning of pellets starting in the near future at the power plant, 5-10 % of the fuel, would not increase shipping traffic. The pellet is importedby trucks. The volume of this traffic is about 5-7 timesa day. Coal and fuel oil are transported by sea, as is currently the case.
- The Hanasaari power plant will be upgraded so that 40 % of biofuels can be used there. In this case,the power plant continues to operate. The biofuel is designed to be imported by sea into the port of Hanasaari, where coal and oil are still being imported. The transportneed for the Kivihii flight is decreasing.

In the first case, ship transport is required during the warm season 2-3 weeks and the second 5-6 times a week. Each transport means the arrival of the ship and the departure of the ship from the port.

The construction of a bridge between Terva Island and SompaIsland would probably lead to the construction of a bridge as a bridge. This applies to tramway options VE 1, VE 2 and VE 8. In order to manage the transport of fuel toHanas Islands, a bridge has to be opened during the winter season several times a day for a single ship, takinginto account the activities of the necessary icebreakers and tugs. During the-winter season, when there is more transport thanin summer, the opening time of the bridge may be in the order of 45 minutes when there is a need for ice-breaking. Two tram lines have been designed in the Broadsalo, one of which, according to preliminary plans, would run from the Island to the Kruunu Mountain and the other from the railway station to Yliskyl. The frequency would be between 5 and 10 minutes for each line. Even when the opening hours of the shortest 15-25 minutes, delaying a large number of tram passengers and disruption of tram trafficin a large area.

It is not possible to schedule shipping outside public service times. In addition, it is likely to be impossible for ship dismantling activities to be carried out at night due to the inhabitation of the nearby area.

Tramway traffic from the Kruunu Mountain to the centre makes no operational sense if the planned volume of fuel transport to Hana Island is provided by ships.

Options VE 0, VE 3, VE 4, VE 5, VE 6 and VE 7Hanasaa ren are not affected.

Living conditions, comfort and movement of people

bridge are:

The impact on people's living conditions has been prepared as a socio-logist expert judgement. Other impact assessments (transport, landuse, etc.), group interviews with residents, opinions from the EIA programme have been used as input for the assessment, as well asretrieval from residents through public events, feedback forms and other-channels. People's living conditions are also affected by noise, vibration and emissions, as well as by the effects of wind in the case of bridge options. These factors are dealt with separately in Chapter 9.6 (Environmental disturbances and risks). The human impact assessment combines options with similar effects. Atthe end of the assessment of each option(s), the views of the residents on the option are summarised (in italics).

Ve 0 Carriage buses for Herttoniemi metro station

This option will only have an impact on the area on the-broad side of the planning area.

There is a clear increase in transit traffic along the motorway of the Linnan lake through the southern part of the Herttoniemi centre and a significant increase in congestion, which reduces amenities around the road. Increasing through-way traffic also leads to increased net migration risks. Transit services are both buses and passenger cars. The buses are frequent, approximately every few minutes, between the lagoon and the metrostation. During the peak hours in the morning,the buses would be around 1 500 people and some 1 800 people on another vehicle (in 2035). The convenience of the metro is also diminished due to the growing number of users.

The tunnelfor runways improves a sense of comfort at the line as part of traffic moves underground. However, the streets associated with the tunnel take a strip onthe map of Hertto nie from the park area, which is an important recreation area and green in the urban structure. On the other hand, increasing connectivity will improve the bus connections of residents from the south-east of Herttoniemenranta to the metro station.

Increasing bus and car traffic, as well as congestion,also reduces comfort in the Broad Room and theways in which road accident risks increase. The main impacts will be on the large-scale environment, where bus and passenger transport is high. The bus would also travel around 1 500 people through the largeest hours in the morning and some 1 800 people by another vehicle (hung na 2035). A possible blocking of the bridge in the large-bridge, e.g. due to an accident, may create a risk that rescue vehicles will not enter the island. However, the probability of implementation is low because the bridge linkcomes from two separate bridges.

On the other hand, the increasing bus service serves the streets ofthe Laajasalo. The commuter connection from the Broad basin to the centre is good, but requires switchingto bus and metro. However, the connection is less popular becausethe bus terminal at Herttoniemi metro station has been developed in such a way that the metro station has a new ticket hall and commercial premises.

The residents of the first areas of the Kruunu Mountains made their choice of residence on the basis of the situation indicated at the time of the purchase or rental of the apartment and on the basisof the light image of the area. The rail connection tothe can city is likely to be of great importance to the inhabitants of the Kruunu Mountain, who have afashioned image of the area as a urban shore town with a corner-up connection to the metropolitan city without having to use their own car. From 2016 to 2017, the high-quality residential area of the Kruunu Mountain, where tram stops have been presented, will become a reality on the shore. The lack of a new connection seriously undermines the public transportconnections of the inhabitants of this part of the Kruunu Mountain to the centre in relation to their expectations.

In 2014, residential building will be started in Gunillango and Borgströ in the eastern part of the mountains of the Cruunu Mountains. Theimpact on the purchase or renting of dwellings in these areas is likely to be less significant because they are located in the context of the existing ladder structurein Laajasalo and the public transport and passenger car connections.

Among the residents interviewed, the wide-spread citizens fear that vehicle traffic through the Laja Strait will increase dramatically if the Kruunu Mountains do not have a direct shuttle withpassenger cars to the metropolitan city. The

population of the Greater Basin will increase tomorrow—

and for the years to come. The scarring of large volumesof traffic is likely to cause congestion, significantly reduce comfort and cause risks of accidents. Citizens expect that, even if people are redirected to public transport, and next generations' transport behaviour will be different from that of existing cars in the future. There are also concerns about how rescue vehicles can enter the island in the event of a blockageof the large strait bridge. The inhabitants of Herttoniemi are worried by the increasing flow-through traffic and the reduction of thered area on the Herttoniemi map by theLinnanrakentajantie tunnel.

Ve 1 Rail and light traffic link on bridges from the Kruund to the Kruunu Mountain

Ve 2 Rail and light traffic concrete concrete and bridge link from the Kruund to the Kruunu Mountain

Options VE 1 and VE 2 have essentially similar or similar-features.

In Kruunha, the alternatives will provide the Liisankadu witha tram for wagons and long-distance cycling, if a presumed Liisankatu link is selected as a tram route. On the other hand, vehicle traffic at the Liisankadu would cease. The 'Liisanka-du' begins with the Liisanpuist, which is used, for example, as an outdoor outdoor for dogs and as a playground for children. Moving thefield away from Liisankadu will reassure street space and improve air quality and safety. However, restrictions on vehicletea may pose challenges as residents and brick-and-mortar shops have a need to visitLiisankatu.

Tram traffic to the street brings newnoise, tram crossings and gears to the region. A tram would travel on average every few minutes in both directions. However, studies show that the normal constructions of the façades of buildings are insulated less than basic noise or car traffic noise from small-frequency crossings.

If cyclists are not allocated a route of their own, increasing bicycle transit traffic can increase the number of people in-light traffic accidents.

The rail link clearly improves the publictransport connection in Kruunha, in particular in its northern, north-east and easternparts. There is currently only one bus in the area, with a commuting time of approximately 20 minutes.

In the North Bank, the bridge starts at the Terva Island strain, departs from it and travels through the Terva Island wedge, which reduces somewhat the recreation value of the island due to the tramvoice and landscape changes. In addition, the number of vehicular places may decrease or at least change in such a way that sailboats cannot be kept north of the bridge. The value of the Health Island as an area of proximity to walking distanceis significant for the Crowns. On the other hand, the new connection brings the extensive refreshment areas of Mustikkamaa and theLarasalo to the Crown's tram and cycle distance.

Bridges have a significant impact on the landscape that opens up from the Kruunundo to the sea, which can be seen to reduce comfort.

In the fishing port, these options will significantly improve public accessto the metropolitan city, especially in future residential areas in the southern part of the fishing port. Traffic with trams is responsible for noise, but from the newer beginning a tram in a residential area along theroad is perceived to bevisually less disturbing than, for example, inKruu nunha. Bridges have a significant impact on the landscape from the fishing port to the sea. In this case too, however,the experiment is likely to be different from that of the old residential area. The new bridges will clearly improve the recreation possibilities for the inhabitants of the fishing port by enablingfast cycling and tram journeys to the Recreational Areas of Terva Island and Laajasalo.

The options are likely to improve the services provided by Liisankatu, KalaPort Nihd and the High Island, asflower traffic brings more users to the services.

The new link will significantly improve access to the High Islands. However,SIL has an impact on the landscape and tram-tram sounds can be seen as undermining comfort. However, due to the charge, the island is not currently used for recreational purposes other than zoo visits.

The bridges also have an impact on the landscape in Option 1for Mus on the ladder soil, Kulosaar, Katajanoka and Larjasato. The mountains are dominated by the landscape. Under Option 2, the connection runs across four of the KruunuMountain, so it does not affect the landscape on the side of the Broadsalon.

These options have a clear destabilising effect on trafficin the Herttoniemi and Laajasalo regions. During the busiest hours in the morning, a direct tramway to the metropolitan city would be used by some 3 500 people (in 2035). However, those who move witha car continue to pass through the northernpart of Laajasalo and Herttoniemi, as there is no other connection.

The commuter connection from Laajasalo Yliskyläwill clearly improve the city's hardness compared to the current bus-metro route, as the tram journey is direct and unchangeable. However, it is currently planned that the rail link will not serve the entire sub-area of Laajasalo, as the lines end in the Kruunu Mountain and Yliskyla.

The tunnelfor runways improves a sense of comfort at the line as part of traffic moves underground. However, the streets associated with the tunnel take a strip onthe map of Hertto nie from the park area, which is an important recreation area and green in the urban structure.

The residents of the first areas of the Kruunu Mountains made their choice of residence on the basis of the situation indicated at the time of the purchase or rental of the apartment and on the basisof the light image of the area. The rail connection tothe can city is likely to be of great importance to the inhabitants of almost the whole of the Kruunu Mountain, who have developed the image of the area as a urban coastal town with a high-quality connection to the metropolitan city without having to use their own car. These options are in line with residents' expectations of a public transport connection.

The tunnel section of Option 2 reduces the comfortability of the light traffic connection and reduces the useof the connection by cycling or walking. The long connection in the tunnel is not attractive for light traffic.

Among the residents interviewed, Crown-soakers experience significant disturbances to theLiisankatu's environment due to the tram traffic that is currently being regulated. In addition, it is feared that the banning oftea from the vehicle-movement in Liisankadu will lead to slippages due to the presence of car parks in houseyards, the need for passenger cars sometimes to reach the door, and the need to maintain the logistics of Liisankatu stones. Furthermore, there are doubts as to the adequacy of parking spaces in the event of the loss of the Liisankatu's places. However, some Crown sharks find it important to create new connections and feel positive that the new connection will improve public transport connections with Kruunha.

The inhabitants of the Large Storage consider the new connection tobe of great importance to the metropolitan city in order not to increase transit traffic in the Broad basin and to make another connection out of the island, e.g. for rescue vehicles. However, the connection between rail and light traffic is not considered to be sufficient, but it is also considered necessary for the connection of vehicles. In additionto the link, it is important that good public transport-links with Herttoniemi are maintained.

Ve 3 Metro Kamppi-Laajasalo; rock and concrete tunnel and bridge link from Kruunha to Kruunu Mountain Bank

Ve 4 Metro Kamppi-Laajasalo; rock and concrete tunnels

Ve 5 Metro Kamppi-Laajasalo; rock tunnel

Options VE 3, VE 4 and VE 5 have essentially similar effects. The options have the least detrimental impact onpeople's living conditions.

The rail connection to the metropolitan town was likely to be very importantfor the inhabitants of almost the whole of the Kruunu Mountain, who have developed the image of the area asa ur ban coastal town with a high level of connection to the metropolitan without having to use their own car. Metro is not entirely in line with the image of public transport inthe public debate, but some of the inhabitants of the Kruunu Mountains have a very good and rapid connection to the metropolitan town.

A short metro would serve only as an interchangeable bus-

metro link for the inhabitants of other areas of the Great Say. However, the connection bus pitch would be workable. The continuation of the Metro-line from the Kruunu Mountain Bank to Yliskylaand then served the inhabitants of Laajasalo far better.

These options have a clear destabilising effect on trafficin the Herttoniemi and Laajasalo regions. During the busiest hours in the morning, a direct tramway to the metropolitan city would be used by some 3 300 people (in 2035). However, those who move witha car continue to pass through the northernpart of Laajasalo and Herttoniemi, as there is no other connection.

The tunnelfor runways improves a sense of comfort at the line as part of traffic moves underground. However, the streets associated with the tunnel take a strip onthe map of Hertto nie from the park area, which is an important recreation area and green in the urban structure.

Under Option 3, the metro crosses the Kruunu Mountain spine throughthe bridge. This significantly alters the landscape in the Horse Island, Mustikkamaa, Kulosaar, Larjasalo andKatajanokalla.

Due to landscapes and natural light, the metro period on the bridge is more comfortable for passengers than the tunnel period. MET shalltrap fixed electrical systems adjacent to the track — they shall be segregated from other traffic by fencing. This affects the comfort of light traffic on the bridge.

The metro options will bring metro to the Esplanade and-stretch the links between the people living and trading aroundthe Esplanade.

Among the residents interviewed, people living in the metro-town stalled positively with metro options. The disturbances causedby the construction of the metro were perceived to be harmful, but they were toleratedand therefore acceptable. The inhabitants of the Great Say felt that the short metro does not servethe broad slope and should continue at least in Yliskyla. Rail connections were considered to be better than metro options, astram services are more diverse as the routes are longer and stops are more frequent.

Ve 6 Water traffic from Crounu Mountainside — Central

This option will have the greatest impact on the Katajanoka region, where it would result in a significant increase in bus traffic. This means that,as the end point of the bus ferry, the-hypothesis of Katajanoka's alternative would be achieved. Bustransport and its possible congestion would cause noise and emissions and would significantly reduce comfort throughout the grip. However, the new bus line would improve the public transport connections of Katajanoka residents towards the centreand Laajasa lon. The new connection would make the recreation areas in Lajasalo available to junior consumers.

The other end-points ofthe Bussier ferry in the main town gaze (Hakaniemi, Halkokia and Tradetori) are less detrimental to housing, as buses would not run on narrow streets.

The water link is well served by the inhabitants of the western part of the Kruunu Mountain, who have the possibility to walk at the ferry-term, as well as by other-streets. There is a moderate service for the inhabitants of the Large Room. It would be important for bus routes to serve the widest widestarea in the Broadtail. The smooth operation of thetravel chain is stretched by the fact that the public transport connection is inextricably linked, the ferry isfast and the frequency of the service is relatively frequent (six minutes). However, the journey is slowed down by loading and unloading the ferry. In addition, journey times on the constituency side are relatively long and there will be more exchanges than tram-ways for longer journeys. Waterborne transport emphasises the maritimeityof the region.

This option reduces traffic through Herttoniemi and-Broadsalo by far less than tramways and met-routes. During the busy hours of the morning, the bus bridge to the city would be used by some 1 100 people (in 2035), i.e. a large part of the population would continue to travel towards Herttoniemi metro station by bus or car.

The tunnelfor runways improves a sense of comfort at the line as part of traffic moves underground. However, the streets associated with the tunnel take a strip onthe map of Hertto nie from the park area, which is an important recreation area and green in the urban structure.

The feedback received during the public event gave little supportto collective water transport. The benefits of this option included costs, flexibility, experience and ecologicality.

Katajanoka residents interviewed propose a light-traffic ferry instead of a bus link. A few of thelane in the lane welcomed the ferry connection while others were on the tram and vehiclebridge. The ferry connection was proposed as a first-stage investment before the bridge.

Ve 7 cableways Hakaniemi-Kruunu Mountain

The Köysway option provides the inhabitants of the Kruunu Mountains andthe Lara salo with a light-traffic connection in themain town. A wheel can be taken and used with a wheelchair, a roller or a pram. The service level of the Köysi line is quite good due to the relatively fast connection and the frequency of gondols. However, the cableway system is not as comprehensive and efficient as rail transport. Moving by bus or other means of transport requires a cableway at one or both ends, which slows down and complicates the-travel chain.

The cableway also offers the inhabitants of the fishing porta direct task to Hakanime, which has the possibility to switch-me to troon, tram or bus. This link israther well-functioning.

In Finland, a cableway is a new means of urban transport, with the result that lack of knowledge and preconception may havean impact on the image of the vehicle.

Access to the High Island would be facilitated from Hakaniemi andLaajasa loung. A cableway trip to a leisure tunnel is agood thing, rather than everyday travel. The cableway is likely to attract interest and may attract main urban and tourists to recreatethe LAA.

The cableway has an impact on the landscape in Hakaniemi, Sörnäis, the fishing port, Kruununhaa, the High Island,-Mustik on the chama, Kulosaar, the Large Strait and Katajanoka, which can be seen to reduce comfort. However, the effects are less predominant than the bridging options. The position in Hakaniemi alters the landscapeof Hakaniementor and Hakanimen Hall.

This option reduces traffic through Herttoniemi and-Broadsalo by far less than tramways and met-routes. During the busiest hours in the morning, around 1 500 people would be spent on the cableway link to the metropolitan town (2035). Car users would continue to go through the-northern part of the Laajasa lont and Herttoniemi.

The tunnel for the runways improves comfort as traffic in the tunnel section moves underground. However, the tunnel--related streets take a strip of the park area ofthe Herttoniemi map, which is an important recreation area and a green boar in the urban structure.

A few comments and ferries were received at the public event onbehalf of the cableway option. Among other things, costs, low-volume visual harm, brand element, speed and alternationweresuggested.

The residents of the Large Hall interviewed did not see the cableway as a viable alternative to everyday mobility.

Ve 8 Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain

The effects of the tram and light traffic link aresimilar to those of Option 1.

The link between vehicle traffic would bring a large number of long-distance traffic to thefishing port. Almost 800 vehicles would pass through the fishing port during the peak hours in the morning (in 2035). Such traffic levels have not been taken into account in the planning of the region and traffic is likely to be congested. Traffic, as well as the noise and emissions it generates, tends toreduce comfort in the area. The risks of road accidents are also increasing.

This option would also provide a high level of vehicle traffic to the bridge between the fishing port and Kruunha and would reduce comfort in the shore side of Liisankatu. Movement—

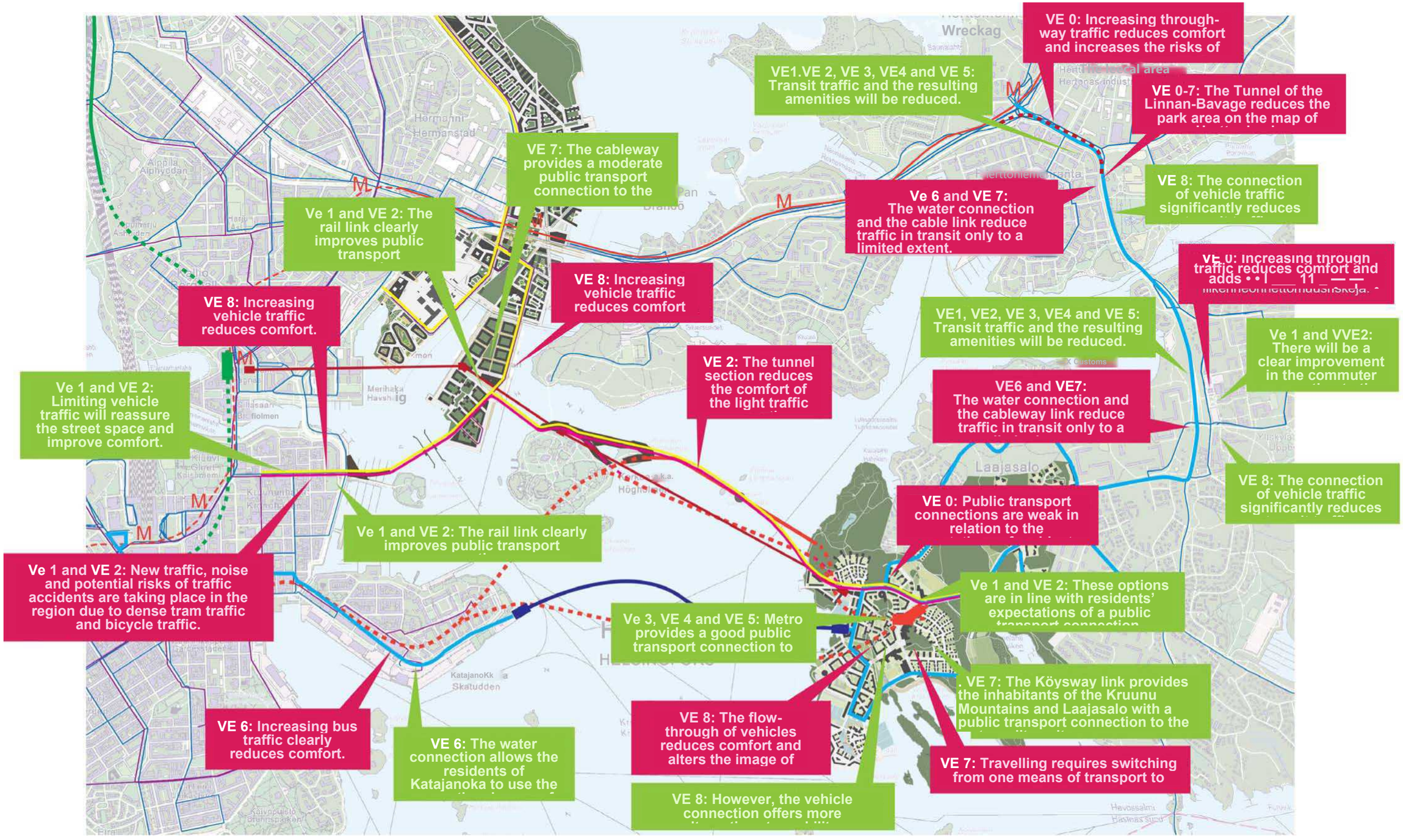


Figure 9.46. Citizens' views on the impact of the options received during the Focus Group Interviews and the public event.

they are distributed from Terva Islands to Liisankadu and northto the shore.

For the inhabitants of the mountains, this option will have animpact on the cadre. The residents of the first areas have made their choice of residence on the basis of the situation indicated at the time of the purchase or rent of the apartment and the image of the area. The rail connection tothe treasures is likely to be of great importance to the inhabitants of the Kruunu shore, who have developed the image of the area as a urban coastal town with a high-quality connection tothe metropolitan city without having to use their own car. This option brings through-way traffic to the area, which leadsto comfort and changes to the image of the area. On theother hand, the link between vehicle traffic offers more alternatives to mobility for residents.

For the inhabitants of the large-scale hall, the alternative provides a route of anothervehicle lion to the transport town.

In the northern parts of the Large Room andHerttoniemi, the changeover will significantly reduce vehicle traffic and the resulting disturbances. During the peak hours in the morning, some 3 200people would use direct contact with the cane town. The transitmovement in the Broadtail and Herttoniemi would have more than 700 vehicles less than it would have been without the vehicle traffic link (flun na 2035).

In the case of bridges close to the field and tram connectionof light glue and tram, the vehicle traffic link reduces the comfort of these modes of transport, in particular onlight traffic.

Both the residents of the Kruununha and the inhabitants of the fishing port consider the linkbetween the advisory traffic to be very undesirable. Themovement is said to cause significant disruption to settlement and recreation.

The inhabitants of the Great Say are in favourof a single task of vehicle traffic, so that all new residential car movements donot pass through the Laajasalo and Herttoniemi and to provide another connection to the island, for example for life-saving vehicles.

9.4 Motor boating, sailing and other navigation

Options VE 1, VE 2 and VE 8 have a significant negative impact on the racing use of the Kruunu Mountain spine. Or-the spawning to other boating is much lower.

The underpass height of the Krounu Mountain Bridge of 20 metres tracks the access and placement of thelargest offshore sailboats estimated to exceed 15 metres in length in the area's marinas. Such boats are visited by existing mill clubs in the region. There is no more detailed information on the number.

In practice, the bridges in the western part prevent sail boatsfrom being kept and sailboat mooring between the bridge of the Wakaniemi Sörniemen Street and the future bridge, due to the 7 m sub-length of the bridge between the Tervae Island strain and Nihdi in options VE 1, VE 2, VE 3 and VE 8.

The construction of options VE 1, VE 2, VE 3 and VE 8creates some restrictions on boating, racing sailing and shipping over several years.

The northern port, the Isle of Sompa Island,the Katajanoka submarine and the Kruunu Mountainselki area have extensive water bus and ferry traffic, which is constrained by construction.

During the construction of options VE 3 and VE 4, the impact onboating and navigation is significant due to large dredging, filling and installation operations and the transport of mass barges.

The impact on the transport of fuel by seaat the Hanas Islands power plant is shown in theimpact on traffic.

Landscape

The assessment is based on a synopsis drawn up by the landscape architect of the relevant landscape studies, plans and detection declarations made in the context of the-various plans.

Ve 0 Carriage buses for Herttoniemi metro station

This option has no significant impact on the landscape. The openings of the tunnel of therunways alter the landscape image locally.

Ve 1 Rail and light traffic link on bridges from the Kruund to the Kruunu Mountain

The three bridges to be built in the option will significantly alterthe landscape image of Helsinki in the surroundings of-the Kruunu Mounu ring. *(Figures 9.47 to 9.56)*

In the mountains of the Cruunu, there is a significant change in the image of the marine landscape,particularly in the directions of the HighIsland, Mustikkamaa, the Island, Herttonimenranta and the Kruunu Mountain. On the southern shore of the Kulosa Island, the open sea horizon and the Finnish castle are visible in some places on the bridge deck at aheight of approximately 20 metres, but the bridge isdominated by the landscape. The bridge also changes the landscape image of Katajanoka, Kaivo Park, Finnish Castle and neighbouring islands, as well as the Vasikka Island, but the landscape changes are smaller due to the underlying built-upcontinent of thecontinent.

When viewed from an open landscape space, the pylons of the Kruunu Mountain Sil Lay are visible in all directions of a different altitude.

Construction on the northern bank of the High Islandwill change the landscape locally and towards Mustikkamaa.

The bridge between the High Island and Sompa Islands altersthe taste of the landscape, particularly from Katajanoka, Kruununha, Tervasaren and north to Mustikkamaa.

The lifting bridge between Kruununha and Sompasaari Nihdi changes the maritime landscape around Kruunuha, Meriha and Hanasaari and also from the north coast of Katajanoka and the westcoast of the High Island. The nostosilla pylo structures are dominant elements in the urban and landscapepicture. The terraces in Kruunuhashore change the landscape image locally and northwards.

The drainage bridge is located in an urban structure and its-city has significant visual effects on the site.

The openings of the tunnel in the runways alter the tasteof the landscape locally.

Figure 9.47. View of the direction of the Bear Town of the High Island towards the Kruunu Mountain.
Visual picture of the Visual Analysis Report

Figure 9.48. The Kruunu Mountains bridge from the north-eastern beaches of the Herttoniemenranta Tuorinniemi. Visual picture of the Visual Analysis Study (Draft), WSP Finland

Figure 9.49. From the lunch of Krounu Mountains from Katajanoka. On the right-hand side, the residential area of the Kruunu Mountains can be distinguished. Visual picture of the Visual Analysis Report (Draft), WSP Finland Oy 2013.

Figure 9.51. The Kruunu Mountains in a long-distance landscape from the Gulf of Vanhan Town in the north. The picture shows on the right the towers of the Kala Harbour Centre. Visual picture of the Visual Analysis Report (Draft), WSP Finland Oy 2013.

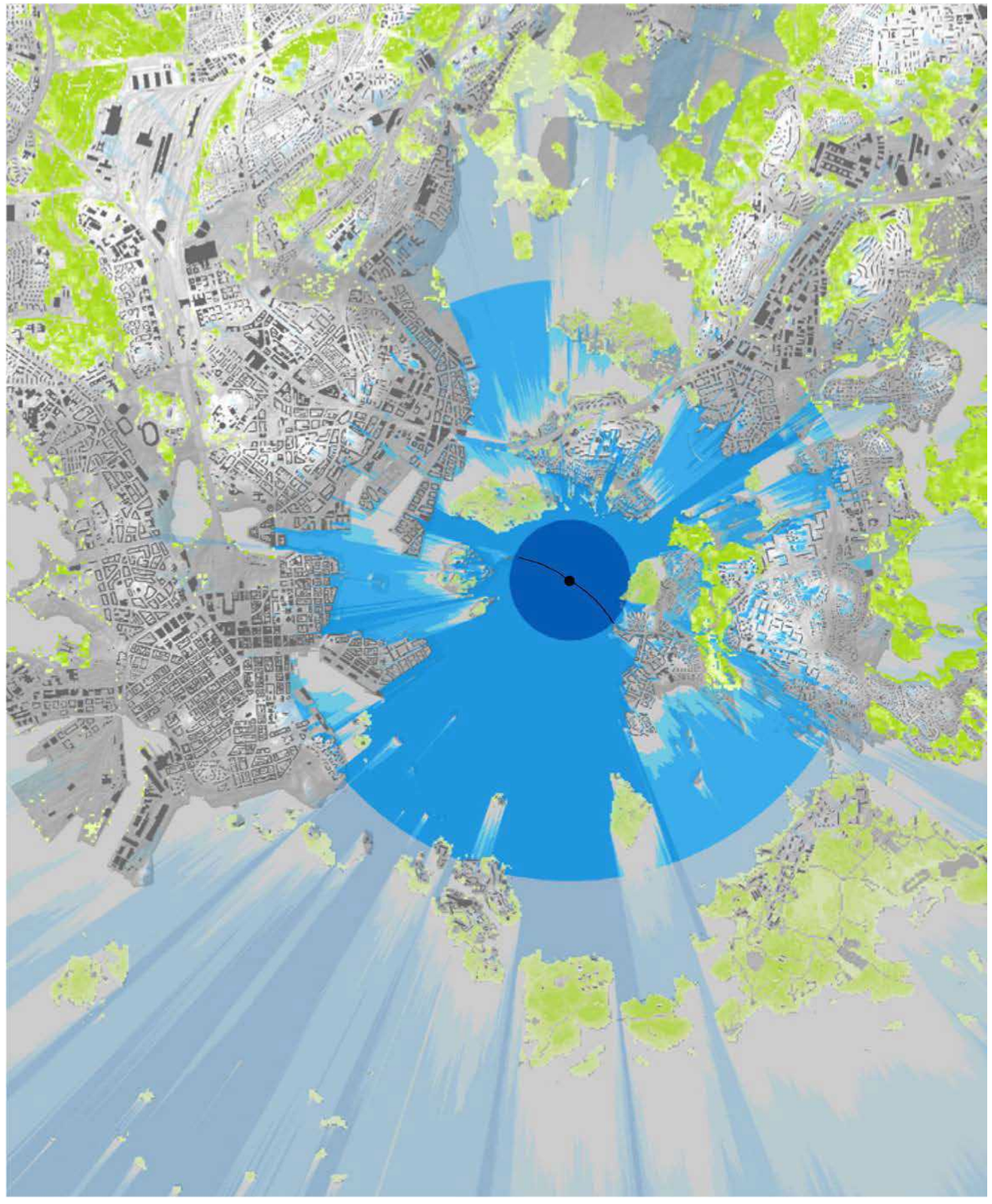
Figure 9.52. Perception of the High Island ferry beach. The bridge between the end of the northern shore of the Liisankad and at the beginning of 2014 the unplanned Sompasaari (Nihti) has a lifting bridge — with an underpass height of 44 m and a pylon height of 52 m. The drainage bridge is located in the urban structure and its urban-imaged effects on the site are significant. Extract from the Master Plan on Ramm and Light Transport Linked by Kruunuhaka-Sompas Islands. Engineer's office Pontek Oy. HKR. 23.9.2011.

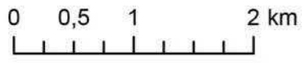
Figure 9.50. The Kruunu Mountains from the north towards the Kulosaaari casino. The height of the pylons is 135 m and the underpass height is 20 m. Visual picture of the Visual Analysis Study (Draft), WSP Finland

Figure 9.53. Crown bridges — Visual Analysis, WSP, draft 14.1.2014: The bridge and its high pylon are widely visible to the Kruunu Mountains and its surrounding beaches. In particular, the peak of pylon appears on a large scale. The bridge deck is mainly visible to the waters and to the nearest shores of the bridge, but hardly to the shores of the metropolitan city.

The immediate catchment area of the bridge, within a radius of 600 metres of pylon, is almost entirely covered by water. In this area, the bridge dominates the landscape. The catchment area of the bridge within a radius of more than 600 m but less than 3 km from pylons extends to the eastern part of the metropolitan area, the fishing port, Kulosaare. To the west, the area comprises the whole of the Lajasalo and the Herttoniemenranta. In the south, the zone extends to the north bank of Finnish Castle. In this area, the bridge is clearly visible in the landscape.

Outside the area of proximity of the bridge, the bridge is more than three kilometres away from the water catchment area and open terrain. The bridge has little impact on the landscape.





Ve 2 Rail and light traffic concrete concrete and bridge link from the Kruund to the Kruunu Mountain

The two bridges to be constructed in this option significantly alter thetaste of the landscape.

Construction on the northern bank of the High Islandwill change the landscape locally and towards Mustikkamaa. The openings of the Beto peninsula change the landscape on the northern shore of the High Island and in the Kruunu Mountain.

The bridge between the High Island and Sompa Islands altersthe taste of the landscape, particularly from Katajanoka, Kruununha, Tervasaren and north to Mustikkamaa.

The lifting bridge between Kruununha and Sompa Islands Nihdi changes the maritime landscape around Kruununha, Meriha and Hanasaari and also from the north coast of Katajanoka and the westcoast of the High Island. The nostosilla pylo structures are dominant elements in the urban and landscapepicture. The terraces on the shore of-Kruununha alter the landscape in a local and northern direction.

The drainage bridge is located in an urban structure and itscity has significant visual effects on the site.

The openings of the tunnel in the runways alter the tasteof the landscape locally.

Ve 3 Metro Kamppi-Laajasalo; rock and concrete tunnel and bridge link from Kruunha to Kruunu Mountain Bank

In the mountains of the Cruunu, there is a significant change in the image of the marine landscape,particularly in the directions of the HighIsland, Mustikkamaa, the Island, Herttonimenranta and the Kruunu Mountain. On the southern shore of the Kulosa Island, the open sea horizon and the Finnish castle are visible in some places on the bridge deck at aheight of approximately 20 metres, but the bridge isdominated by the landscape. The bridge also changes the landscape image of Katajanoka, Kaivo Park, Finnish Castle and neighbouring islands, as well as the Vasikka Island, but the landscape changes are smaller due to the underlying built-upcontinent of thecontinent.

From an open landscape space, the pylons of the bridge are ableto reach all directions of air in the form of fields of a-different height. The openings of the tunnel in therunways alter the landscape image locally.

The landscape of Palosaaari on the High Island is changing locally because of the opening and arrangement of the-tunnel.

The openings of the tunnel in the runways alter the tasteof the landscape locally.

Ve 4 Metro Kamppi-Laajasalo; rock and concrete tunnels

This option has no significant impact on the landscape. The entrances to new metro stations change slightly the tick image inthe city of Kaart and the Kruunu Mountain.

The openings of the tunnel in the runways alter the tasteof the landscape locally.

Ve 5 Metro Kamppi-Laajasalo; rock tunnel

This option has no significant impact on the landscape. The entrances to the new metro stations change slightly the tick image ofthe city of Kaart and the Kruunu Mountain. The openings of the tunnel in the runways alter the tasteof the landscape locally.

Ve 6 Water traffic from Crounu Mountainside — Central

This option will not have a significant impact on the landscape, but will strengthen the experience of maritime Helsinki like the cableway and bridges. New terminal, port and quay fields change slightly the urban picture in Katajanova and the Bay of Haakon in the Kruunu Mountains.

The openings of the tunnel in the runways alter the tasteof the landscape locally.

Ve 7 cableways Hakaniemi-Kruunu Mountain

This option brings a new element to the landscape picture. They canbe assessed as a whole to be moderate, withthe other pillars and stations of the cableway in particular significantly changing the landscape in the nearby landscape.

The openings of the tunnel in the runways alter the tasteof the landscape locally.

Ve 8 Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain

The three bridges to be built in the option will significantly change thelandscape image of the reindeer Helsinki on the KruunuMountainselen and the cartridge. The landscape effects on womenas a whole are similar to those of Option 1, but are even more pronounced due to the more pronounced bridge structures.

In the mountains of the Cruunu, there is a significant change in the image of the marine landscape,particularly in the directions of the HighIsland, Mustikkamaa, the Island, Herttonimenranta and the Kruunu Mountain. On the southern shore of the Kulosa Island, the open sea horizon and the Finnish castle are visible in some places on the bridge deck at aheight of approximately 20 metres, but the bridge isdominated by the landscape. The bridge also changes the landscape image of Katajanoka, Kaivo Park, Finnish Castle and neighbouring islands, as well as the Vasikka Island, but the landscape changes are smaller due to the underlying built-upcontinent of thecontinent.

From an open landscape space, the pylons of the bridge are ableto reach all directions of air in the form of fields of a-different height.

Construction on the northern bank of the High Islandwill change the landscape locally and towards Mustikkamaa.

The bridge between the High Island and Sompa Islands altersthe taste of the landscape, particularly from Katajanoka, Kruununha, Tervasaren and north to Mustikkamaa.

The lifting bridge between Kruununha and Sompa Islands Nihdi changes the maritime landscape around Kruununha, Meriha and Hanasaari and also from the north coast of Katajanoka and the westcoast of the High Island. The nostosilla py-loni structures are dominant elements in the landscape picture.

The drainage bridge is located in an urban structure and itscity has significant visual effects on the site.

The terraces at the Kruununha are transformingthe landscape locally and from a northern direction.

Urban photo

Ve 0 Carriage buses for Herttoniemi metro station

This option has a negative impact on the cultural environment ofthe Herttoniemi map. The use of metro as an access tool will increase the flow of people in metro stations, in particular in Herttoniemi and in city stations. This option will transform the surroundings of metro stations into the most lively and vibrant parts of the city.

At the map of the Herttoniemi, the openings of the tunnel on the shipbuilder's road are likely to have an adverse effect on the historic millions.

Ve 1 Rail and light traffic link on bridges from the Kruund to the Kruunu Mountain

The three bridges to be built in the option will significantly-alter the portrait of Helsinki in the surroundings of the Kruunuvuo-Rhine.

As a whole, the bridges form a new dominant gestureof the city of Helsinki. The bridges affect the image of Hels'gin and transform it into a city of bridges, the main landmark of which is the dominant Kruunu river. The Kruunu Mountains are an image factor that will become one of Helsinki's business cards in the future. The bridge doesminate the urban image not only when you see thecity structure, but also when you arrive from the air and the sea.

The urban image of the Kruunu Mountains is influenced, in particular, by the directions of the High Island, Mustikkamaa, Kulosaaari, Herttoniemen and the Kruunu Mountain. The bridges also change the urban image of-Katajanoka, Kaivo Park, Finnish Castle and nearbythe rivers and the Vasikka Island.

The significant height of pylon of the Kruunu Mountain Bridge (135metres trail) is obtained from the planned towers of the centre of the counter pair from the direction of the sea (compare the stadium tower88 m). The evening of the bridge brings a new contribution to the urban image.

From a public viewpoint, a land mark such as the Kruununberg Bridge may become speculative for the city asa whole. The construction of a major trambridge can support the image of Helsinki as a public transport city.

The bridge between the High Island and Sompa Islands alters thethorny of the city, in particular from Katajanoka, Kruununha, Terva Island and north Mustikkamaa.

The hull bridge between Kruununha and Nihdi is located inthe city's conurbation and its urban-imaged effects are significant. The stretch bridge moves intothe city of Kruununha, Meriha and Hanasaari and also from the northern bank of Katajanoka and the west of theHigh Island. The nostos bridge pylone structures are dominant gestures inthe city picture. The nature of the area also changes when the bridge, and in particular the section of the drawbridge on it, can be seen as a gateway to the metropolitan city.

The Liisankatu moves from a residential street in the City to a more public transport street typeor the street space of the cask remains largely unchanged. Street contact wires and rails change the street image. This option will increase human flows and liveliness. To the Liisankadu.

The openings of the tunnel at the junction lanternsalter the ticks locally.

Ve 2 Rail and light traffic concrete concrete and bridge link from the Kruund to the Kruunu Mountain

The two bridges to be built in the option will significantly change thethorny image of the city.

As in Option 1, the Kruununha to Nihdi bridge is located in the urban structure and itsurban picture is significant in the location. The lifting bridge changes the urban image of Kruununha, Meriha and Hana along theIsland, including the northern bank of Katajanoka and the west coast of the High Island. The nostos bridge pylon tracks are dominant elements in the city picture. The nature of the area also changes when the bridge, and in particular the section of the drawbridge on it, can be seen as a gateway to the metropolitan city.

The Liisankatu moves from a residential street in the City to a more public transport street typeor the street space of the cask remains largely unchanged. Street contact wires and rails change the street image. This option will increase human flows and liveliness to Liisankadu.

Building on the northern shore of the High Island will change the urban image locally and towards Mustikkamaa. The openings of the Betonitunnel change the city's harsh image on thenorthern shore of the High Island and in the Kruunu Mountain. The tunnel does not significantly change the picture of the city.

The bridge between the High Island and Nihdi alters the urban image, in particular from Katajanoka, Kruununha, Terva Island andthe north of the river Mustikkamaa.

The lifting bridge between Kruununha and Sompasaari Nihdi changes the urban image of Kruununha, Meriha and Hana along theIsland and also from the northern bank of Katajanoka and the west coast of the High Island. The nostosilla pylon tracks are dominant elements in the urban picture and the meaning and nature of the area is becoming less significant inurban terms. A haul bridge can be seen as a gate tothe ticks.

The drainage bridge is located in an urban structure and itscity has significant visual effects on the site.

The openings of the tunnel at the junction lanternsalter the ticks locally.

This option does not affect the image of Helsinki. I will promotethe realisation of a public transport city, but will not make it visible compared to option 1.

The easier connection to a free destination such as the High Island reinforces the city's positive image.

Ve 3 Metro Kamppi-Laajasalo; rock and concrete tunnel and bridge link from Kruunha to Kruunu Mountain Bank

The Cruunu Mountains form a new dominant elephant and havea significant impact on the landscape in the city image of the maritimeHels gi around the Kruunu Mountain.

The Kruunu Mountains are an image factor that becomes oneHelsinki business card in the future. The bridge is dominatednot only from the urban structure but also from the air and the sea.

The urban image of the Kruunu Mountains is influenced, in particular, by the directions of the High Island, Mustikkamaa, Kulosaaari, Herttoniemen and the Kruunu Mountain. The bridges also change the portrait of Katajanoka,Kaivopuis ton, Finnish Castle and neighbouring islands, as well as the Vasikka Island.

From a public viewpoint, a land mark such as the Kruununberg Bridge may become speculative for the city asa whole. The construction of a major trambridge can support the image of Helsinki as a public transport city.

The city of Palosaare of the High Island will changeto the urba due to the opening and arrangement of the tunnel.

The entrances to the metro significantly change the image of the city locally. Stations bring more human flows tothe surrounding environment and may add other services and activities to the region.

The openings of the tunnel at the junction lanternsalter the ticks locally.

Ve 4 Metro Kamppi-Laajasalo; rock and concrete tunnels

This option will not have a significant impact on the city,but on the other hand. The entrances to new metro stations change slightly the city image in the city of Kaart and Kruunuvuo. Metro stations bring more human flows to theirproximity and may add other services and activities to the region.

The openings of the tunnel at the junction lanternsalter the ticks locally.

Ve 5 Metro Kamppi-Laajasalo; rock tunnel

This option will not have a significant impact on the city,but on the other hand. The entrances to new metro stations change slightly the city image in the city of Kaart and Kruunuvuo. Metro stations bring more human flows to theirproximity and may add other services and activities to the region.

The openings of the tunnel at the junction lanternsalter the ticks locally.

Ve 6 Water traffic from Crounu Mountainside — Central

This option will not have a significant impact on the city,but on the other hand. However, ferry traffic supports and reinforces the image of maritime Helsinki. New terminal, port and quay fields change slightly the urban picture in Katajanova and the Bay of Kruunu Mountain Haakon.

The openings of the tunnel at the junction lanternsalter the ticks locally.

Ve 7 cableways Hakaniemi-Kruunu Mountain

This option brings a new strong element to the urban image. The main pillars and stations of the cableway area major change in the city in Hakaniemi and Meriha. The cableway structures are suitable for the Meriha scale with aimpressive urban beauty, and in Hakani the role they play will grow and become challenging.

A cableway is an important element of image at local level which can have positive effects in terms of tourism.

The openings of the tunnel at the junction lanternsalter the ticks locally.

Ve 8 Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain

The growth of car traffic in the metropolitan city is making the city's harsh picture more congested and more car-town.

The three bridges to be built in the option will significantly alterthe landscape image of Helsinki in the surroundings of-the Kruunu Mounu ring.

As a whole, the bridges form a new dominant gestureof the city of Helsinki. The bridges affect the image of Hels'gin and transform it into a city of bridges, the main landmark of which is the dominant Kruunu river. The Kruunu Mountains are an image factor that will become one of Helsinki's business cards in the future. The Bridge makes thepicture of the city accommodating not only thena seen from the urban structure, but also when coming from the air and the sea.

From a public viewpoint, a land mark such as the Kruunuberg Bridge may become speculative for the city asa whole.

The urban image of the Kruunu Mountains is influenced, in particular, by the directions of the High Island, Mustikkamaa, Kulosaaari, Herttoniemen and the Kruunu Mountain. The bridges also change the urban image of-Katajanoka, Kaivo Park, Finnish Castle and nearbythe rivers and the Vasikka Island.

The bridge between the High Island and Sompa Islands alters thethorny of the city, in particular from Katajanoka, Kruununha, Terva Island and north Mustikkamaa.

The lifting bridge between Kruununha and Sompasaari Nihdi changes the urban image of Kruununha, Meriha and Hana along theIsland and also from the northern bank of Katajanoka and the west coast of the High Island. The nostosilla pylon tracks are dominant elements in the urban picture and the meaning and nature of the area is becoming less significant inurban terms. A haul bridge can be seen as a gate tothe ticks.

Cross-section contact wires and rails change the image of the street. The tram-way link of the broad room will make the nature of the streetsin the area more urban.

The openings of the tunnel at the junction lanternsalter the ticks locally.

Figure 9.54. Hakaniemi market. A preliminary outline of the urban characteristics of the cableway. Architectural firm JKMM Oy.

Figure 9.55. From Sompa Islands to Merihaka. A preliminary outline of the urban characteristics of the cableway. Architectural firm JKMM Oy.

Figure 9.56. From the direction of the mudish soil to the Kruunu Mountains. A preliminary outline of the urban characteristics of the cableway. Architectural firm JKMM Oy.

Built cultural environment

Ve 0 Carriage buses for Herttoniemi metro station

This option has a significant negative impact on the nationallyvaluable nature of the map of theHertto nie.

Ve 1 Rail and light traffic link on bridges from the Kruund to the Kruunu Mountain

In the Mountains Kruunu Mountains, there is a significant change in the image of the marine landscape,in particular the power of the Horse Island, Kulosaar Huvilakau, the CustomsIsland and Helsinki steam shipping routes in the summer metropolitan area and Santahamina andFinnish Castilla in the direction of valuable cultural environments. Specifically, there are adverse effects on the northernshore of the High Island, where construction works are carriedout within the boundaries of the area. The landscape landscape-changes only slightly along the old part of Katajanoka, the Kaivo Park and the nationally valuable cultural environments in the city of Kaart and Kruununha.

The bridge between the High Island and Sompa Islands transforms the taste ofthe landscape into the nationally valuable cultural environments of Katajanoka and Kruununha.

The lifting bridge between Kruununha and Sompasaari Nihdi alters the maritime landscape in Kruununha andSör, along these valuable culturalenvironments.

Ve 2 Rail and light traffic concrete concrete and bridge link from the Kruund to the Kruunu Mountain

The effects of the option are similar to thoseof condition VE 1. In the Mountains Kruunu, there is a significant change in the maritime landscape, in particular the HorseIsland, the Florence City, the Customs Island and Helsinki's steam and shipping routes, as well as the nationally valuable cultural heritage of Santahamina and Finnish Castilla, along the lines of the summer pleasure of thesteam and shipping routes of Helsinki. Specifically, adverse effectsoccur on the northern shore of the High Island, where construction operations are carried out within the area boundary.

The landscape landscape changes to a lesser extent along the old part of Katajanoka, the Kaivo Park and, in part, the city ofKaart and Kruu nunha, along the linesof nationally valuable works.

Ve 3 Metro Kamppi-Laajasalo; rock and concrete tunnel and bridge link from Kruunha to Kruunu Mountain Bank

The impacts of this option are similar tothose of Options VE 1 and VE 2. The Kruunu Mountains are sympathetically-changing the maritime landscape landscape, in particular the Horse Island, Kulosaar venturi, Customs Island and Helsinki ferry routes, as well as the nationally valuable cultural landscape of Santahamina and Finnish Castilla on thedirection of the summer pleasure. Specifically, adverse effectsoccur on the northern shore of the High Island, where construction operations are carried out within the area boundary.

The landscape landscape changes to a lesser extent along the old part of Katajanoka, the Kaivo Park and, in part, the city ofKaart and Kruu nunha, along the linesof nationally valuable works.

In addition, metro stations are located in high-value environments at national level, which means that their adaptation/integration into the environment must be carefully carried out.

Ve 4 Metro Kamppi-Laajasalo; rock and concrete tunnels

This option has no impact on valuable built cultural environments. Metro stations are locatedin nationwide hunted environments, which means thatthey need to be adapted/integrated carefully.

Ve 5 Metro Kamppi-Laajasalo; rock tunnel

This option has no impact on valuable built cultural environments. Metro stations are locatedin nationwide hunted environments, which means thatthey need to be adapted/integrated carefully.

Ve 6 Water traffic from Crounu Mountainside — Central

This option has no direct impact on the valuable structure of thecultural environments supported. As with the bridge and cableway, this option reinforces the experience of maritime Helsinki. The uudet Terminal, Harbour and Pier structures slightly alter the urban image ofKatajanova and Kruunu in the Bay of Haakon, where they are located in valuable cultural environments.

Ve 7 cableways Hakaniemi-Kruunu Mountain

One of the pillars of the cableway is the power of the High-Island in a municipality-rich environment. This option will have significant implications for Meriha and Hakaniemifor valuable built cultural environments.

Ve 8 Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain

The effects of the option are similar to those ofexchange e.g. VE 1. The mountains of the Kruunu Mountains significantly alterthe landscape image of us, particularly in the summer huvil settlements of the Horse Island, Kulosaaari venturi, Customs Island and Helsinki steam shipping routes, as well as the mouth of the nationally valuable cultural environments ofSantahamina and Finnish Castilla. Specifically, adverse effects occur on the northern shore of the High Island, where constructionoperations are carried out within the area boundary. The landscape landscape changes to a lesser extent in the old part of Katajanoka, the KaivoPark and, in part, the power of the city of Kaart and Kruununha, alongmunicipally valuable cultural environments.

The bridge between the High Island and Sompa Islands transforms the taste ofthe landscape into the nationally valuable cultural environments of Katajanoka and Kruununha.

A lifting bridge between Kruununha and Sompasaari Nihdi transforms the maritime landscape in Kruununha and Sör-along these valuable cultural environments.

Ancient residues

Options VE 1, VE 2, VE 3, VE 4, VE 6 and VE 8 may have adverse effects, especially during construction, on earlier residues in the Helsinki centre area. Constructionon water is rather limited inoption 7. Option 5 does not involve the construction ofthe waters (the reservoir is deep below the seabed).

The underwater sites are under the authority of the Museum Agency. When construction is being prepared, contact should also be made with the Museo Agency for ancient-remnants underwater. The need for further research in the submarine areas,which is the subject of construction, is evident since the site as a whole has not been examined.

If, prior to construction, it is not possible to "circumvent" the identified object by modifying the plan, the necessary actions will be considered on a case-by-case basis.

In the case of ground architectural sites, the Helsinki City-Museum is working together in accordance with the cooperation agreement between the Museum Agency and the City Museum.

Finland's World Heritage Site

The project has not been estimated to have any direct negative or worn-outs inFinland as a World Heritage Site. In RAPort 'Majorland of Finland. Current and future land use. Helsinki City Planning Agency 2011' has addressed the landscape in Finland and the experience of the ferry journey as follows:

"At present, the Kruunu Mountain spine is separated in the north by an open stretch of water around forested beaches. MAh domtramway would disrupt the view of the northernpart of the water catchment area. However, the High Island and the Hylky Islands would remain at the edge of thebridge ETE and would continue to border the Kruunu Mountain. One of the most significant changes in the construction of the bridge and the Kruunu Mountain bed would be to highlight the urban pitch in the north. However, in a report commissioned by the city, the urban impact report of the High Isle-Cruunu Mountain Bridge estimates this direction to be secondary to-the southern high sea landscape in Finland.

At present, the bridge line runs quite far from theFinnish Belt (approximately 3.5 km measured from the shipyard) and even though the bridge can be achieved,for example, from the coasts of Great Mustas Island north and east, a bigger problem is estimated tobe the 'landscape and open tunnel' of the ferry journey in Finland.

In particular, the report mentions the negative effectof scattered pylons. The Pylonit may also appear in the interiorof the Finnish Castle at the height of Pylonit, which is why the report considers the diagonal pond to be a negative solution.

Air quality and impact on climate change

The CO2 reduction impact of the different project options in the Helsinki region in 2035compared to non-implementation of the project is in the order of VE 3, VE 4 and VE 5 % and the tramway and cableway options (VE 1, VE 2, VE 7 and VE 8) are in the order of one third. The project therefore has a positiveimpact on Soil, with the exception of the water liquor (VE 6).

Air quality modelling has not been considered appropriate-in the context of the environmental impact assessment.

Environmental disturbances and risks

Emissions to air

In the context of the impact assessments basedon the transport model of the Environmental Impact Assessment (EIA), total emissions (NOx, PM and CO_2) were calculated using the emission factor measures. *(Table 9.1)*

Following the choice of the follow-up planning option, it may be necessary to consider air quality on a point-by-point basis, in particular in the area of the fishing port under Option 8 and in all other options to take into account the exit solutions of the tunnel for the eastern waterway-building segments or theair quality spawning in the vicinity of the tunnels.

Table 9.1. Nitrogen oxides, fine particulate matter and CO2 emissions under different

Total emissions	VE 0	VE 1, VE 2	VE 3, VE 4, VE 5	VE 6	VE 7	VE 8
NOx ton/a	582,1	581,4	580,9	583,8	581,9	581,7
PM ton/a	39,8	39,8	39,8	40,0	39,8	39,8
CO_2 1000 tonnes/a	27 180,5	27 145,1	27 133,7	27 201,9	27 160,6	27 159,5
Absolute difference						
NOx ton/a		—	—1,2	1,8	—0,2	—
PM ton/a		—	—0,1	0,2	0,0	—
CO_2 1000 tons		—35.4	—46.8	21,4	—19,9	—21,0
Relative difference						
No $_x$		—	—	0.3 %	0.0 %	—
PM		—	—	0.5 %	0.0 %	—
CO_2 1000 tons		—	—	0.1 %	—0.1 %	—

Nois

Noise levels in the settlement area were calculated for all noisesources marked by the area (road traffic, metro, tramway, Ha nasaarithermal power plant stack) by day (7 to 22 a.m.) and at night (22:00-7.00) in the current situation and in the forecast scenario for the comparative — option 0 and for those alternatives that were considered to have a significant impact on the noise levels in the area (change of conditionsVE 1, VE 2, VE 3, VE 6 and VE 8). The noise zones are reduced at 2 m above the ground. In addition, in a few locations in Kruunhaa, the varressa of the Liisankatu, Katajanoka beach at the Kanavaka and Katajanoka beach Ressa, the fishing port in the Sompa Island plan area along a new tramway, and in the Lajasalo, the Varres of the Islands of Koira,have lowered noise levels on the façades. The noiselevels for public belts have been calculated for all layers and the images in this chapter and the text always show the maximum façade noise level for each point. An expert assessment of the noise impact of the other options was carried out.

The design of the 'Linnary Attorney' in Herttoniemi has been taken into account in all options except option 8. The tunnel is used by traffic from the easternwaterway from the mouth of Helsinki to Laajasalo.

This section shows the noise zones by day in images where significant changes occur whencompared to option 0. For all calculated events, the day andnight noise zones of the whole mouth mowing area are shown *in Annex 2*.

45-50 dB
M 50-55 dB 55-60 dB 60-65 dB
M 65-70 dB
M > 70 dB

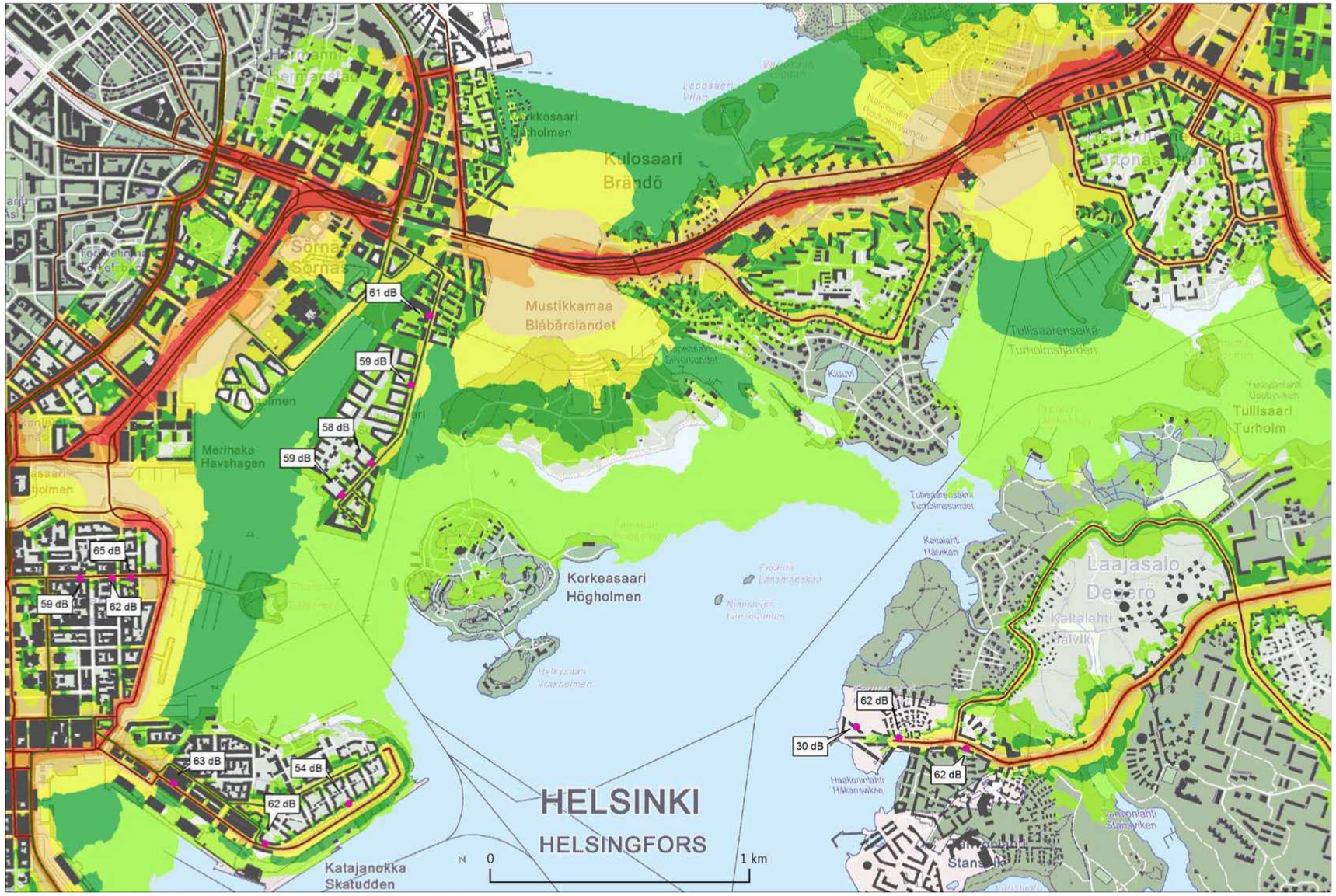


Figure 9.57. Noise levels L_{Aeq} by day from 7 a.m. to 22 a.m. in option 0. The highest noise levels calculated on the façades in the area are

Ve 0 Carriage buses for Herttoniemi metro station

Option 0 is the baseline in the forecast year. Compared to the current situation, new buildings have been added to the Broadsalo and the fishing port, taking into account the centre of the fishing port on the eastern fairway and the metroradar. Future tramways of fish in theport area have also been taken into account. In the Herttoniemi area, account has been takenof the influence of the Linnanra road tunnel onthe ground.

Traffic is increasing compared to the current situation, leading to a slight increase in noise zones in some places. The noise situation in the Kruununhaa area will not change significantly in the future. In the fishing port, the passage of the easternfairway and the metro below the centre's deck slightly reduces the noise levels

of the crossing nearby. Similarly, new high-density buildings limit the spread of noise. Along the eastern fairway, there is a slight increase in noise belts, but the change is not significant comparedto the situation. As a result of the construction of the Tunnel of the Liftway, noise levels in the Herttoniemi area will not increase, even though the volume of traffic flowing through is higher. Noise levels in the Broadcasting Room increase compared to the current situation. In particular, the island of dog will become a less significant source of noisethan is currently the case. Noise levels in the High Island do not change compared to the current situation. In the northern part of the blueskaya, the noise zone is increasing by more than 55 dB, but the noise levels in the southern part of the island remain similar to those currently applied.

The study also calculated façade noise levelsin those areas where noise levels change most significantly in different-conditions. The maximum noise level on the façade along the street is just over 65 dB, on the Katajanok on Kanavakadu around 63 dB and on the Katajanokanshore is about 54 dB. In the fishing port, the highest noise levels are slightly above 60 dB south of the eastern fairway, below 59 dB in the south and just under 62 dB in the large basin.

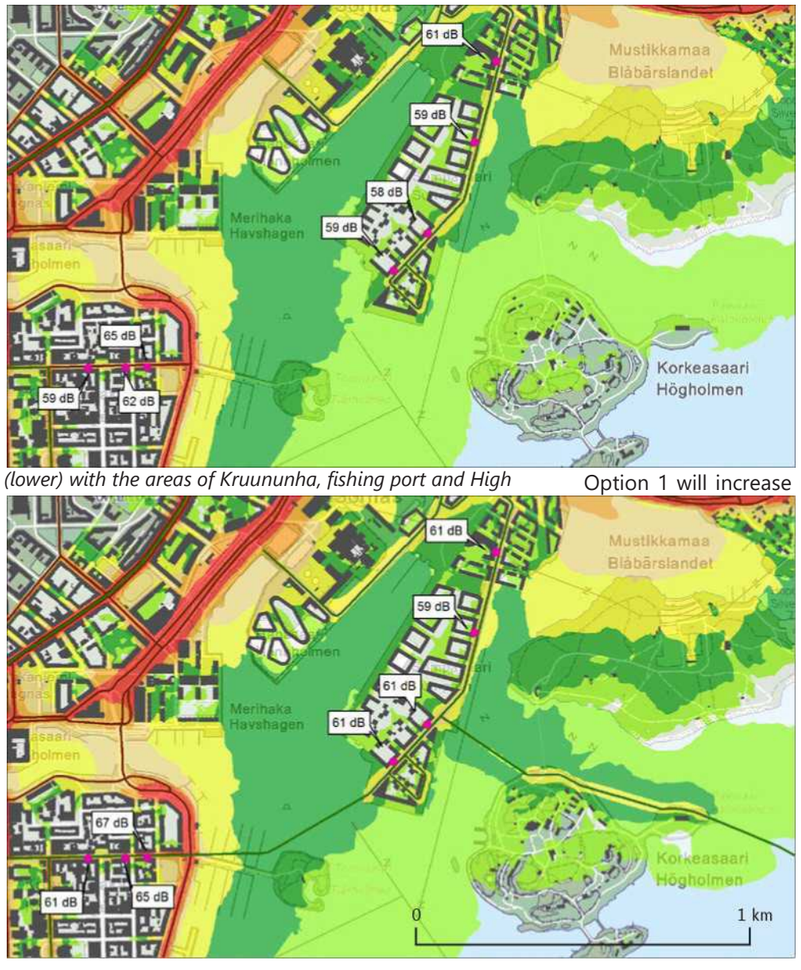
Figure 9.57 shows the noise levels of option 0 in thedesign area. The bubbles show the highest façade noise levels at the points (marked redon it) from which they were calculated.

Ve 1 Rail and light traffic link on bridges from the Kruund to the Kruunu Mountain

The calculations of option 1 take account of all the noise sources ofcondition 0 as well as the tramway noise from Kruuthrough the bridges to the Kruunu Mountain. A 1 m high handrail has been modelled on the Kruunu Mountain-Renbridge. No handrails have been modelled for other bridges.

The impact is largely the same as for option 0compared to the current situation. In addition, noise levels will increase on thenew tramway of HIE man in Liisankadu, in the southern part of the fishing port and in the High Island. Overall, the increase in the noise situation is not high, as the starting noise levels of the tramway are lower. In the case of the High Island, the zone above the guide values does not extend to the outer areas of the island. The zone above 45 dB is increased byHIE man. Noise levels in the southern part of Mustikkamaa also increase slightly, but remain below 50 dB. In the case of bridges, noiselevels do not significantly increase compared to option 0, as the bridge in the Kruunu Mountain in particular is so high that the bridge structure protects from tramway noise.

Figure 9.58. Comparison of options VE 0 (upper) and VE 1 (lower) with the areas of Kruununha, fishing port and High Island. The noise levels L_{Aeq} shown in the images during the day from 7 a.m. to 22 a.m. and the maximum noise levels on the façades in the phone bubbles.



As regards option 1, noise levels were also calculatedon the sides of Liisankatu, in the fishing port along the tramway and along theIslands of Koira. On the road, traffic levels are smaller without tramways, and the relative noise levelsof the alternative 0 will increase by about 1.5 to 2.5 dB. The maximum noise level on the façade is just under 67 dB. It should be noted that this would require a sound insularity of 32 dB, that the guide values for indoor noise are met. The guide values may be exceeded indoors. Normal wall structures are assumed to insulate noise by about 30 dB. The tramsrunning in the southern part of the port under Option 1 will increase noise levels by about 2.5 dB, resulting in a maximum façade noise level of around 61 dB. In the larger basin, the noise levels will increase by about 1 dB compared to option 0, with the maximum noise level being about 63 dB.

Figure 9.58 shows the daily noiselevels of options VE 0 and VE 1 in the area of Kruununha, the fishing port and the High Island to facilitate comparison. Similarly, *figure 9.59* shows the noise levels in these options in the area of Kruunuvuo. In the other areas, there is no difference between VE 0 and VE 1.

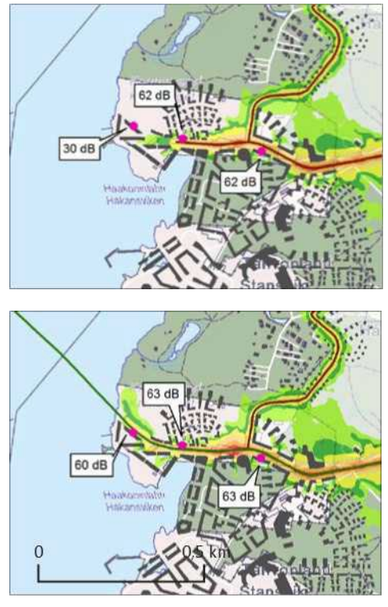


Figure 9.59. Comparison of options VE 0 (upper) and VE 1 (lower) in the area of Kruunu Mountains. The noise levels L_{Aeq} shown in the images during the day from 7 a.m. to 22 a.m. and the maximum noise

Ve 2 Rail and light traffic concrete concrete and bridge link from the Kruund to the Kruunu Mountain

Option 2 is modelled as Option 1 withthe exception of the line for the High Island and the Kruunuvuo-Fren Bridge, which is replaced by a concrete tunnel. With the exception of the High Island region, the effects are the same asunder condition 1. On the High Island, the tramway line and thus the scope of the noise zones are slightly different from Option 1, but the overall noise situation on the island is practically the same in both options. Blueberry in the southern part of thecountry slightly increases the noise levels compared to option 0 and slightly less than option 1.

Figure 9.60 shows the daily noiselevels of options VE 0 and VE 2 in the area of Kruununha, the fishing port and the High Island in order to facilitate comparison. Inthe other areas there is no difference between VE 0 and VE 2.

Ve 3 Metro Kamppi-Laajasalo; rock and concrete tunnel and bridge link from Kruunha to Kruunu Mountain Bank

Option 3 has been modelled as option 0, except for the metroragraph modelled on a bridge from the High Island to the Kruunu Mountain. The noise effectsdiffer from those of option 0 only at the bridge ifthe noise levels are slightly higher. Such as:

option 1, the bridge structure protects from noise, but the noise zones are slightly larger due to the outer noise levels- of the metro. This results in a larger noise zone of more than 45 dB in the sea area, but little increase in noise zones of more than 50 dB, with only the tunnel openings increasing noise levels in a small area by more than 50 dB. The noise levels present on the façadela are as in option 0. The noise levels of the High Island and the Black Earth are also

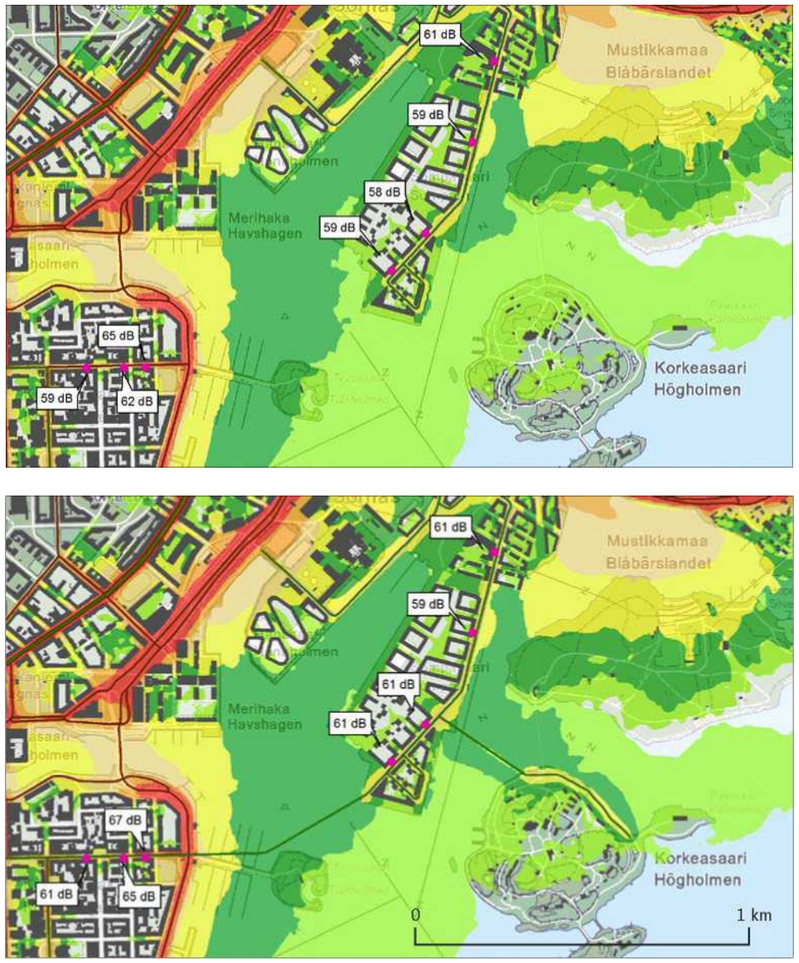


Figure 9.60. Comparison of options VE 0 (upper) and VE 2 (lower) with the areas of Kruununha, fishing port and High Island. The noise levels L_{Aeq} shown in the images during the day from 7 a.m. to 22 a.m. and the maximum noise levels on the façades in the phone

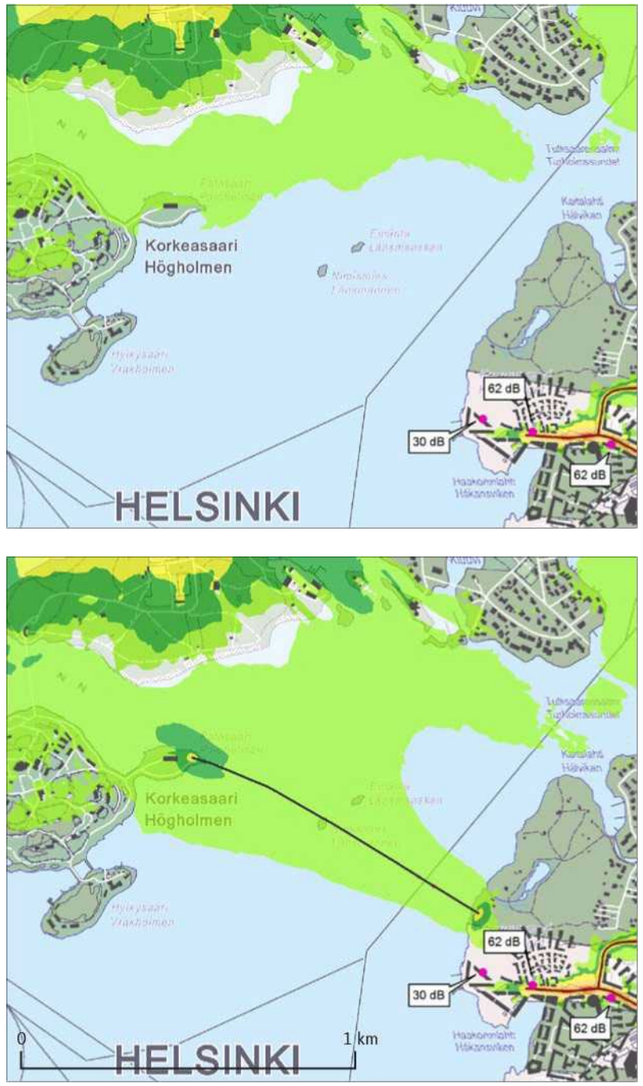


Figure 9.61. Comparison of options VE 0 (upper) and VE 3 (low) in areas adjacent to the bridge. The noise levels L_{Aeq} shown in the images during the day from 7 a.m. to 22 a.m. and the maximum noise levels on

similar to those of option 0, i.e. slightly betterthan in exchange dos VE 1 and VE 2. However, the difference is not significant.

Figure 9.61 shows the daily noiselevels of options VE 0 and VE 3 in the vicinity of the new bridge in orderto facilitate comparison. In the other areas, there is no difference between VE 0 and VE 3.

Ve 4 Metro Kamppi-Laajasalo; rock and concrete tunnel and VE 5 Metro Kamppi-Lajasalo; rock tunnel

The impacts are as in option 0. The metro in the tunnel does not cause noise.

Ve 6 Water traffic from Crounu Mountainside — Central

Noise emissions fromferry traffic are very low and difficult to distinguish from other waterborne noise effects. The noiseeffects are due to an increase in land transport and are almost the same as for option 0. On the route from the Isle of Island to the ferry in the large basin, noise levels may be slightlyoverwhelming, as can the Katajanok on the Katajanocan bank. The other traffic increasebelow is not significant. The façade noise levels in the Broad basin on the Isle of Dog are not different from those indicated in option0. On the Katalya ok, along the Kanavakatu, noiselevels increase by slightly more than 1 dB, leading to a maximum façade noise level of about 64 dB. Along the street, noise levels increase by about 2 dB and the highest noise levels on façades are around 56 dB. Although noise levels will increase slightly, the guide values for indoor noise are unlikely to be exceeded in the future.

Figure 9.62 shows the noise of options VE 0 and VE 6 byday in Katajanoka to facilitate comparison. In the other areas, there is no difference between VE 0 and VE 6.

Ve 7 cableways Hakaniemi-Kruunu Mountain

The height of the cableway is such that it does not affect the overall noisesituation in the area. In the case of machinery, noise levels may rise locally,but these sound pressure levels can also be designedto avoid interference.

Ve 8 Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain

The calculation took into account tramway and vehicle traffic on the Lipfrom the Kruunhaunha to the Kruunu Mountain and themove of the bank on other main roads compared to option 0. Significant changes in noise levels occur inthe fishing port compared to option 0, where car traffic significantly increases noise levels compared to-tramways. Also in thesouthern part of the High Island and Mustikka, noise levels are significantly higher than in other options, and the zone above the guide values extends tothe recreational area. The constructions of the Cruunu Mountain Bridge also contribute to the protection of road traffic noise, but the zone is significantly larger than under option 0. The runway tunnel will not be built inthis exchange

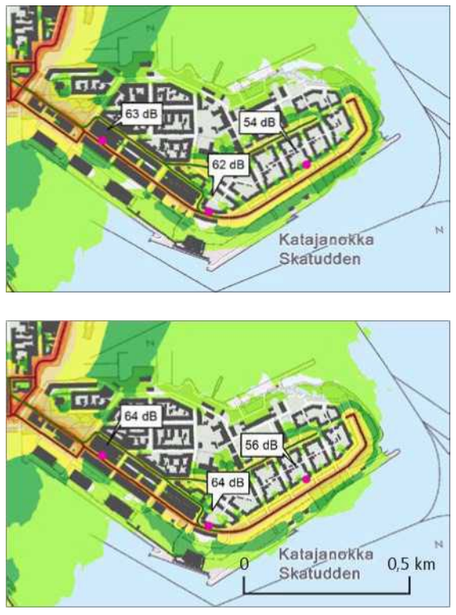


Figure 9.62. Comparison of options VE 0 (upper) and VE 6 (low) in Katajanoka. The noise levels L_{Aeq} shown in the images during the day from 7 a.m. to 22 a.m. and the maximum noise levels on the façades in

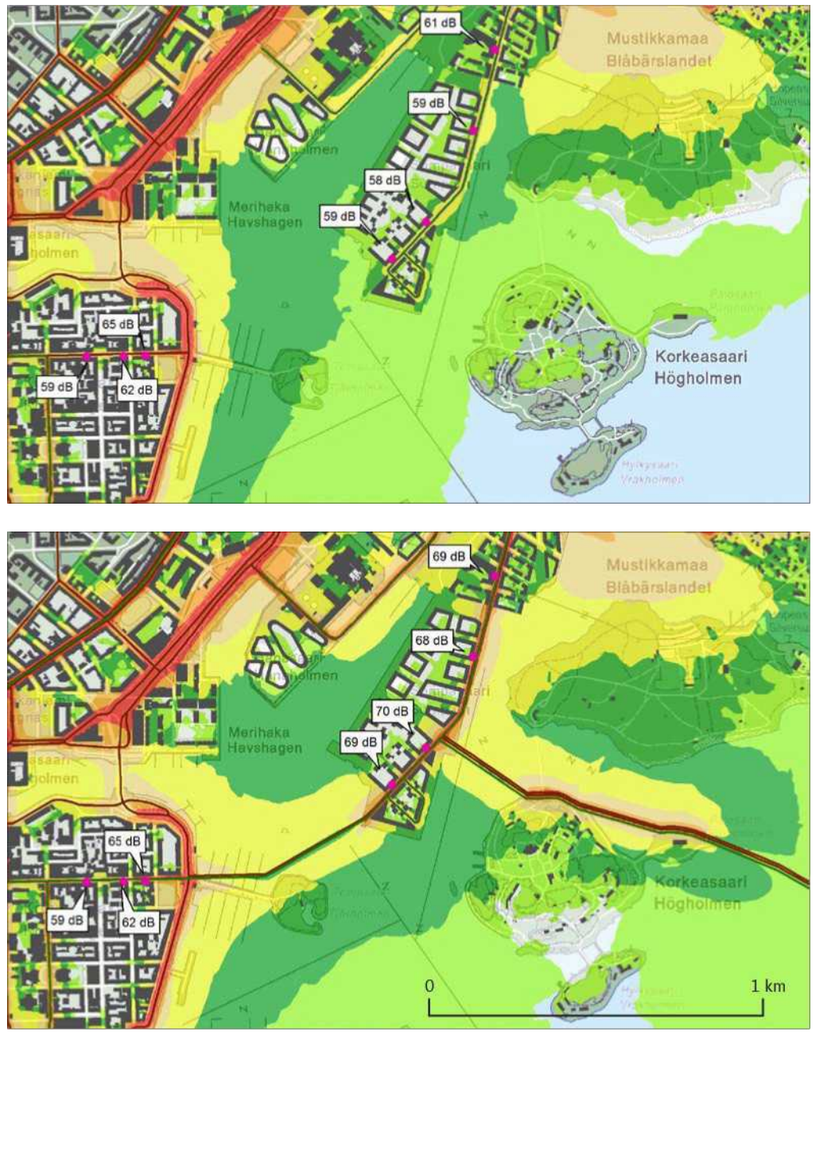


Figure 9.63. Comparison of options VE 0 (upper) and VE 8 (lower) with the areas of Kruununha, fishing port and High Island. The noise levels L_{Aeq} shown in the images during the day from 7 a.m. to 22 a.m. and the maximum noise levels on the façades in the phone

e.g. the noise levels in the centre of Herttoniemi are slightly higher than in option 0.

The highest façade noise level along the slide is similar to that of Option 1, slightly below 67 dB. As inOption VE 1 and VE 2, guidance values may be exceeded indoors. The maximum noise levels in the fishing port are close to 70 dB, which would require 35 dB sound insulation. In the current-cane, the trunk of sound insulation is30 to 32 dB on the closest walls, which is too low in relation to the calculated noise level. Some of these houses have already been built. It should be borne in mind that it is very costly and cumbersome toimprove the soundness of your structures after the event. In the large basin, at the western end of the Island, the noise levels are higher than in option 0, approximately 66-69 dB and, when traffic moves to the districts, the noise levels are about 62 dB, half a kilometre away from the bridge, the same asunder condition 0. As a result, constructions at the very westernend would require a sound insulation of up to 35 dB.

Figure 9.63 shows the daily lunch levels of options VE 0 and VE 8 me inthe area of Kruununha, the fishing port and the-High ren for ease of comparison. Similarly, the noise levels *in these options are shown in Figure* 9.64 in the area of the Kruunu shore and *in Figure 9.65 in* the Herttonie for the Lin-nanching street. In the other areas, there is no difference between VE 0 and VE 8.

From the point of view of noise, option 8 has significant adverse effects and is by far the worst. The effectsof other exchanges are limited (options VE 1, VE 2, VE 3, VE 6 and VE 7) or have no noise impact (optionVE 4 and VE 5) compared to option 0.

Of the alternatives, only tramway and metro in the rock-tunnel can in practice cause vibration or body noise spikes. Under all options, tramways are on hard soil, so the presence of vibration nuisances isunlikely. In addition, when a new tramway is built on hard soil, it is possible to absorb more as a hull-noise as a vibration by means of body noise mounted on the track structure layers or under rail. Insulation is used to insulate the rail with absorbing rubber material from the substrate and the surrounding soil, thus preventingus from producing snow and spreading it into the environment. Runkome snow attenuation can be planned for Liisankadu, Kalasatama Sompa Island and Kruunu Mountainsidewhere settlements are in the immediate vicinity of the tramway.

Vibration

The pre-report on the assessment of hull noise caused by-land transport, which is commonly used by the VTT, has broken down the distances betweenroads and residential buildings where the level of hull noise generated bytraffic is considered to be less than 35 dB (surface fairway). Without vibration or hull damping measures, this level is reached on hard ground 40 km/h and ata distance of at least 15 m.

The metro in the rock tunnel can also cause hull noise pollution. Anticipating this, while plans are still very general, is very difficult. In the case of metro, vibration barrier roads may also be used as a slide.

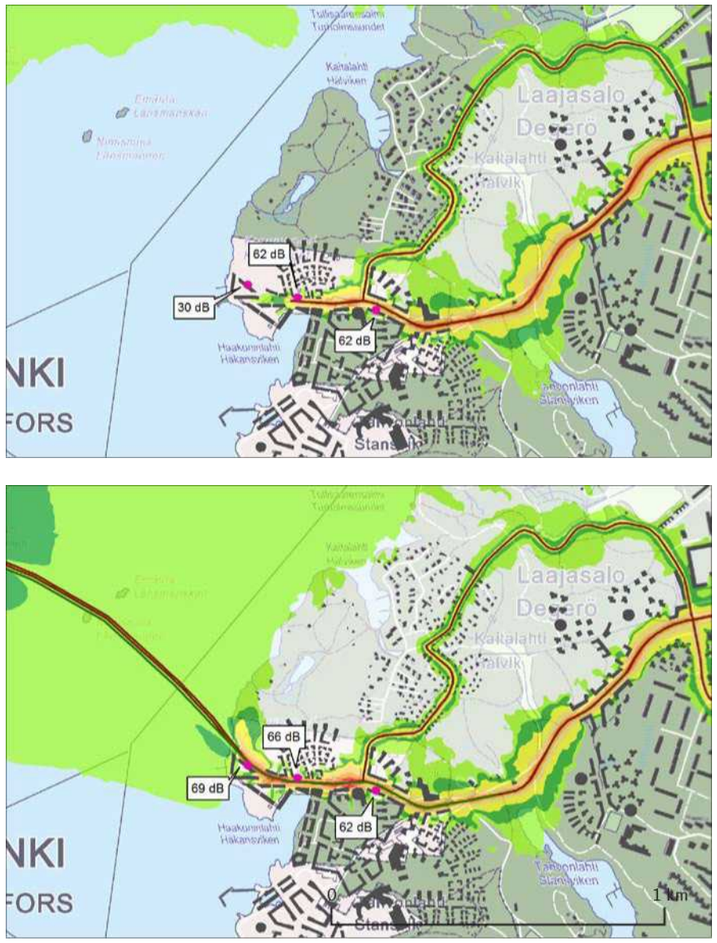


Figure 9.64. Comparison of options VE 0 (upper) and VE 8 (lower) in the area of Kruunu Mountains. The noise levels L_{Aeq} shown in the images during the day from 7 a.m. to 22 a.m. and the maximum noise

Figure 9.65. Comparison of options VE 0 (upper) and VE 8 (low) in the Herttoniemi area. The noise levels L_{Aeq} shown in the images during the day from 7 a.m. to 22 a.m. and the maximum noise levels on the façades in

Wind & wind

The assessment of bridge optionsand cableways is based on a study prepared by WSP Finland Oy by Risto Kiviluoma (WSP Finland Oy 2013). It deals with the impact of windon the planned public transport connection of the Broad Long Lunge and concerns options VE 1, VE 3 and VE 8 containing the Kruu-Yu Nu Bridge, options VE 2 and VE 4 with other bridges and the cableway option VE 8. The study did not address the waterborne transport option.

Wind has an impact on road safety, as well ason the comfort of people moving outdoors and waiting at stops, including frost disassembly in winter. In special cases, a hard wind may also affect the comfort of passengers within theadvice: wind can sleep the vehicle, cause noise and open doors for public transport vehicles.

For the construction and equipment of traffic paths such as poles, signboards, overhead contact lines and cables, wind causes rooms(vibration) which may lead to fatigueand decomposition of their joint.

The stowage of the contact wire and support columns of the rail trolley in the wind and the resulting fatigue shall be taken into account in the design. Fatigue may result in a loss of contact wire (and a safety risk for usersle), as well as traffic disruptions related to maintenance. The stall is the result of a direct wind effect anda combination of the bridge lying.

Wind can quint snow into structures and dripice now, posing a risk to the environment. Wind can elevate snow dust from e.g. ice, thus causing a sudden problem of coldness.

Machinery and equipment, such as flap bridges or cableways, may have a specified maximum pitch speed in which case they can be used. At international level, there are few uniform safety protocols and guidelines for the closure of tram traffic due to heavy wind.

Without windmills, more than 23 m/s of wood chips would occur for about 7 hours a year, i.e. well more than once a year (the equivalent of approximately 2.2 hours per year from theaid). According to the wind statistics, there are only 1.5 % of the time during the summerseason.

The aim is to enable pedestrian access throughout the year, so wind-rails will be beneficial for all the bridges currently runningon the project. Identification of the appropriate type and height of windways is carried out in connection with the further designof bridges.

Need to limit bridge traffic

Bridge between the High Island and the Kruunu Mountain:

- 30 minutes per year, i.e. on average once every four years (when a bridge is covered by wind rails).
- A warning about winds that make footpath difficult can beactivated for about 50 hours a year.

Bridge between the fishing port and the High Island:

- Closure: there is no practical need for a bridge with windways; other than the bridge between the High Island and the Mount Kruunu Mountain.
- Warning about winds that make pedestrians difficult: not necessary if the bridge is fitted with wind rails, otherwise linked to the bridge between the High Island and the Kruunu Mountain.
- Nostosis may have a maximum fly-flight chip, in which case it can be used. If the bridge cannot be opened due to wind, shipping to the fuel port is prevented.

Bridge between the Kruunha and the fishing port:

- Closure: No practical need, taking into account the possibility of a circular road.
- Warning about winds that make pedestrians difficult: No need. However, the bridge could have a warning signaland, for example, a wind bag from which users can assess wind.

The winds tend to shine the hen's snow, which slips withthe wind. Since your bridge is located at a high level, it is assumed thatthe matter is not of greater importance. For the same reason, the visibility of wind snow dust is unlikely to become a problem. However, winds have the effect that the snow deposited on the deck is not likelyto move away from the wind. The removal of snow from the bridge must be arranged in the most visibleway, e.g. by means of a link across the rails.

Limeness and formation of ice in bridges

The diagonal lines of the bridge are in a continuous small-colouring dys movement that prevents ice from accumulating in the ropes. Ice is also likely to beprevented by the rope of large bridges by a plasticprotective tube that is used in the rope. However, in certain circumstances, most evidently after the night, ice can accumulate on the cables, which drips on the bridge deck when wind rises.

As the cables on the Kruunu Mountain Bridge run over the pavement, there is a possibility of accidents due to the ice falling from the cables. For example, a road mark could be placedon the bridge.

Wind impact on cableway operation

The cableway is intended to be in service for 20 hours a day ata distance. The breaks on the cablewaydue to heavy wind or myrs are about four hours a year. A reduced driving speed may be required for an average of 10 hours per year.

Cableways generally contain an alarm system thatcan ratify hard fans. The use of a cableway in storms contributesto the experience of the operating staff on the impact of wind on the sleeping of the baskets, also taking into account the direction of the wind.

In Meriha, where the track runs on buildings, the flow over roofs can increase wind speeds locally and the wind may be a special wooden ladder.

Wind has an impact on navigation, its comfort, safety and reliability. As in the case of maritime transport, bad weather causes roughness, sometimes difficulties in beaching and the freezing of structures in winter. According to the preliminary assessment, the sensitivity to weather disturbance is similar to that of a cableway.

9.7 Soil and bedrock, groundwater

Ve 0 Carriage buses for Herttoniemi metro station

Option 0 does not have an in-use effect on soil and bedrock or groundwater.

Ve 1 Rail and light traffic link on bridges from the Kruund to the Kruunu Mountain

Impact of wind on bus bridge traffic

Option 1 does not have an in-use effect on soil and bedrock or groundwater.

Ve 2 Rail and light traffic concrete concrete and bridge link from the Kruund to the Kruunu Mountain

Option 2 does not have an in-use effect on soil and bedrock or groundwater.

Ve 3 Metro Kamppi-Laajasalo; rock and concrete tunnel and bridge link from Kruunha to Kruunu Mountain Bank

Option 3 does not have an in-use effect on the earth and bedrock.

Despite the injections, there is some leaking of groundwater into the tunnel area on the rock tunnel section. The volume of water leakingin the Valmiis tunnel must remain below the limit given, which ensures that the groundwater surface does not fall to an adverse extent.

Ve 4 Metro Kamppi-Laajasalo; rock and concrete tunnels

Option 4 does not have an in-use effect on the earth and bedrock.

Despite the injections, the rock tunnelsection will lead to some leaking of groundwater into the tunnel. In the finished tunnel,the amount of water leaking in the finished tunnel is kept below the limit given, which ensures that the groundwater level does not fall to an adverse extent on the ground. In maritime areas, the groundwater is not affected by a similar leak in the tunnel.

Ve 5 Metro Kamppi-Laajasalo; rock tunnel

Option 5 does not have an in-use effect on the earth and bedrock.

Despite the injections, the rock tunnelsection will lead to some leaking of groundwater into the tunnel. In the finished tunnel,the amount of water leaking in the finished tunnel is kept below the limit given, which ensures that the

groundwater level does not fall to an adverse extent on the ground. In maritime areas, the groundwater is not affected by a similar leak in the tunnel.

Ve 6 Water traffic from Crounu Mountainside — Central

Option 6 does not have an in-use effect on soil and bedrock and groundwater.

Ve 7 cableways Hakaniemi-Kruunu Mountain

Option 7 does not have an in-use effect on soil and bedrock or groundwater.

Ve 8 Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain

Option 8 does not have an in-use effect on soil and bedrock and groundwater.

9.8 Water, fish and fishing

Ve 0 Carriage buses for Herttoniemi metro station

This option does not have an in-use effect on water bodies.

Ve 1 Rail and light traffic link on bridges from the Kruund to the Kruunu Mountain

The effects during use are related to the stable supporting-structures and terraces in the water of the bridges andthe possible sedentary changes in water flows. For all bridges, the water cross-section of the free opening issmaller than 5 % of the current level. Bridge support can lead tolocal sedimentation, which is estimated to be of limited importance to the aquatic ecosystem and its functioning.

In the case of the bridge between the Isle of Terva Island and Sompa Island, a minor change in the water booth and surface area is of little importance and the impact on the flow is limited, also taking into account the fact that water exchange is already limited at that point. The effect of the bridge between the Tervae Island and Sompasaaren on the water exchange of the tea in the Gulf of Töölö will be small and the bridge will not have any effect on the fish or other aquatic life. The flow change in the Kruunu Mountain bridge between the Kruunu Mountain Bridge and the High Island is also estimated to be limited, as the small change in water cross-sections takes place in a large area of water with good water turnover. The fishing grounds are not affected by the Cruunu Mountains bridge.

In the case of the bridge between Sompa Island and the High Island, the impact of sil structures on currents is slightly higher than in the sites previously shown, although the reduction in thesurface area across the water is proportionally similar. The flows between Sompa Island and the High Island arelikely to be very strong from time to time, since the flow survey carried out (Lude Consulting Oy 2013) prusteellashows such flows in the proximity of thetarget area between Sompa Island and blueberries. In addition, the route in question is also part of the Vantaajoki fishing ladder, which is already very narrow at that point.

The landbank between the High Island and Palosaare reduces to some extent the Mustikkamaa Strait, but this is not estimated to have a significant impact on flows, as flows are mainly north-south pigs in the projectarea. The landbank separates a small water area into a garage-taking between the High Island and Palosaare.

The adverse effects of this option on waterare assessed to be submerged, as the form between Sompa Island and the High Island ensuresan important part of the water body and the area is covered by a very narrow fishing route.

This option may also have positive effects, inter alia, on herring fishing from bridges. The alternative is not expected to have any other fish effects.

Ve 2 Rail and light traffic concrete concrete and bridge link from the Kruund to the Kruunu Mountain

The effects of the bridge between the Tervae Island and SompaIsland and between the Sompa Island and the High Island are set out in Option 1.

The concrete clinic in the Cruunu Mountain has an impact on water exchange, as the water cross-section of the free opening decreases by about 25 % and the barrier becomes around 3 m on the bottom. In the case of concreteitnel, the average depth of water is reduced from around 10 metres to seven metres. The solids of the Vantajoki river accumulate to the north of the concrete concrete which contributes to the accumulation of sediments, as is the case with the dam, and the tunnel prevents water exchange and causes sedimentation to the north of the concrete tunnel. Sedimentation contributes to loweringand may in some cases cause dredging needs. KE where thefluxes of the Vantaajoki river are small, the salty seawater will not penetrate along the bottom to the northern parts of the Kruunu Mountain-Back, and the amount of seawater in the Vanhankaupungin Bay will be reduced. This may result in a reduction in the salinity of the waters of the Bay of Vanhan and an increase in the corrosion of the water area and, consequently, changes in fish and other aquatic life. The amount offine hard material in the north of the tunnel is increasing. Water effects are also likely to occur in the Vanhankaupungin Gulf Natura area. The positive phenomenon is that the solid load from Van tothe south of the concrete tunnel of the Kruunu Mountain can be reduced somewhat, which can improve water quality in the southern Kruunu Mountains.

The water impacts of this option are assessed as significant as the changes brought about by concrete tunnel will be affected by:

important parts of the water body, i.e. the narrow section of the fishing ladder between Sompa Island and the High Island and the Bay of Vanhan Town, which is an important area for other migratory fish routes and has a Na- Tura area- in the north.

This option may have a detrimental effect on recreational fish inthe Gulf of Vanhankaupungin, with possible changes in fish stocks. There is no assessment ofthe impact of the professional street of the Mountain Mountain.

Ve 3 Metro Kamppi-Laajasalo; rock and concrete tunnel and bridge link from Kruunha to Kruunu Mountain Bank

For the Cruunu Mountain Bridge, it is estimated that the changes in flow rates will be limited, as a small change in the water cross-surface area, i.e. less than 5 %, takes place in a large water area with a high water exchange rate. The mountain bridge has no or nospawnings for the fishery.

A concrete pitch between Katajanoka and the High Island- has an impact on water exchange, as the water cross-sectional area is small byabout 25 % and the barrier becomes around 3 m at the bottom. The average depth of water is reduced from around 10 metRI to seven. The solids of the Vantajoki river accumulateto the north of the be- tunnel, which contributes to sediment accumulation, and prevents water exchange and causes sedimentation to the north of the concrete tunnel. Sedimentation contributes to depression and may in some cases cause dredging needs. In the summer, when the fluxesof the Van dove are small, the salty seawater will not penetrate on the bottom to the sea area west of the High Island, and the amount of sea- water entering the Vanhankaupungin Bay will be reduced. This could lead to a reduction in the salinity of the waters of the Bay of Vanhankau and an increase in the corrosion of the water area and, consequently, changes in fish and other aquatic life. The amount offine hard material in the north of the tunnel is increasing. Water effects are also likely to occur in the Vanhankaupungin Gulf Natura area. The project also potentially reduces water exchange in the Gulf of Töölön. The positive phenomenon is that the solid load from Vantajoki is kept to the south of the concrete tunnel, i.e. a- reduction in the material load of the outer sea area.

The movement of the metro in concrete tunnels causes noise,which can expel fish. It is possible that underwater noise and its inconvenience are so high that migratory fish start avoiding the western route of the fishway.

The water impacts of this option are assessed as very significant, as the changes caused by concrete-itunnelare targeted at an important part of the water body's dynamics and are significant. The permanent changes will affect the western part of the Vantaa River Fish Corridor and possibly the Vanhan Town Bay, which is an important area, inter alia as a migration route, with a Natura site in the north. The west of the Vantaajoki fishing ladder is endangered by the underwater noisecaused by the underwater noise caused by the metrolial.

This option may have a detrimental effect on recreational fish inthe Gulf of Vanhankaupungin, with possible changes in fish stocks. There is no assessment ofthe impact of the professional street of the Mountain Mountain.

Ve 4 Metro Kamppi-Laajasalo; rock and concrete tunnels

Concrete tunnels have an impact on water interchange, as the cross-sectional area of the water decreases by about 25 % and the baseof the tea is about three metres. The average depth of water is reduced from around 10 metres to seven metres. The solids of the Vantaajokiriver accumulate to the north of the concrete concrete tunnel which contributesto the accumulation of sediments, as is the case with the dam, and the tunnel prevents water exchange and causes sedimentation to the north of the concrete tunnel. Sedimentation contributes to depression and may in some cases cause dredgingneeds. In the summer, when the Vantajoki river has small flows, the sea water of thelaw cannot be pushed along the bottom to the north of the bridges and to the Bay of Vanhan Town. The 'Seanuksena' is the reduction in the salinity of the waters of the Bay of Vanhankaupungin, and the intensificationof the corrosion of the water basin and, consequently, changes in the fish and the rest ofthe slurry. The amount of fine material to the north of the tunnels is increasing. Water impacts also occur in the Vanhankaupungin Bay Natura area. The project may alsoreduce water exchange in the Gulf of Töölö. A positive phenomenon is that the solid load from Vantajoki to the south of theCruunu Mountain concrete tunnel can improve waterquality in the southern Kruunu Mountain.

The movement of the metro in concrete tunnels causes noiseand can expel fish. It is possible that underwater noise and its nuisances are so high that migratory fish pick up in- the Vantajoki river significantly.

The water effects of this option are assessed as highly- damaging, as the changes caused by concrete tunnels affect an important part of the water body's dynamics and are large. Permanent changes will affect otherprotected fish species and the Bay of Vanhankaupungin, which is an important area, including as a route for migratory fish, with a Natura site in the north.

This option is likely to have adverse effects on caterers in the Bay ofVanhankaupung, as a result of possible fish changes. It is estimated that therewill be no impact on cargo from the trade of the Cruunu Mountain.

Ve 5 Metro Kamppi-Laajasalo; rock tunnel

This option has no effects on water bodies during use, nor impacts on fisheries or fisheries.

Ve 6 Water traffic from Crounu Mountainside — Central

This option has no effects on water bodies during use, nor impacts on fisheries or fisheries.

Ve 7 cableways Hakaniemi-Kruunu Mountain

This option has no effects on water bodies during use, nor impacts on fisheries or fisheries.

Ve 8 Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain

This option has no effects on water bodies during use, nor impacts on fisheries or fisheries.

9.9 Other nature

Nature reserves, Natura sites and other valuable natural sites

The nature reserves inthe vicinity of the project are not affected by any change in their characteristics.

In the north of the Kruunu Mountain, between Mustikkamaa and Kulosa Island, there are no bulb-change effects onthe bulbs, but noise can cause significant damage during construction. The loans mainly cover logs, which are excellent pilots. In the case of options involving bridge or cableway fields, individual birds may be impacted with structures. Isolatedyoung individuals are vulnerable to collisions.

The area north of the project area, closest to adistance of about 2.5 kg from the High Island, is located in the nature reserves of the Bay of Viikki-Vanhan and the bird water in Vanhan kaupunki-Gulf (FI0100062). The activity or construction does not have an impact on the water quality or habitats of the site under options VE 1, VE 5, VE 6 and VE 7. For options VE 2, VE 3 and VE 4, concrete tunnels can have a significant impact on the low bay habitat. If these options go ahead with further planning, a Na- Tura assessment within the meaning of the Nature Conservation Act will be necessary.

In addition, there are no adverse effects on the breeding environment or the conditions of the bird population in the- protected area. Indirect effects on the bird population may, however, arise from occasional collisions of birds with the bridge structure under Options VE 1, VE 7 and VE8. The 2011 bird club suggests that the Cruunu Mountains are mainly breeding bird species in the nearby environment, such as guinea-bed guinea fowl. The results do not suggest that there will be a high number of dining flights across the bridge for species nesting the Vanhankaupungin Gulf della. However, it should be noted that the bird monitoring was concentrated in the area of the Kruunu Mountain.

Vegetation and fauna

Ve 0 Carriage buses for Herttoniemi metro station

This option does not involve scattered fields affecting the-natural environment. The option does not have an in--service impact on vegetation or fauna.

Ve 1 Rail and light traffic link on bridges from the Kruund to the Kruunu Mountain

There are no impacts on vegetationand habitats. The bridge between the High Island and the Larasalo may adversely affect the nesting bird of the dam and the Nimman's bullets, as they are located in the verynucleus of the bridge. Traffic noise can cause disturbance to the bird population and noise and traffic can reduce the suitability of bullets as lagoon breeding sites in municipalities. Birds may also be impacted with bridge structures. Collisions are most likely to occur on the bridge wire ropes. The main bridge structures are very distinct. The Lokplates are most active across the bridge structure and are therefore likely to be affected by themouth. Otherwise, there is relatively little movement of birds across the bridge structure.

Some bird collisions with bridges have been studied in Eu-Roopa. However, as a structure, bridges are moreaccessible than electricity lines. For the Swedish-Denmark bridge, it was estimated that between 0.01 % and 0.05 % of birds over the bridgewould come into contact with structures.

The barrier effect of the bridge is marginal and does not have a strong impacton the energy use of birds.

Ve 2 Rail and light traffic concrete concrete and bridge link from the Kruund to the Kruunu Mountain

There are no specific effects on vegetation onthe activity, the effects occur during construction, when the beacharea becomes a built environment.

The bridges from Kruundoun to Sompa Islands and Sompasa toResta High Island are not located on the main flightroutes of the birds. Bridges are of low construction. In the case of bridge roads with pylons and head-widths, it is possible that individual birds may be hit by wire ropes. If bridges are constructed without head-lines, the bridges themselves do not pose a particular risk of collision to the bird population. Tramway wiresmay cause individual bird collisions. The embossing of thin conductors into bird balls has been identified as an effective means of reducing collisions.

The use of concreteitunnel does not cause harm to fauna. Impacts on the aquatic environment have been addressed-separately.

Ve 3 Metro Kamppi-Laajasalo; rock and concrete tunnel and bridge link from Kruunha to Kruunu Mountain Bank

The effects are similar to those of Option 2, as the difference betweenthe electrical current of the metro from the runway adjacentto the track and the absence of overhead contact lines with which individual birds could be impacted is not linked to the metro.

Ve 4 Metro Kamppi-Laajasalo; rock and concrete tunnels

The activity does not adversely affect vegetation or animal work,as the transport connections are located throughout the entire journey to the lime tunnel.

Ve 5 Metro Kamppi-Laajasalo; rock tunnel

This option does not involve scattered fields affecting the-natural environment. The option has no impact on vegetation or fauna. The activity does not cause harmto vegetation or fauna.

Ve 6 Water traffic from Crounu Mountainside — Central

The activity does not adversely affect vegetation or animal-activity. Navigation by ferries or waterbuses is located in the southern partof the Kruunu Mountain, which is moderately distant from the main birds' necks. The waterbus traffic has no significant adverse effects on the breeding bird in the area or on the bird transversal, as the current volume of navigation on the Kruunuvuo-Rhine Rhine is significant and the navigation of this project is far from the nesting and bullets.

Ve 7 cableways Hakaniemi-Kruunu Mountain

The activity does not adversely affect vegetation. Cableway structures increase the risk for birds to crosscables. As a construction, a cableway can be compared to apower line. The risk of collision with cables is highest in bad weather, thus not separating the cables.

The cableway is more distant from the mother's and Nimisman's bullets, and the cableway is relatively non-existent. The option is unlikely to have any sheathsthat would impair the suitability of the bullets as nesting environments.

Cableway structures expose the birds to collisions,-sequencing the line wires. For the assessment of collisions, a cableway may be assimilated to structurally similar high tension-drive lines (110 kV or 400 kV). Bird collisions with power lines have been studied quite extensively in the world. Collisions aremost affected by the active mouth of thebird. A large number of collisions have been recorded in some places. The most vulnerable species are large birds such as swimmings, geese and prey.

There is no significant number of birds flown across the-Köysway link. Migratory movements are relatively low and during the breeding season the vast majority of bird flights are ice bird flights. Individual bird collisions may occur but, taking into account the birdistic nature of the area, this is not estimated to have an impact on the population level. The marking of cableway wires on a bird ball reduces the risk of bird collision with the cables.

Ve 8 Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain

The impacts are similar to those of option 1. The option-differs from option 1 as a wider bridge structure ifthere is also vehicle traffic. These differences do not have different effects on vegetation or animal activity that differ from Condition1. There is some increase in traffic noise, which can have a negative impact on the nesting environment of nearby bullets.

10 Synergies and integration with other plans

This chapter describes the potential impact of the combined effects of ongoing projects in the region and the alternatives to rail transport in Laajasalo. The projects and plans to which the project may be conceived are also mentioned.

10.1 Hanasaari power plant solutions

The project is essentially concerned with the objective of a significantincrease in the use of biofuel in its Helsinki power plants under the Helsinki Energy DevelopmentProgramme. The conditions forthe exchange are either to implement a new multi-fuel power plant in Vuosaare or to increase the use of biofuelsto 40 cents at the Hanasaari and Salmisaaari power plants. If the new power plant is implemented in Vuosaare, the power plant onthe island of Hana may be dismantled. The transport and maintenance of fuel by sea to the port of the Hanas Islands power plant partly affects the same area as some of the options considered in this EIA.

The construction of the Sompa Island-Kruunhaka bridge and the operation of the Hanasaari power plant are incompatible with each other due to the maritime transport of fuels if the bridge is constructed before the plant ceases operating inHa nasaari. A further connection from Sompa Island to Kruunha can only be fully operational under the scenario where energy production at the Hanasaari B power plant has ceased and a new multi-fuel power plant is located in Vuosaaari. From the point of view of the operation of the power plant, the bridge between Sompasaa reland and Kruununha would have an adverse effect on the fluidity and security of transport of fuel and materials.

See also Chapter 9.2.10 The transport effects of Hana Islands fuel transport and Chapter 14 Uncertainty factors

10.2 Amendments to the Isle of Sompa Islands

The Isle of Sompa Island is the main channel of freshwater flow from the river Vantaa to the Kruunu Mountains. As part of theconstruction of the fishing port, the strait in the Sörnäistenniemi area has been filled in about one district and theassociated street area. The flow conditions have thus changed. No flow-measuring road toa is available for the pre-loading period.

The lightest point of the Isleof Sompa Island was approximately 185 metres before construction in the town plan. The narrowest point between this period is about 125 metres after the completion of the works. The smallest point of the strait lies southward between Sompa Island and Mustikkamaa, where the current smallest width is approximately 116 metres. In Sompasaari's pending draft urban development plan, the gap is proposed to be reduced by 10 metres.

The Bridging Options under consideration in the RTP are not located at the narrowest pointof the strait, but between Nihd (now Sompasaari) andKorkesa Ren. The bridge would be constructed at a point approximately 260 metres wide. The narrowest point of this strait is located at thetop of the ETE and is approximately 210 metres in width. After the northern part of the Isle of Sompa Island, the water is also accessed through the Mustikka-Land. The impact of the project on the reduction of the bedding does not occur in the same range as the urbandevelopment plans or the bonuses, which is presumably a mitigating factor for the cumulative effects.

10.3 Land use plans

The project relates, inter alia, to land use planning inthe following areas:

- Crown Mountain
- Herttoniemi; Eastern Waterway and Linnanrakantajan Road
- Fishing port area
- Other development of the broad room (centre)
- Development of the High Island (Bulk Island-Master Plan)
- Helsinki Park.

In the vicinity of the project area, there are areas for which the principles of planned land use and transport connections remain to be definitively resolved. These include the guard on theisland and Kivinokka.

10.4 Water remediation projects

Since 2005, the Gulf of Töölön has been runninga refurbishment project in which sea water has been extracted from Humallahti, west of Helsinki. When thelifting project has an environmental permit and sewers inaccordance with it (Western Finland Environmental Permit Authority, 12.2.2004, No 17/2004/1). There isno significant impact on the Töölö Bay and the projects have no significant cumulative effects on the estuary of Vantaajoki.

11 Prevention and mitigation of adverse effects

This explains how possible adverse environmental impacts can be prevented or mitigated through the choice of working methods, timing or monitoring. These disadvantages can be mitigated, inter alia, by specific measures to combat in-use harm or by demarcating work areas.
Interaction and information is important to enable the inhabitants and users of the region

11.1 Water construction

As far as possible, the timing ofcarrying out dredging and other construction operations shall be such as to cause as little harm as possible to protected species, other biota and water use. The timing of the workis designed to take into account the uprising and spawning periods of fish. However, it makes sense to carry out the works in such a way as to reduce the overall water pollution to thelowest possible level. In this case, it is preferable to work in parallel, rather than to spread the construction works over several years.

The aim is to use environmentallysound and generally accepted methods as dredging and construction methods. When feeding contaminated sediments, specialattention is paid to dredging methods. For example,silt curtains can be used to limit the spread of solids and harms bound to the solidin bark restricted environments.

Professional fishermen in the catchment area of the project will be informed about the work to be carried out in advance. Work will be interrupted if the hayis absorbed by a significant spread of turbidity to a large area or towards sensitive areas such as the Vanhankaupun-Ginlago Natura site. Such situations may take the formof hard winds, for example.

During construction, the flow of water from the Humal bay to the Töölö Bay may be added. The gentleis used to intensify the flow eastwards from theGulf of Töölön, which in turn reduces the flow of water and the potential load of solids and harmful substances from project berth to Töölön Bay.

11.2 Underwater ancient residues

The presence of underwater architectural residues maps outthe areas of impact of the construction beforethe start of the works. If an architectural remains in the survey or at alater stage, the necessary activities will be planned with the Museum Agency.

Prevention of adverse effects is aimed at storing either the object or its data content in future generations. The necessary steps to consider the procedure on a case-by-case basis may be, for example, a case-by-case documentation of the site. In some cases, a potential site-may be transferred to another site for examination, for example old iron anchors may be moved away from the project.

11.3 Impact on people's daily lives, recreation and health

In order to reduce the nuisance of the site, transport and noise, the fencing, the accumulation of soil into high noise-barriers, the dedusting of equipment and other suitable methods of buildingin good and environmentally friendly conditions may be used.

Information throughout design and construction is key to mitigating harm and minimising harm experimentation. During construction, the use of appropriate communication formats and tools for different groups and rapid reactions to incident reports will be proposed.

Water transport or partial waterborne transport isproposed for the transfer of materials and masses.

The verification of vibration or body noise, as well as the design ofworm mitigation measures, shall be carried out by means of site-specific measurements.

12 Significant impacts by option

Table 12.1. Ve 0 Carriage buses for Herttoniemi metro station.

VE 0	Environment	Land-use planning and transport
	The western edge of Herttoniemi's nationally valuable map park is transformed from a built cultural environment into a transport area. The impact is significant. The effects of the construction of the tunnel on traffic and nearby traffic are significant. The above effects are also the same for options VE 1 to VE 7.	In 2035, public transport will operate on the same basis as today. Frequency is more frequent than is currently the case. This option is not in line with the objectives set out in the zoning.

Table 12.2. Ve 1 Rail and light traffic link on bridges from the Kruund to the Kruunu Mountain.

VE 1	Environment	Land-use planning and transport
	The three bridges to be constructed will significantly change the landscape image of the maritime Helsinki surrounding the Kruunu Mountain spine. The urban image effects of the nostos bridge are significant. The handicaps to the racing and exercise activities of the Cruunu Mountain spine are significant. The effects on water bodies during construction are assessed as significant due to, inter alia, dredging, filling and embankment on the Palosaaari and High Island soils and the presence of protected fish species such as trout and migratory pigs. There is a conflict between the construction of the Sompa Island-Kruunhaka bridge and the operation of the Hanasaari power plant if the bridge is constructed before the plant ceases to operate in Hanasaari. A further connection from Sompa Island to Kruunha can only be fully operational under the scenario where energy production at the Hanasaari B power plant has ceased and a new multi-fuel power plant is located in Vuosaaari.	There is a well-functioning link between rail and light traffic on the bridges from the Kruununha to the Kruunu Mountain. Frequency on line (a) 5 minutes and on line (b) 7.5 minutes. To promote the use of public transport and lightweight transport and to improve accessibility between Laajasalo and the city of origin, thus also in line with the objectives of town and country planning. Provides a walking and cycling connection from the Broadhouse to the centre. Connect the High Island with rail transport.

Table 12.3. Ve 2 Rail and light traffic concrete concrete and bridge link from the Kruund to the Kruunu Mountain.

VE 2	Environment	Land-use planning and transport
	The two bridges to be constructed in the option change the landscape image of the maritime Helsinki. The urban image effects of the nostos bridge are significant. The effects on the water body during construction are assessed as **very significant** due to the large-scale construction of concrete tunnels and the presence of protected fish species such as trout and migratory pigs, which in the worst case may also affect a Natura site. During operation, the tunnel reduces water exchange and increases harmful sedimentation. The impact is **very significant**. There is a conflict between the construction of the Sompa Island-Kruunhaka bridge and the operation of the Hanasaari power plant if the bridge is constructed before the plant ceases to operate in Hanasaari. A further connection from Sompa Island to Kruunha can only be fully operational under the scenario where energy production at the Hanasaari B power plant has ceased and a new multi-fuel power plant is located in Vuosaaari. UNFEASIBLE DUE TO VERY SIGNIFICANT ENVIRONMENTAL IMPACTS	The railway and light traffic link in the bridges from the Kruund to the High Island and still in the concrete tunnel to the Kruunu Mountain shore is well-functioning, but its convenience for cyclists and walkers is well below option 1. Frequency on line (a) 5 minutes and on line (b) 7.5 minutes. Promotes the use of public transport and light traffic and improves accessibility between Laajasalo and the metropolitan city and is therefore in line with the objectives of general planning, but on the Kruunu Mountain-Bay Coast there is no provision for this in the town planning.

Table 12.4. Ve 3 Metro Kamppi-Laajasalo; rock and concrete tunnel and bridge link from the Kruund to the Kruunu Mountain Bank.

VE 3	Environment	Land-use planning and transport

	The section in the rock tunnel from Kamp to Katajanoka is a technically demanding construction project. Undershooting of the strait from Katajanoka to the High Island requires the construction of a submersible concrete tunnel, which is detrimental to navigation and boating during construction. The large-scale bridge of this option will significantly change the landscape image of the maritime Helsinki surrounding the Kruunu Mountain spine. The effects on water bodies during construction are assessed as **very significant** due to the large-scale construction of concrete tunnels and the presence of protected fish species such as trout and migratory pigs and the potential impact on the Natura site. During operation, the tunnel reduces water exchange and increases harmful sedimentation. The impact is significant. From the mountains, the landscape is changing greatly and these changes can be seen as negative. Landscape effects are significant.	Metro is an efficient public transport system in line with the objectives set out in general planning, promotes public transport, including walking and cycling, and improves accessibility between Laajasalo and the convenience city. The metro connection is fast and provides capacity for future needs. Frequency of 7.5 minutes. The bridge from High Island to Kruunu Mountain has a light traffic connection alongside the metro. During the construction of a tunnel between Katajanoka and the High Island, shipping traffic is adversely affected. The link from the bridge to the Kruunu Mountain area is no longer possible under the approved urban development plan.

Table 12.5. Ve 4 Metro Kamppi-Laajasalo; rock and concrete tunnel.

VE 4	Environment	Land-use planning and transport
	The section in the rock tunnel from Kamp to Katajanoka is a technically demanding construction project. Undershooting the Strait from Katajanoka to the High Island and from the High Island to the Kruunu Mountain Bank requires the construction of two submersible concrete tunnels. The construction of concrete tunnels causes significant damage to boating and shipping. The effects on the water body during construction are assessed as **very significant** due to large-scale construction projects of two concrete concrete tunnels and the presence of protected fish species such as trout and migratory pigs and the potential impact on the Natura site. Concrete tunnels have **very significant** adverse effects on water exchange and sedimentation and possibly also on recreational fisheries in the Gulf of Vanhankaupungin (fishway). UNFEASIBLE DUE TO VERY SIGNIFICANT ENVIRONMENTAL IMPACTS	The metro link is an efficient public transport system in line with the objectives set out in general planning, promotes the use of public transport and improves accessibility between Broadsalo and the city of origin. Frequency of 7.5 minutes. The metro connection is fast. It will also provide capacity for future needs. During the construction of a tunnel between Katajanoka and the High Island, shipping traffic is adversely affected.

Table 12.6. Ve 5 Metro Kamppi-Laajasalo; rock tunnel.

VE 5	Environment	Land-use planning and transport
	This option has significant local amenity problems during construction due to the vibrations of rock mining and crushing. Other metro options also have similar impacts but short-term disruptions in the urban area.	There is a very demanding construction project between Metro Kamp and Laajasalo, which includes many risks in terms of feasibility, rescue safety and construction costs; The metro link with the Kruunu Mountain shore is an efficient public transport system in line with the objectives of general planning, promotes the use of public transport and improves accessibility between Laajasalo and the convenience city. Frequency of 7.5 minutes. The light traffic link is not implemented.

Table 12.7. Ve 6 Water traffic from Crounu Mountainside — Central.

VE 6	Environment	Land-use planning and transport
	The construction of transport infrastructure and waterborne transport will not have significant adverse environmental impacts.	The Bussifer between Laajasalo and Katajanoka opens a new public transportconnection, in particular from the Kruunu Mountain to its core centre, alongside the existing public transport system. The frequency is 6 minutes. It is estimated that the link will not significantly increase public transport and will have little impact on the modal split. The majority of public transport users pass through Herttoniemi via metro to the centre.

Table 12.8. Ve 7 cableways Hakaniemi-Kruunu Mountain.

VE 7	Environment	Land-use planning and transport

	This option brings a new element to the landscape picture. The overall impact can be assessed as moderate. However, in Hakaniemi and Meriha, the main pillars and stations of the cableway in particular change the picture of the city. The main pillars and stations of the cableway are a major change in the urban image of Hakaniemi and Meriha.	The cableway Hakaniemi-Kruunu Mountain is an effective means of transport between Hakaniemi and Kruunu Mountain and offers a parallel public transport route to Sompa Islands. It may prove problematic to adapt the system to the urban structure, as well as further connections from the Kruunu Mountains region. There are many exchanges at both ends on the Köysway link. The connection to the core centre will not be very rapid. There is little experience with the Köysira as part of a heavy public transport system.

Table 12.9. Ve 8 Vehicle, tramway and light traffic connection at bridges between Keskusta and Kruunu Mountain.

VE 8	**Environment**	**Land-use planning and transport**
	The three bridges to be constructed will significantly change the landscape image of the maritime Helsinki surrounding the Kruunu Mountain spine. The urban image effects of the nostos bridge are significant. This option does not include the Tunnel of the Linnan Attorney Roads. In other options, the damage to the Herttonieemi Centre area during construction will not materialise, but the future traffic regime will not be sufficient to prevent the effects of increased traffic and noise and comfort. Traffic congestion is severe due to the connection of the fishing port, with the handicaps in the residential area being **very significant**. The disadvantages of congestion in the Herttoniemi Centre's area may be significant, however, the connection with the eastern waterway appears to be working satisfactorily. The handicaps to the racing and exercise activities of the Cruunu Mountain spine are significant. The effects on water during construction are assessed as significant due to, among other things, the dredging, filling and embankment of the Palosa and High Island land beds and the presence of protected fish species such as trout and migratory pigs. There is a conflict between the construction of the Sompa Island-Kruunhaka bridge and the operation of the Hanasaari power plant if the bridge is constructed before the plant ceases to operate in Hanasaari. A further connection from Sompa Island to Kruunha can only be fully operational under the scenario where energy production at the Hanasaari B power plant has ceased and a new multi-fuel power plant is located in Vuosaaari.	It is technically feasible to connect vehicles, tramways and light traffic at bridges. Increased traffic in Kruunha and in the fishing port area. Traffic congestion is increasing. On the tram line (a) 5 minutes and (b) 7.5 minutes. Causes significant disadvantages in a large area. Reduce the use of public transport. There is a well-functioning connection between the centre and the Kruunu Mountain line between tramways and light traffic on bridges from Kruununha to the Kruunu Mountain. It promotes the use of public transport and lightweight transport and improves accessibility between the city of Laajasalo and the city of origin and, in that respect, is in line with the objectives of town and country planning.

13 Overview of the impact on transport

Under standard option VE 0, passengers go to Herttoniemi metro station using buses and switch to metro. During the morning peak hours,the Herttoni Strait bridge crosses just under 3 600 passengers. There are more than 13700 passengers travelling backwards on the metro.

The metro and tram options will reduce the number of morning peakhours between 2 100 and 2 300 morning peak hours. In the case of the Kruu doll, the number of passengers is between 3 300 and 3 500 on metro and trams.

The bus ferry option will reduce thenumber of passengers going to the centre at Kulosaaari by about 900 morning peak hours in 2035, according to forecasts. There would be 1 100 ferry crossings.

In the case of the Köys Irridgeoption, the number of passengers going to the centre will be reduced by abundantlyla 1,000 morning peak hours in Kulosaaari in 2035, according to predictions. The Cruunu Mountain Self exceeds almost 1 500 passengers.

Under the rail-vehicle bridging option, the number of public transport passengers travellingto the centre in metro will decrease by 2 450 persons in the morning peak hour in 2035, according to forecasts. There would be more than 3 200 tram passengers on the back.

Table 13.1 shows the number of public transport passengers and thenumber of cars at the bridges to the Kulosaaari and the Herttoniemi Strait and in the Kruunu Mountains. The figures are the traffic forecast for teaand reflect the situation of the morning peak hour in 2035.

Table 13.1. The number of public transport passengers and the number of vehicles towards the centre at the bridges to the Kulosaaari and the Herttonie Strait and in the Kruunu Mountains.

Morning peak-hour passengers in 2035

Option	At the Bolosaary Bridge		On the Herttoni Street bridge		In the Crown Mountains	
	passengers	cars	passengers	cars	passengers	cars
VE 0	13 735	4 894	3 570	2 465	0	
VE 1, VE 2	11 432	4 738	724	2 135	3 513	
VE 3, VE 4, VE 5	11 564	4 761	900	2 097	3 344	
VE 6	12 823	4 884	2 561	2 406	1 116	
VE 7	12 710	4 839	2 462	2 259	1 491	
VE 8	11 287	4 563	725	1 677	3 225	821

Change in the number of passengers per morning peak hour in 2035 compared to

Option	At the Bolosaary Bridge		On the Herttoni Street bridge		In the Crown Mountains	
	passengers	cars	passengers	cars	passengers	cars
VE 1, VE 2	—	—	—	—330	3 513	0
VE 3, VE 4, VE 5	—	—	—	—368	3 344	0
VE 6	—	—10	—	—59	1 116	0
VE 7	—	—55	—	—206	1 491	0
VE 8	—	—	—	—788	3 225	821

Relative change in the number of passengers per morning peak hour in 2035 compared to option VE 0

Option	At the Bolosaary Bridge		On the Herttoni Street bridge	
	passengers	cars	passengers	cars
VE 1, VE 2	—17 %	—	—80 %	—
VE 3, VE 4, VE 5	—16 %	—	—75 %	—
VE 6	—7 %	0 %	—28 %	—2 %
VE 7	—7 %	—	—31 %	—8 %
VE 8	—18 %	—	—80 %	—

The tram option will reduce the number of cars congested on the Kulosaar Bridge in more than 150 aa-hour hours. The bridge between the ladder and Herttoniemi is reduced by 330 vehicles. Some carusers have switched to public transport.

The metro option will reduce the number of cars running in the congested direction of the Kulosaar Bridge by more than 130 morning falls. The bridge between the ladder and Herttoniemi is reduced by 370 vehicles. Some car users have switched to public transport.

The brush ferry option will reduce the number of cars passing through the Kulosaar Bridge in more than 10 morning peak hours. There are 60 fewer vehicles running on the bridge between the latency and Herttoniemi. The bus ferry has little influence on the traffic pattern.

In the case of the Köysway option, the number of cars passing through the Kulosaaari Bridge will be reduced by more than 50 morning peak hours. The bridge between the ladder and Herttoniemi is reduced by 200 vehicles. Some car users have switched to public transport.

Under the rail-vehicle bridge option,the number of peak openings on the KulosaIsland bridge is about 330 morning peak hours. The bridge between the Broadband and Herttoniemi is less than 800 vehicles. There will be a decline in the number of mobile vehicleson the Rantat road between 200 and 450 vehicles in their direction. Under the option, the Sompa Island street network consists of a through-link fromthe lake Ka to Kruunhaka. According to the model, the number of vehicles in the connection increases by 700-800 vehicles in the direction of a shredder threat. The roads on the Hermanncoastline increase by 200-320 vehicles in their direction. The crown getsless than 1 200 vehicles in the direction of congestion. This option will increase traffic in the street network at Kruununha by up to 400 vehicles on themost congested lines.

In the simulation reviews carried out, the tram-and-driving bridging option leads to significant queues in the Kalaport area. Traffic cannot be slippedthrough the Hermann coastline. Delays per direction and queues increase exponentiallythroughout the peak hours. During the morning peak hours, traffic arriving via Sompa Island loads theconnections along the Herma Nu riparian road with a very high load factor.

Table 13.2 shows the staggering figures over the entire region whenthreshed. The figures for option 0 are totals and thenumber of options is a change compared to it.

Table 13.3 shows the share of public transport inthe motorised journeys over the whole transport model region.

Table 13.2. Traffic indicators calculated from the transport model in 2035.

	VE 0	VE 1, VE 2	VE 3, VE 4, VE 5	VE 6	VE 7	VE 8
car journeys a day	3 150 298	—	—6 651	843	—2 348	288
jelly mats a day	1 235 666	10 803	9 381	—113	3 944	8 006
walking+pp days	1 424 557	—	—3 159	—708	—1 335	—8 295
total	5 810 520	—396	—429	22	261	0
haemorrhagic accidents	9	0	0	0	0	0
light-duty fuel consumption. (L)	2 895	—5	—8	3	—4	—5
heavy-duty fuel consumption. (L)	584	—1	—2	1	—1	—1
CO_2 (1000 tonnes)	10 547	—35	—56	23	—30	—38

Table 13.3. Share of public transport in the region (motorised transport).

Share of public transport	VE 0	VE 1, VE 2	VE 3, VE 4, VE 5	VE 6	VE 7	VE 8
motorised trips	28.17 %	28.39 %	28.37 %	28.17 %	28.25 %	28.30 %
change	21.27 %	0.21 %	0.20 %	—	0.08 %	0.13 %

14 Uncertainty factors

14.1 Uncertainties and assumptions in the

Level of plans

The evaluation is based on plans at different times and with a different levelof detail. The most detailed plans have been usedfor tramway options VE 1 and VE 2 and the metro option VE 3 for the Kruunuvuo-Round part.

Studies carried out

Insufficient data on sediment harmful concentrations are available for the final impact assessment at project design level in all areas. In addition, the sediment studies carried out differed, inter alia, in terms of parameters and sampling depths, which hampered the comparability of the results. However, there is a lot of material and thiswill be further refined during further planning as necessary. There has not yet been a risk analysis of awoman with regard to sediment harmful substances. The impact assessments will be refined in this respect when applying for authorisation.

For the purpose of the environmental impact assessment, the project carried out flow measurements for about four points over a period of approximately four months. Although flow measurements and the interpretation of their results were conducted in an informed manner and gave a good picture of the han flows, the interpretation of flow results provideduncertainty about the shorter measurement time and the number of flow measurement points. At a later stage, flow modelling and solid spread modelling may be used to refine the impact estimates in the context of licence applications.

Construction methods and work areas

It is only at the time of drawing up the design of the building thatthe final method of construction will be decided. In practice, theplace of works is always to determine the final method of construction. The designer makes a proposal for the construction method and the subscriber imposes-conditions for the construction. The final solution is the choice of the contractor accepted by the contractor.

In particular, the assessment of the effects in the construction phase is based on the assumption of the method of construction,but on a description of the method of construction or knowledge of best construction practices. In line with the precautionary principle, the impact assessment has presented the "worst possible"tide.

There was not yet sufficient information onworking methods (e.g. dredging methods) and timing. The working methods and timing shall be chosen taking into account the results of the evaluation and subsequent studies.

Cost estimates and profitability comparisons

The environmental impact assessment has looked at the options for public transport in Laajasalo, which have so far been designed mainly with theaccuracy of the general plan. The options are very different and are also projects of differentsizes in terms of cost. The technically demanding costof projects can be estimated with sufficient reliability for comparison and project decision-making once the design has reached a more precise level. The work of tram, walking and cycling bridges, which is important for the economic comparison of alternatives, and which has been accepted by the Helsinki Borough Council asa basis for furtherplanning, consists of special structures,the implementation of which falls far short of thenormal construction process. The estimated costs of the bridge project available at the time of drawing up the EIA are based onthe calculations produced by the competition for the silhouettes and the clarifications and additions made possible by the current planning accuracy. In order to provide the correct cost estimate, the construction of bridges, the identification of-uncertainties and the examination of the other cost elements related to the project portfolio are required.

The environmental impact assessment does not require an economic assessment of the alternatives to be compared. As planning accuracy has not been sufficient at the time of the assessment to allow for a consistent comparison of costs and urban profitability, there are no profitability estimates.

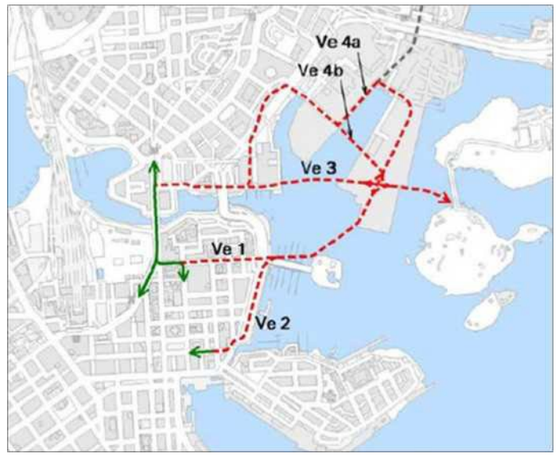


Figure 14.1. Alternative tramway routes from the metropolitan city to the Sompasaari-Kalaport area and further to the Kruunu Mountain.

to be presented in the evaluation report. One of the alternatives demonstratedby the environmental impact of the EIA to beimplemented may be applied. Project decisions require further technical and financial planning.

Sub-options at the western end of tramways

The route through Liisankatu has been selected as the basic solution for the western end of the stairway options *(Kuva 14.1)* and is based on its implementation. If the solution is different, it will have an impact on transport, makeusable, amenity, environmental disorders, different landscapes on-land and urban images.

One feature of the sub-options Ve1 and Ve2 of the rail transport options is that tramwayscan only function as part of the transport system ifthe lifting bridge between the North and Sompa Islands is onlyopened outside the day-ahead service.

In the case of the sub-option Ve 3in the case of rail transport options, there is no possibility to build a bridge section for the transport of the Hanasaari power plant by ship.

Tunnel of the runways

Traffic modelling and traffic impact assessment have been carried out in such a way that the four solutions for slurry construction have been assumed forall other options exceptin Option 8.

Hanasaari power plant and its maritime transport

On 23 January 2014, Helsinki Energia issued a statement on the impact ofthe railway bridges on the operation of the Hanasaari power plant.

It is essential that:

The construction of the Sompa Island-Kruunhaka Bridge and the operation of the Hanasaari power plant are incompatible with any singlepitch if the bridge is built before the end of the power plant operation in Hanasaari. A further connection from Sompa Island to Kruunha can only be made operational under the scenario where energy production at the Hanas Island B-voi site has ceased and a new mo-fuel power plant is installed in Vuosaaari.

and that:

in its decision, theCity Council has required Helsinki Energia, in 2015, to introduce theHelen Development Programme to increase the use of renewable fuels, either by continuing to-use the Hanasaari power plant and by increasing pellets to-about 40 % of fuel energe, or by the construction of a new multi-fuel power plant in Vuosaaari which, once completed, will stop operating the power plant on theisland of Hana. In order forit to be possible to genuinely decide on the choice of option, no other solution should exclude eitherexchange. If a bridge between Kruununha and Sompa Island is decided tobe constructed, the effects on Hanas Islands' fuel supply are such that it is impracticable to operate the power plant and develop it as planned. The coordination of the incinerators of the traffic planned for the bridge and of the power plant, as described, is not workable. In the opinion of Helsinki Energia, Sompasaari and

The construction of the Kruununha Bridge should not be decided until the City Council has taken a decision on the implementation ofthe Hel Sing Energy Development Programme.

The summary of the opinion states:

The construction of the bridge link between the Broadband and SompaIslands does not affect the fuelkulls of the Hanas Islands power plants.

The bridge between Sompa Island and Kruununha is incompatible with the maritime transport needs of the Hanasaari power plant. If the City Council decides that Option 1 will be implemented, i.e. the construction of a new power plant replacing the Hanasaari powerplant in Vuosaare, provision should be made for the continued transport of fuel to the port of Hanasaari and some increase to some extent until the beginning of the 2020s,until the power plant in Hanasaari canbe stopped once the new power plant becomes operational.

If the City Council decides that Option 2 is implemented,i.e. the share of renewable energy is increased to at least 40 % for existing coal plants, the Hanasaari B power plant will continue to be used. The undisturbed operation and operation of the Hanasaari power plant requires approximately 100-160 fuel transports to the Hanasaari port every year. Fuel transport is not spread evenly throughout the year, but is concentrated in the heating delle. In autumn and winter, with the largest vessels enteringthe port, the average number of vessels entering the port is 1-2 days. Due to the intermittent fluctuations in traffic due to logistics and conditions, the port of Hanasaari must be able to change the vessel during the day on each berth, i.e. for atotal of four trips per day to or from the port under the bridge.

In addition, port ice-breaking services as well as escort tugs are needed to ensure the passage of vessels transporting fuels, which contribute to the increase of shipping traffic along the route to and from the port basin.

There is a sharp discrepancy between the construction of the bridge to Sompasaari-Kruunha and the transport of fuel by the power plants on theisland of Hana. The construction of a bridge between Kruununha and Sompasaari over the waterway leading to the port of Hana Island would have the following consequences for the transport of fuel at the Hana-Island power plant and the operationof the bridge:

- *In all future options, the bridge must be reserved for the-opening of one to two fuel vessels per day during the heating season and, in addition, for the operation of the necessary port icebreakers and tugs up to the beginning of the 2020-lu yacht, even if the City Council takes a decision on the replacement of the Hanasaari B power plant in2015, even if the City Council took a decision to replace the Hanasaari B power plant.*
- *If the Hanasaari power plant is continued, provision must be made to open the bridge for up to four combustible vessels and, in addition, for the operation of port icebreakers and tugs a day after 2020.*
- *During the winter season, the opening of 4 to 6 bridges may be required for a single fuel ship visit in order to also provide port icebreaking and tug services.*
- *For safety reasons, the bridge must be open for a further period of notice than the passage time of the ship. According to the assessment of the Port of Helsinki Port of Helsinki, for security reasons, several dozens of minutes should be reserved for the duration of a single opening session.*
- *There are additional risks of non-occupational navigation through the opening of thebridge, e.g. a collision of a ship with a bridge. Damage and defects of the bridge opening equipment may cause fuel and/or rail traffic to be disturbed or completely impeded for a long period of time.*
- *Limiting traffic to night time alone is unlikely to be feasible. The restriction would increase the waiting of ships at their worst in almostdaily directions, and the need to operate at times is so high that it would not be possible to handle it during the limited opening hours of the bridge. Ships' cargoes cannot be unloaded at night (-22-7 a.m.) due to noise standards and work on Sundays is avoided, so that reconciling the landing times and the navigation times allowed by the bridge would lead to further waiting for ships. This would lead to significant annualcosts and could hamper the availability of shipping in a port that is poorly operated, as already today night-time landing restrictions have shifted individual fuel deliveries for weeks.*
- *Limiting vessel traffic to only a few hours of night time to the narrow fairway and to the port pond would increase the risk of transport and couldcause noise effects in existing and future residential areas near the port. It is possible that the night-time ship's linerwould not even be granted the environmental permit required for the operation.*

14.2 Risks, accident and abnormal situations and preparedness

Before drawing up the project design, a separate risk assessment will be carried out for the option of further planning, which is primarily a procedure designed to assist the projectowner's design and kid management.

For the EIA, a preliminary risk assessment was carried out for allthe conditions. It identified process risks, design risks, project construction risks and risks during operation/uptake.

Some of the areas identified in the context of thisrisk assessment are as follows:

- There is always a net risk of spreading fuel or lubricantsin migratory situations (VE 1, VE 2, VE 3, VE 4, VE 6, VE 7, VE 8)
- Finland's position as a world heritage site is jeopardised despite the fact that provision has been made (VE 1, VE 3, VE 7, VE 8)
- Insufficient preparedness for exceptional natural conditions in mouth-moulding solutions (VE 1, VE 2, VE 3, VE 6, VE 7, VE 8)
- Non-maritime massescannot be placed as planned (VE 2, VE 4)
- The solutions for the construction of the High Island are not clear (transportsand othertechnicians influencing the operation of the High Island are not sufficiently clear (VE 1, VE 2, VE 3, VE 4)
- Restrictions related to reproduction of fish or bird nesting lead to, for example, a negative timingof work in relation to the effects of hydraulic construction on women (all except VE 6)
- Risks related to contaminated masses
- Dredging may be at risk of unexpected drift
- The sizing (underestimation or overestimation) of water protection structures may lead to a result that is worse than the effect that was discarded (e.g. rapid blocking and damage to protective grooves/meals from the natural non-accumulation of suspendedmaterial)
- Unexpected difficulty in winter maintenance, e.g. snow quincing (bridge options).

In addition, during the planning process, the experts have raised the following issues:

- Bridges for alternative bridges are designed to withstand collisions of theship, the bridges may be damaged as a result of a collision of a passenger ship.
- Anchoring of a large ship in the case of concrete tunnel options may pose a risk of breaking the tunnel. If the likelihood of risk is identified as requiring further-planning, the perimeter of concrete tunnel pitches may be reinforced.
- During dredging and hydraulic works, projectiles, less likely to be found in toxic barrels or similar may be found.
- Extreme sea floods or exceptional situations occurring during construction can cause or amplify the adverse effects on water bodies associated with theconstruction of water.
- The submarine area of the rock rock fragility near the Kruunu Mountains significantly increases the risks and costs associated with the construction of the metro in the rock tunnel.

15 Permits and decisions required for the project

15.1 Project decision and subsequent planning steps

The planning decision, the so-called 'project decision', is taken by the City Councilon the proposal of the City Board. The project decision shall indicate how the environmental impact assessmentreport and the opinion of the contact point on it have been taken into account.

The option chosen for further planning will be thesubject of a tap design and a construction plan.

15.2 Town and country planning

A town plan is required for the project. In addition, the project must not hamper the implementation of the provincial or zoning plan.

The implementation of the project is subject to the condition thatthe basic solution of the transport system has been indicated in the provincial plan. The provincial plan is approved by the Regional Council and approved by the Ministry of the Environment.

The layouts are approved by the City Council.

Major building blocks are approved by the City Council.

15.3 Authorisations

Environmental permit

An environmental permit shall be required:

- intermediate storage of soil and aggregates,
- the location or recovery of contaminated soil and sediment,
- stone-breaking and quarrying;
- asphalt station
- and other comparable facilities or warehouses.

Permit under the Water Regulation (water permit)

Bridges, dredging, waterfills and drainage are subject to authorisationin accordance with the Water Act (587/2011). The project manager is authorised to place dredging masses in the suction bag it owns. The permit authority for the water permit is the Regional State Administrative Agency of Southern Finland. Any dredging work on the seaway will also require authorisation from the Finnish Transport Agency.

Authorisation for action by the Construction Board

Unless otherwise specified in the building order, the erection of a bridge, noise barriers or other structures having a significant impact on the environmental image, unless astronger formula is used. There is no need for a permit to take action, as the project area as a whole is intended to be covered bythe station plans.

Non-removable architectural residues

In Finland, solid monuments have been reassured by the-Women's Musis Act (295/63). The Act reassures the-automatic and automatic architectural remains covered by the Act and prohibits measures that may endanger the survival of the monumental remnants.

The monumental law obliges the designer and developer of a general land use project or planning plan to investigate the effects of the work on a fixed monument. If the work has an impact, the implementation of the project or town and country planning may require various studies or other measures. Pursuant to Sections 13 and 15 of the monumental law, anyone planning orcarrying out a land use project or planning may, for these reasons, have to commission archaeological fieldwork services.

In the case of fixed architectural remains, the matter must be negotiated with the City Museum of Helsinki. This applies, inter alia, to opinions on planning and the formula forchanges. The submarine shall be negotiated withthe Music Agency. If the archaeological residue was to be removed, the Museovirasto issued a licencefor examination to a messenger qualified for archaeological examinations. In such cases, after examination, the subject matter, if it has been fully examined, may be removed from protection without the ELY Centre being granted leave to intervene.

If a solid architectural residue causesdisproportionate damage to its significance, the Regional Centre for Non--Transport and the Environment may, on application, allow-the architectural monumental too. The ELY Centre consults the Ministry of Education andCulture and if the decision is contrary to the opinion of the Museum Agency, it must be submitted for confirmation by the Ministry of Education and Culture.

Aircraft License Licence

Since the project area is approximately 16 km from Hel-zin-Vantaa airport and 9 km from Malm airport, the obstacle is more than 30 m above sea level, for Options VE 1, VE 2, VE 3, VE 7 and VE 8, the project requires a further flight barrier licence under Section 165 of the Aviation Act (1194/2009).

Noise notification

The noise notification shall be made to the buildingval vonna of the City of Helsinki.

Fishing fairway

Article 24 of the Fisheries Act (16.4.1982/286) (22.12.2009/1462):

In the river and in the strait or neck referred to in Chapter 1, Section 6 of the Water Act, a highway open for the passage of fish shall be kept in accordance with the provisions of the Water Act. (27.5.2011/600)

Where a river connects with the sea or lake, the highway is extended by a fishing fairway which, at the deepest point, covers one third of the width of the water in question and extends so far into the backbone water that the passage of the fish is secured. However, if this is necessary to ensure the flow of fish, the Regionalhal Federal Office may, on application, determine the width or location of the fishing fairway.

The boundaries of the fishing fairway may be identified and recorded on the map at the request ofthe Centre for Exploration, Transport and the Environment, the owner of the water areaor the holder of the right to fish inthe course of a survey of the land. The delivery is carriedout by a mezzanine engineer without trustees and is otherwise subject to the provisions of the Land Formation Act (554/1995) on border crossing.

The modification of the fishing fairway requires a survey of the land.

Natura

Section 65 Assessment of projects and plans

If the project or plan, either on its own or considered in-combination with other projects and plans, is likely to significantly reduce the natural values of asite proposed by the Government to or within the Natura 2000 network for the protection of which the site has been or is to be included in the Natura 2000 network, the developer of the project or plan shall, unless the projectis subject to theassessment-procedure required by Chapter 2 of the Environmental Impact Assessment Act (468/1994), appropriately estimate-those effects. The same applies to a project or plan outside the site which is likely to have significant adverse effects on the site.

Paragraph 66 Grant of authorisation, approval and approval of the plan

A public authority may not grant permissionto carry out a project or approve or confirm a plan if the procedures for assessment and opinion referred to in Article 65(1) and (2)-show that the project or plan significantly elevates the natural valuesfor the conservation of which the site has been included or is intended to be included in the Natura 2000-network.

16 Monitoring of environmental impacts

16.1 Monitoring needs

The content, nature and extent of the monitoring will depend on the choiceof the option.

The main impacts of the project come from waterfill works and the construction of a waterbank, in particular dredging, whose effects on water are proposed tobe monitored. The effects of water fillings and terracesare limited in time of construction, and dredging effects are short-time and temporary.

Major changes to the landscape in the Bridge and Cableway Options may requirevigilance. The importance of such monitoring is essentially toverify the success of the landscape impact assessment.

Traffic in the Helsinki region (HSL) and the city of Helsinki are shaking the development of transport and the implementation of the solutionsproposed, along with other activities.

16.2 Initial monitoring programme

Monitoring will be carried out:

- before construction
- during construction
- during use
- long-term monitoring.

In all options, the monitoring will be carried out by Helsinki-ticks. The implementation of the monitoring programme for water effects is monitored by the Uusimaa ELY Centre Y area.

16.2.1 Groundwater and deflection monitoring

Options VE 3, VE 4 and VE 5, where a feeling of cutting in the rock is extracted, monitoringthe surfaces of groundwater and the depression of thesurfaces and structures of the ground in the potential area of influence of the extraction. Monitoring is carried out before, during and after construction.

16.2.2 Reporting

The results of the monitoring of water and fisheries are reported to the authorities mentioned in the Ve-Licence Decision, such as the NewCountry ELY Centre Y area of

responsibility and the environmental authoritiesof Helsinki beauty.

17 Sources and literature

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City of Helsinki. The Environment Agency 2011. Kruunu Mountain-Rhine bench bottom animal survey in 2011.

On 1 September 2011, samples of demersal animals were taken with a pocket from the Island Som, the Kruunu Mountain from Nimisman and the north-eastern sea of Katajanoka, and the species were analysed.

Kala and Water Research Oy 2011b. An inventory of the fish structure andthe nursery areas of Kalo je, in the context of the environmentalimpact assessment of the Laajasalo Rail. Fish and water printers No. 63.

A survey of the fish structure and a mapping of nursery production areas were carried out in summer 2011. The work started with a mapping of suitable habitats, where pilot sweeps were carried out inthe staircases of representative areas. The fish structure was explored through nursery fishing and net fishing using established methods. More information was obtained from the professional fisherman's interviews.

Creat Consulting Oy 2013. City of Helsinki, city planning-agency, flow and water quality measurements in front of Kruunu Mountainselä and Sompasaari.

Measurements were made using continuous measuring instruments at ameasuring point at which two measurement periods of several months were measured in the open water season in 2013. The results provided new and more accurate information on the qualityand flow of ve in the surface and ground layers.

WSP Finland Oy. Public transport connection of the Broadcasting House, assessment of theeffects on the public. Statement on wind effect. December 2013

Climate and weather-related disadvantages and risks to bridges and rope tracks have been addressed. The relevant or theamounts are set out in Chapter 9 of the evaluation report.

Sediment study report, Sompasaari and NihdiWaters, Helsinki City Planning Agency, Vahanen En-vironment Oy, 13.9.2013.

The purpose of the study was to examine the impact of concentrations of harmful substances in the waters east of Sompas Island, the top of Nihd and the sediment in the Sompa Island basin on sediment dredging, dredging spoilsand seafill planning. Sampling of sediment was carried out between 3 and 17 June 2013. A total of 52 samples were taken out of 16 points.

Sediment study report, divers displaying the sedimentof the bridge planning area in Kruunuha, Helsinki City Planning Agency, Vahanen Environ-ment Oy, 27 March 2014.

The report contains the results of environmental studies carried out on 9 December 2013 in thewaters between the Kruuni tap and the Tervasaari. The studies included 4 study points and 8 sediment samples.

Sediment study report, demonstration by diverof sediment from Sompas Island sediment, Helsinki City Planning Agency, Vahanen Environment Oy, 27.3.2014.

The report contains the results of the environmental engineering studies carried outon 9 December 2013 in Sompasaari andNihdin, which consisted of 10 study points and 18 sediment samples, and from studies carried out in the area between 2005 and 2013. Previous studies included a total of 26 study points and 69 sediment samples.

Study report, Monitoring of the mutating and resting bird species of Helsinki Kruunu Mountain in 2011,Environmental Study Yrjölä Oy.

The ferment survey examined the numbers of birds that areresting in the Kruunu Mountain and the camps, as well as the numbers, directions and flight altitudes of the birds flying in the area. The workstarted in April 2011, when the Kruunuvuoenselkä was still largely ice. The surveillance was carried out during both the spring and autumn migration periods and the last visit took place on 1 November 2011. Relevant results are assessed in-chapters 2, 8 and 9 of the statement of accounts.

Mapping of water and beach vegetation in the Kruunu Mountain, Esa Lammi, Jouni Leinikki, Environmental Planning Enviro Oy and Alleco Oy, 21 November 2013.

The work carried out in July-August 2013 included an inventoryof underwater vegetation lines by diving and an inventory of beach vegetation. The relevant results are set out in Chapter 2 of the evaluation report.

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Annexes

Appendix 1 Opinion of the contact point on the environmental impact assessment programme

Annex 2 Noise spread

Current situation: noise levels $L_{Aeq\ during}$ the day from 7 a.m. to 22 a.m. and at night from 22 a.m. to 7 p.m.

Forecast status VE 0 Noise levelsL_{Aeq}day by dayfrom 7 a.m. to 22 a.m. and at night from 22:00 to 7:00

Forecast situation VE 1 Noise levels L_{Aeq} day by dayfrom 7 a.m. to 22 a.m. and at night from 22:00 to 7:00

Forecast VE 2 Noise levelsL_{Aeq}day by dayfrom 7 a.m. to 22 a.m. and at night from 22:00 to 7:00

Forecast situation VE 3 Noise levels L_{Aeq} day by dayfrom 7 a.m. to 22 a.m. and at night

from 22:00 to 7:00

Forecast situation VE 6 Noise levels L_{Aeq} day by dayfrom 7 a.m. to 22 a.m. and at night
from 22:00 to 7:00

Forecast situation VE 8 Noise levels L_{Aeq} day by dayfrom 7 a.m. to 22 a.m. and at night
from 22:00 to 7:00

Centre for Economic Development,
Transport and the Environment

OPINION UUDELY/50/07.04/2010

3.12.2010

City of Helsinki, Agency for Urban Planning
PL 2100
00099 City of Helsinki

Reference: Evaluation programme 26.8.2010

OPINION ON THE ENVIRONMENTAL IMPACT ASSESSMENT PROGRAMME, BROAD ALTERNATIVES TO RAIL TRANSPORT IN SALO

1. PROJECT INFORMATION AND EIA PROCEDURE

On 26 August 2010, the City Planning Agency of the City of Helsinki initiated the environmental impact assessment procedure forthe alternatives to rail traffic in Laajasalo by submitting a projectassessment-programme for the project to the Centre for Economic Development, Transport and the Environment of Uusimaa (ELY Centre).

Evaluation programme and evaluation report

The assessment programme is a plan drawn up by the developer for the studies to be carried out in order to assess the effects on the environment and how the assessment procedure is to be organised.

On the basis of the evaluation programme and the opinion of the contact point, the project manager shall draw up an evaluation report.

Project leader and contact point

The authority responsible for the project is the City Planning Authority of the City of Helsinki. The contact points for the project are Eija Kivilaakso, Kaarina Laakso and Juha-Pekka Turunen. As aconsultant, I assessed Trafix Oy and Landpro Oy, who arelinked to Tore Granskog and Matti Keränen.

The Uusimaa ELY Centre acts as the contactpoint under the Environmental Impact Assessment Act. The Chief Inspector, Tuomas Autere (Act on Centres for Economic Development, Transport and the Environment, Section 3, paragraph 1, is the contact point in the assessment procedure. 10and Section 2(1) of the Decree on Centres for Economic Development, Transport and the Environment. Paragraph 3 and Section 3(1). Paragraph 1).

Project and description of the project

The City of Helsinki has launched an environmental impact assessment procedurefora number of planned transport connections between the city centre of Helsinki and Laajasalo. The Kruunu Mountain of the Large Strait is designed to:

Payment to the developer of EUR 4800. The fee scales are annexed to the opinion.

Call No 020 636 0070 Chief Executive Officer 14 PL 36
www.ely-keskus.fi/uusimaa 00520 Helsinki 00521 Helsinki

area of approximately 10 000 inhabitants. With the new residential area, the city will need to improve the accessibility of Laajasalo through a new high-quality public transport connection with a good service and a combination oflight traffic.

Options for the project

Six design options for Hels Gin niemi-Broadsalo are considered, compared to the situation without a new connection (VE 0). The options are:

VE 1: Railway wagon and light traffic bridge link Kruunhaka — Sompa Island — Korkein Islands — Large Islands.

VE 2: Railway wagon and light-traffic concrete tunnel and bridge link Kruunhaka — Sampa Island — Korkein Islands — Large Islands.

VE 3: Metro Kamppi-Katajanokka — Large Rock Tunnel and Bridge link.

VE 4: Metro Kamppi-Katajanokka-Broadtail-Rock and concrete tunnel.

VE 5: Metro in the Kamppi-Katajanokka-Lajasalo.

VE 6: Waterborne transport from Laajasalo-Kesku.

Project EIA — need for procedure

The Uusimaa Environment Agency adopted a decision on the need for an EIA procedure on 24 June 2009 (ref. UUS-2009-R-2-531).

Other relevant projects and plans

The project relates to land-use planning in the following areas: Kruunu-Mountain Coast, Herttoniemi Region, Fishing Port Area, Other Laajasalo Development (Centre), High Island Development, Helsinki Park, Helsinki Energy Fuel Transport and Maintenance.

Other transport projects that are closely linked to the Larasalo rail solution are the Linnanrakåntie tunnel and the Töölö metro, as well as the development of Rai road traffic. In addition, the project will have an impact on the fuel and service tractions of Helsinki Energia to the port of Hanasaren.

The overall design and environmental impact assessment of the pisara lineis currently underway.

The updating of the Uusimaa provincial plan is ongoing. It is foreseen that the provincial government draft will be made available for inspection in the first halfof 2011.

The transport system work in the Helsinki region (HLJ 2011) is currently onthe road.

2. INFORMATION AND CONSULTATION ON THE EVALUATION PROGRAMME

The lis pendens of the evaluation programme was reported on 13 September 2010 inHelsinki Sano m and Hufvudstadsbladet.

The evaluation programme was published between 13 September and 12 November 2010 on the noticeboard of the City of Hel Sing. In addition, the alert was available on the website of the Uusimaa ELY Centre.

The evaluation programme was available from 13 September to 12 November 2010 at theCity of Helsinki City Planning Agency, Info and the exhibition space in Laitur. The evaluationreport has been available in the Library of Laajasalo and Herttoniemi and on the project manager's website.

The evaluation programme was presented to the public on 28 September 2010 at the Audito ofthe City Planning Agency of Hel Sing. Representatives of the Contact Point, the City of Helsinki and the PlanningConsul were present.

3. SUMMARY OF OPINIONS AND OPINIONS RECEIVED

The Uusimaa ELY Centre has requested opinions on the evaluation programme from theCity of Hel Sing, the Helsinki City Transport Institute, the City of Helsinki Environment Centre, the Helsinki Port, the Uusimaa League, the Helsinki Regional Transport Association (HSL), the Helsinki Seu dunEnvironmental Services Association (HSY), the Helsinki City Mouse(Museum of the Province of Helsinki), the Museovirasto and the Ministry ofRiring.

The evaluation programme received 6 opinions and 36 opinions. Some of thestatements requested have been included in the decision of the City ofHelsinki.

Opinions

The**City Board of Helsinki** notes that the evaluation programme provides a verycomprehensive picture of the current situation of the planning area, which provides a good startingpoint for the impact assessment and comparison of project options. The differentconditions are sufficiently comprehensive in terms of content and scope, and the levelof service, in particular for light traffic, differs considerably between them. Further work should focus on the speculationof alternatives that meet the objectives of the project and whose implementationis realistic and technically realistic. Deep metal (VE 5) should be excluded from the evaluation.

A comprehensive description of the options has been provided. The new reports will need to beupdated. The potential of options to respond to future land-use changes must be taken into account in the assessment process. The assessment shall take into account the transport of fuel from the Hanasaari power plants. The evaluation report shall assess the impact of the project on the cultural environment, taking into account the cultural heritage ofthe planning area as a whole. The models of solutions for transport in the Kruunu Mountain must be drawn up in cooperation with the Finnish Transport Administration. Boating and fairway tug are taken intoaccount in the assessment procedure. The combined reference date

attention was drawn to the cost implications of the various options and totheir feasibility.

The opinion**of the Environment Agency of the City of Helsinki (Environmental** Board) has been in line with the opinion of the City Board.

The opinion**of the City of Helsinki** Transport Institute was involved in the preparation ofthe opinion of the City Council.

The opinion of the**Port of Helsinki** has been involved in the preparation of the opinion of the City Board.

The Regional Council of Uusimaa states that the regional plan adopted by the Ministerfor the Environment on 8 November 2006 is valid. Themass of the assessment manual is taken into account in the content of the provincial plan. In drawing up the assessmentreport, account should be taken of the ongoing reform of the provincial plan in the context of the provincial planning. The six different conditions set out in theevaluation programme are, in principle, feasible and provide a sufficient startingpoint for drawing up an evaluation report. It is important to look atthe impact, even as part of the wider regionaltransport system.

The**Helsinki Regional Transport Association (HSL**) states that the nationwide land usetargets and climate change mitigation require an increasein rail traffic in the expanding Helsinki region. The resultsof the Land Use and Rail Network Survey (MARA) show that the closer the region's core area is developing rail and land use, the better the transport system development objectives are met.

The territorial assessment should be extended to the area of the centre, the conurbationand the Laaja salo, but also outside the area of Laajasalo. Special attentionshould be paid to the service level factor. Under the water transport option (VE 6), the sub-option of transporting a tram or bus by ferry overthe Kruunu Mountain should also be assessed. Special attention should bepaid to combating adverse effects in the evaluation process. The evaluationexercise adequately describes how the environmental impact assessment is to be carried out. The assessment methodology is appropriate and the comparison optionsare sufficiently different to reflect the differences between the basic options.

HSY states that there are sufficient alternatives. The assessment should calculate the emissions during the fieldingof the different options. Special attention should be paid tothe development of the neighbourhoods. In order to shape mobility patterns, it is important that there is sufficient provision of public transport and that light roads are in operation at the same time as new residents move to the region. In addition to climate change mitigation, the assessmentwill also take into account the climate change adaptation perspective. The evaluation programme includes adequate explanations of the impact of the different options onemissions and air quality.

The opinion**of the Helsinki City Museum (Museum of the Province of Central Uusimaa)** has been in line with the opinion of the City Council. The Museum of Provinces has previously commented on the sub-scheme and the draft land use of the Kruunuvuoranta and the impact on the

should be revised as work progresses. Particular attention should be given to the procedure:

ten on the need for evaluation. The museum has not been in favour of a bridge project. VE 6 is the only option with limited impact on the cultural environment, landscape or urban image. The assessmentreport shall consider the effects on the built environment. The importance of cultural environments ofmunicipal value should be opened up in the evaluation report. In the evaluation report, the impact of the project on the cultural environment must be assessed taking into account the cultural heritage of the planning area as a whole.

The**Museovirasto** states that there has been an error in the location of the Hålvik silver mine, which has been transferred to the image given in the evaluation programme. The guerrillaprogramme has not assessed the effects on the wolf in Stansvikin-Tahvo Bay. The residual item is subject to the need for further clarification, as the object is not in fact a point but rather a wider area. The project may have an impact on the underwater heritage in frontof Helsinki. In substance, the programme presents what is known today andthe role of underwater inventory in hydraulic engineering has been identified.

The Ministry of the Environment has not issued an opinion.

Opinions

In the opinion M1, options VE 3, VE 4 or VE 5 are recommended. The Metro connection increases the use of public transport. The functioning of thetram link is doubtful.

Opinion M2 states that the waterborne transport option VE 6 is the best and immediately deployable. From the quay at Katajanoka the extension-of the tram with 4 hubs.

Opinion M3 states that VE 1 is the only real option. The ferry connection is too uncertain. The Metro option would reducethe supply of the Katajano cann's tram and is costly.

Opinion M4 states that the possible civilian use of Santahaminashould be taken into account when considering all transportoptions. The future population of the Large Room is estimated at around 28 000, with Santahamina almost doubling that population.

Opinion M5 states that VE 1 and VE 2 would be very linked to the tram-system ny. Ve 3-5 would require extensive planning work and the population base is not sufficient for the metro. Ve 6 needs access at both ends and has poor operational security.

In the opinion M6, option 0 is supported. The development of the service capability of the existing metro would be weakened by a competing route. The placing of a light-movingtea on a wind bridge is questionable. In Molino Oy's report, a barbridge line is included in all tramway options. The organisation of a bridge plate during the EIA process is surprised. Terraces requiring seagoing fillings are not sustainable. In addition, the authorof the reminder agrees with the position of the purse clubs (e.g. Helsinki's worker'sclub) about the consequences of the bridge-penger link forthe thrust.

Opinion M7 suggests the most sensible solution for ferry option VE6. This option is quick to implement and does not hinder the subsequent completion of the rail link inthe event of an increase in traffic volumes.

In opinion M8 (Helsinki-Seura/Helsingfors Samfundetry), VE 6. Second-best metro swap conditions VE 4-5. It is necessary to ensure that environments of national importance are maintained. Ve 2-3 significantly transform the landscape and have an impact on theUNESCO World Heritage Site of Finland. The tramwagon reduces the number of parking places and small recreation areas in theKruuni Way. Fuel transport regularly interrupts traffic on the bridge.

Opinion M9 states that tramway is the worstnatural alternative. The Metrotunnel with possible maintenance and lighttea tunnels is the best in the long term.

Opinion M10 states that, as the population increases, the metro is the best link with Laajasalossa, Jollas and Santahamina. LNG enginesin the ferry movement have the most environmentally friendly option and the connection can function before the metro is implemented. Options should be explored on differentclusters per km travelled (investment, operating costs, environmental impact).

Opinion M11 opposes the bridge project. There is still a lotto be done to shore the current link.

Opinion M12 states that the tramway project endangers thelimited recreational decorations in Kruununha. The Kruununhaka shall not become a transit route in the 10 000 inhabitants. The ferry connection is increased as a possible alternative.

Opinion M13 states that transport will in future be carried out by buses to the Herttoniemi metro station.

Opinion M14 favours a ferry connection, adds no reason to the city.

Opinion M15 favours a light-traffic bridge. The difficulty of the water connection is to ensure smooth connections.

Opinion M16 opposes the bridge because it does not promote maritime Helsinki and undermines recreation opportunities. Ferry transport isa better adapted and maritime solution.

Opinion M17 favours option VE 1.

Opinion M18 (Doppelmayr Seilbahnen GmbH) suggests the inclusion of the cable rail option in the impact assessment.

Opinion M19 (Kruununhaa Association, Kruununhaka club) takes a view on the frequency of meetings of the observatory. The EIA programme does not indicate which of the options set out in the programme are contrary to the land/municipal plan and the zoning plan. The programme militates in favour ofa deceptive tramway solution. The water transport option needs to be clarified. New connectivity options are proposed, including the fishing port and Meriha's beauty—

to Hakanime and to the centre. The traffic forecast needs to be refined. The limited number of recreational areas should be taken into account when assessing the impact. The landscape, noise, residential comfort and the importance of Finland's choice have also been highlighted. There are serious concerns about the objective consideration of alternatives. The decision on the choice of the public transport condition for the Largesalo must be taken only after the EIA process has been completed.

Opinion M20 supports option VE 1, which supports national naïve use-objectives, while ensuring sufficient opportunities for walking and cycling. Options VE 0 and VE 6 encourage a privatecar.

Opinion M21 states that the bridge is not a real solution. Your opinion isin favour of ferry traffic.

M22 states that tramway bridges would be a major deterioration in water exchange and quality. The peace of the Terva Island has gone through tram roads. The opinion is in favour of a ferry connection.

Opinion M23 states that well-implemented biases could give the city a new visible landmark. Positive aspects must also be taken into account in the impact assessment.

Opinion M24 (Helsinki Workers' Press Association ry) states that the Kruunuvuoenselkä is a unique maritime entertainmentarea. New residential areas will increase the pressure on the site's recreational use. The area has a significant landscape value. The western part of thebridge would close the beaches of the eastern metropolitan city from sailing boats and large motor boats. The bridge would have a significant negative impact on the area's rich racing jewellery. Several large marinas are missing in the evaluation programme.

Opinion M25 states that the objectives of rail transport are generally good. However, the number of passenger cars in the Broadtail will increase even if its relative share decreases. The landscape effects of the bridges are high and the delay in schedules istherefore the opening of bridges. Metro alone is an economically burdensome solution. Theferry jacket is an additional component. An exchange of views has been put forward in orderto improve the possibilities for private cars (Kallen tunnel between the Eastern Corridor and Kulosaari).

Opinion M26 (Hästnäs ry) supports the ferry option.

Opinion M27 (Finnish Moottoriveneklubi ry) states that theprogramme is largely comprehensive. The inclusion of the water transport option is important and a specific report should be drawn up carefully. The rectangles proposed inthe programme have a significant impact on the maritime HelsinkiCore Area and its use. Waterborne transport should be considered as a separate entity in the EIA process. The author of the opinion is willing to be happyat the various stages of the process. The opinion suggests the creation of an independent network of experts in the field of Veterinarians.

Opinion M28 (Kulosburg ry — Brändöborna rf) states that the evaluation programme should be entitled "Programme for the evaluation of alternativesto the mass movement". The options to be assessed should

be extended to themetro branching from Herttoniemi and the demarcation of the area under review. The impact on the municipal economy and urban image should be presented. The description of the water transport option is incomplete. The sea flow rateand weather conditions should be taken into account when comparing alternatives, as well as migratory routes for birds. Figure 7 of the programme is incomplete.

Opinion M29 (Laajasalo-Degerö Seura ry) states that metro is a key public transport solution in Helsinki. An option should be added, whereby the connection from the Broad basin to the metro and the Jokeri line to thelane is effectively addressed.

Opinion M30 (Brändö Seglare rf) states that the evaluation programme is rather technical and the options are presented in the light of certain assumptions. The opinion highlights the impact of the transport needs of 10 000 new inhabitants on the living conditions of around 100 000 existing residents. The development of public transport is at the heartof the provincial and zoning plan. UNESCO's World Heritage Site istaken into account. The direction of traffic flows in the context of the reference year-requires a deeper explanation.

Sea flows require further clarification. The lack of an EIA programme is that it does not include, as an alternative, the metro-alignment ofLaajasalo via Hertto. Ve 0 is a good option if internal traffic and feed into the-Herttoniemi metro station can be arranged. In addition to VE 0, the Metro in the rock and the ve-transport options are realistic options. Theway in which the effects are assessed has been adequately addressed. The catchment area is too small.

Opinion M31 (Helsinki Saaristolaivuri Association ry) states that Laajasalo's rail traffic must be organised via Herttoniemi metro station. Bridges are oversized in relation to transport needs and make it more-difficult to navigate. Ferry traffic can help feeder traffic.

Opinion M32 states that one option should be to address the transport option via Herttoniemi metro station to Broadsalo and Kruunu Mountain. The transport capacity of the metro from Hert to the centre should be investigated. The metro options are costly.

Opinion M33 states that the evaluation programme should firstassess the need for the proposed bridge as a whole. The bridge does notdeplete the landscape and it is costly to implement it. The bridge is not included in the region's collective transport plan. Feeder to Herttoniemi metro station is a workable solution. The water transport option is worth experimenting.

Opinion M34 (Lajasalon Small Real Estate Association ry — Degerö egnahemsföreningen rf) states that the condition for different alternatives is a validscientific knowledge of the real mobility of large-scale citizens. The main direction of traffic is towards the Herttoniemi metro station and the Jokeri line. The evaluation programme contains errors and false assumptions. KUonly 8 missing small boat marinas. Emphasising light traffic in the Bridge option is not a weather-sensitive realism.

Opinion M35 (Helsinki Nature Conservation Association — Helsing forsnaturskyddsförening rf) states that indirect effects on the

community structure should also be taken into account. The recreation status of theTerva Island must be taken into account. With the new transport link, ra—

the pitch pressure in the Broadtail may increase from what is now planned, threatening natural sites. The impact of congestion and extreme weather conditions in themetropolitan city on the reliability of tram traffic must be shown. In comparison, account must be taken of ecological links and greenhousegas emissions. The landscape implications, in particular with regard to Finland's choice, need to be clarified. The impact of public transport on the animals of theHigh Island is supported.

It is important to identify the flow rates of the Crown Bed. The impact of the quarrying works onthe bedrock must be included in the assessment. The cost of the project maycause problems for other public transport projects in Helsinki and the capital region. Risk management should be consideredin the assessment process. The potential of light traffic should be described. An alternativesolution should also be considered as a metro or tram connection from Herttonieme or Kulosaaari metro stations.

Opinion M36 states that the maps of the evaluation programmecontain shortcomings in areas such as boating and fisheries (3.5.3 and 3.6.1). Lack of location of Veneker's Veneker and Haukka nie boat club ry by a worker's club in Helsinki. Account should be taken of the large-scale canal in relation to the fish stock.

4. OPINION OF THE CONTACT POINT

In terms of structure, the assessment programme covers the substantive requirements of the assessment programme referred to in Article 9 of the EIA Decree. The assessment programme has beenhandled as required by the EIA legislation. However, the following points should be taken into account when carrying out the studies andassessing the report.

Description of the project

The description, purpose and location of the project and the person responsible for the project are clearly set out in theevaluation programme. The details of the project are sufficiently detailed.

Consideration of options

The options set out in the assessment programme are sufficient and the minimumset of requirements required by the EIA legislation is met. The comparison options are sufficiently different to identify the differences between the basic options.

The assessment report should describe in more detail the options(e.g. cableway) that have been reduced in previous designs. Under the water exchange condition (VE 6), the sub-option for the carriage of a ridgeor bus by ferry over the Kruunu Mountain spine should also be assessed.

Analysis of impacts and assessment of significance

Effects on urban structure and land use
Under the provincial and zoning plan, the developmentof public transport is central. The evaluation programme describes the layout with sufficient precision. The descriptions of the options are briefly presented in terms of schematic or non-consistency. In the assessment report, the option and the box—

the ratio of badness should be opened at each level of the zoning hierarchy (province-va, zonal plan, town plan) and estimate the need for conversion.

The potential of options to respond to future land-use changes must be taken into account in the assessment process.

The possible civilian use of Santahamina should be added to the examination of all transport options as a sensitivity check.

Impact on transport
The evaluation programme presents the public transport corridorprojects of the Helsinki Metropolitan Region (PLJ 2007). As the evaluation progresses, account must be taken of the Hels Gin RegionTransport System Plan (HLJ 2011), currently under consultation. The evaluation-report shall also take into account the work of the province of Uusimaa, the draft of which has been assessed for the forthcoming opinion in spring 2011. The target year of the county formula is 2035 (EIA target year 2030).

The development of the Laajasavo rail link is linked to the Helsinki general plan to transform the oil port area into a residential area. In 2030, it is estimated that there will be around 28 000 inhabitants in the Broadcasting House (currently roughly 16 000). A mass-growth link over or underthe Kruunu Mountains would significantly improve the level of service providedby Laajasalo and the Helsinki peninsula and free upthe capacity of the existing metro and other projects (e.g. Östersundom).

The large-scale public transport connection project will have a limited impact on the road network maintained by the ELY Centre's transport responsibility area. Once the project has been completed, the traffic effects would mainly affect the city of Helsinki's street and public transport network. It is likely that most of the land transport during construction will be carried out by water and thus the impact on the public road network during construction will be limited.

The assessment shall take into account the incineration and transport of the Hanasaari power plants. The map of the small-volume port should be updated with an assessment ofthe report.

The solutions proposed in the programme will have a significant impact on the core maritime region of Helsinki and its use. With the new inhabitants, the recreational use of the Kruunu Mountain will increase pressure and may increasetraffic to the area from outside the immediate catchment area. This should be taken into account in the evaluation.

Impact on the cultural environment
As stated in the evaluation programme, the planning area represents a valuable, varied and diverse maritime landscape. The planning area is affected by cultural environments of high national and local value, which have been recorded by the Museo Agency. Thearea of scrutiny may also be underwater cultural heritage sites that are unknown.

The assessment report should consider the effects on the characteristics ofthe cruise built. Cultural discovery of national value—

the significance of the works should be opened in the evaluation report. The map of cultural heritage sites should be updated in the evaluation report.

The evaluation report shall assess the impact of the project on the cultural environment, taking into account the cultural heritage ofthe planning area as a whole.

Noise and vibration effects
The evaluation programme provides a comprehensive description of the noise and vibrations taken into account.

Impacts on air quality and climate
The description of the air quality and climate consideration is given in the-assessment section with sufficient precision.

Impacts on nature, vegetation and fauna
There are a number of natural sites affected by the project, the nature conservationarea is not protected, the protected habitat and the conservation reserve for the zoning plan, and the Natura 2000 site in the Bay of Vanhan. There are also areas of local importance for vegetationand bird species, as well as bird bullets of national importance. The Helsinki Nature Information System has collecteda road and also important reptiles, amphibians and bat areas. Information on thevaluable natural sites in the area has been collected and the current state of nature of the site has been presented.

In addition to the studies provided for in the programme, it is necessary to carry out surveys of beach plants at the locations where the option runs to theKorkesa Ressa and at the coasts of Laajasalo. It is also appropriate to carry out a survey of the aquatic plants at the grubbing points. In addition, eutrophication and corrosion of beaches that may be caused by concreteelevated tunnels and terraces shall be assessed and mitigation measures shall be presented. The contact point welcomes the clarification ofthe importance of the back of the Kruunu Mountain as a route to the Gulf of Vanhankaupungina and as a resting place for birds. Potential effects on water bodies should also be taken into account in the assessment of the impact on the Natu-ra 2000 area of the Bay of Vanhan Town.

The risk ofcollision caused by electric cables and other cables inthe air space, in particular in darkness and fog, should be added to the effects on the bird population.

The increase in sea trout and salmon in the river Vantaa should be added to the fisheries evaluation (3.5.4). For example, an obligation may be imposed on the applicant to carry out a new or revised fishing fairway operation if the depth-width ratios of the water are changed (VL 2:22 1 other measure). In point 7.6, it should be noted that no fish will be monitored during the Helsinki water monitoring. In the context of the joint fisheries monitoring of the sea basin, in front of Helsinki, fish are monitored. Coastal waters use coastal survey networks slightly different from NORDIC networks, including observationof Hel Sing.

It is good that the importance of the Kruunu Mountain elephant as a spawning and juvenile import area as wellas the fish species in the area should be explored. In particular, theconditions under which the cross-sectional area of the Kruunu Mountain eel decreases (e.g. VE 2) may have an impact on the fishing fairway and its functioning. The effectsof the projects during the construction and operation of the projects on the migration of fish to the Vanhankaupun-Ginsaari and the river Vantaa must be assessed, as well asthe effects on growth in these areas. For example, the disappearance of sea trout and salmon has animpact on the success of the reproduction of these species in the entire Vantaajoki river basin.

The effects during use should be taken into account, as terraces and bridges and possibly rail noise and vibrations may affect the comfort of fish and fishermen in the water area.

Impact on people's living conditions and safety
A description of the consideration of the impact on people's living conditions and safety has been presented in the evaluation programme with sufficient precision. Special attention should be paid tocombating adverse effects in theevaluation process.

Impacts on groundwater and surface water quality and flows
The evaluation programme does not clearly set out the planned flow-measurements, the properties of concrete element tunnels and terraces that affect flows, and the methods to be used to degrade flowchanges. The assessment report shall provide sufficient information on the construction ofprecast concrete tunnels in the DC. In particular,the impact of the element on the depth of the water is important information. The lowering effect of the benchesmust also be taken into account in the assessment.

It is necessary to examine the current situation of flow conditions and to explain the effects on flow, water exchange and water quality with sufficient precision, either modelling or otherwise, to enable the assessment report to reliably damagethe feasibility of alternatives and to compare the water effectsof alternatives. It is also necessary to assess the impact of the changes in the flow conditions resulting from the construction on the flow conditions and the state of the Gulf of Vanhan Town and the Natura 2000 site in the north.

The current status and evolution of the marine area should be described more broadly in the inventory, also using extensive biological material from the observation.

Effects on soil and sediments
The assessment of impacts on soil and sediments has been captured withsufficient precision in the evaluation programme. The evaluation shall also assess the spread of sediments to the Bay of Vanhan Town.

Economic impact
The evaluation programme shows in Table 1 the technical characteristics andbenefits/cost ratios of the options. The table as such does not fully open up the characteristics of the different options, as the objective seems to be to describe movement from the Broadhouse to a specific location in the centre (in the metro options Kamppi). The evaluation report should

include a table and map describing, by option, the examples of trips with similarities.

travel distances, e.g. between the easternmost position of the metro options in the extended room and Kamp.

Effects during construction
The assessment of the effects during construction has been described insufficient detail in the TIP.

Comparison of risks
The consideration of risks is described in the evaluation programme in-sufficient detail. Special attention should be paid to taking account of weather and ice conditions.

Comparison of options
The comparison is described in the evaluation programme with sufficient precision.

Synergies with other projects and activities
The project relates to the Helsinki region's transport system (HLJ 2011), which is already mentioned under *Transport Impacts*. It is useful to use and mirror the options and the HLJ 2011 work andits impact assessment (SOVA). The integration of the options into the whole transport system should be opened in the evaluation report.

Participation and reporting
During the preparation of the evaluation programme, three group interviews were organised in April with representatives of residents' associations, boatmen, medalists, environmental organisations and cyclists.

During the visit to the evaluation programme, a presentation took place on 28 September 2010 at theHelsinki City Planning Agency's Audito, where therewere around 25 people in addition to the representatives of the project manager, consultant and contact point.

The evaluation documentation has also been available on the internet. The arrangements for participation in the project have been properly managed. I shall assessthe consistency of the programme. The project has featured extensively in the media.

The evaluation programme lists the sources used. It is also useful to include in the evaluation report a list of the starting material used during-the evaluation. With regard to the necessary permits and decisions, the concept of 'authorisation for water law' has been misconceived. This is a permit under the Water Act which is issued bythe Regional State Administrative Agency of Southern Finland.

5. VISIBILITY OF THE OPINION

We will send the opinion of the contact point for information to the authors and authors of the opinion. The opinion is available on the website at the-following address: www.ely-keskus.fi > ELY Centres > Uusimaa ELY > OSH > EnvironmentalImpact Assessment (EIA) and SEA.

We will send copies of the opinions and opinions we have received from the evaluation programme to the project manager. The original documents are kept at the Uusimaa ELY Centre.

Senior auditors Hannu Ai-RoLa, Brita Dahlqvist-Solin, Leena Eerola, Antti Mäntykoski and Heidi Åker have been involved in the preparation of the

La, environmental engineer Mauri Karonen, development manager Vilho Taka mäki, special scientist Pasi Lempinen, cultural inspector Ullrike Hjelt- Hansson, fisheries biology Miko Koivuranta and Pekka Räty, a transport system specialist. The case in the environmental and natural resources area of the Uusimaa ELY Centre is handled by the chief inspector Tuomas Autere, tel. 040 503 6172.

Director Marketta Virta

Senior Auditor Judge Autere

ANNEXES Determination of the fee and appeal

DISTRIBUTION Finnish Environment Agency (opinion + 2 evaluation programmes)
Authors of the statement
Reminders

opinion.