



JOINT BARENTS TRANSPORT PLAN

Proposals for development of transport routes



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PREAMBLE

Development of transport infrastructure of the northern regions is an important factor of economic growth for the Barents Euro-Arctic Council (BEAC) member countries. Elaboration of the best long-term solutions based on the results of the analysis of the existing transport infrastructure of the BEAC member states, with regard to national strategies for the development of transport systems, can contribute to finding the best transportation routes and consequently boost the economy of the northern regions.

The recent years have shown increased attention to the High North, the key industries in the Barents Region are expected to grow. Investments in transportation infrastructure throughout its territory are needed to meet the demand in improving accessibility of the region. In order to enhance cross-border cooperation in the Barents Region the transport ministers of Finland, Norway, Russia and Sweden created in May 1998 a cooperation forum of Barents Euro-Arctic Transport Area (BEATA).

During the Norwegian chairmanship in early 2013 the BEATA Steering Committee formed a working Expert Group to prepare the Joint Barents Transport Plan in order “to create in the Barents Region an efficient transport system with good internal communication between the countries of the region and good communication channels with the world markets. The transport system should facilitate the Barents regional development and create new opportunities for the key industries. The transport system should be developed in a manner that safeguards the environment and improves safety and accessibility for all.”

The transport ministers at their meeting in Narvik in September 2013 welcomed the ongoing work on draft Joint Barents Transport Plan prepared by the expert working group.

As part of the follow-up activities during the Finnish Chairmanship of the BEAC in late 2014, the BEATA Steering Committee decided to establish a second Expert Group, which would be “focused on road transport corridors, crossing borders between the states.” As a result of the work of the Expert Group, a draft document “Cross-border road corridors based on Joint Barents Transport Plan” (hereinafter – document “Cross-Border road corridors” was prepared.

The Expert Group used the information and analysis results of the project of the Joint Barents Transport Plan and the Barents Freeway project (the Barents Freeway), its work was focused on the analysis of the current situation and identification of specific needs of road transport routes, adjusted for environmental and financial factors when choosing optimization measures”.

The document “Cross-Border road corridors” was presented at the BEATA High Level Meeting on September 30, 2015 in Rovaniemi. The transport ministers of the BEATA countries welcomed the document as part of ongoing work on actualization of the Joint Barents Transport Plan, noting that further consultation are needed among the respective countries on this document.

During the Russian chairmanship, the Joint Barents Transport Plan was finalized and updated by the experts, taking into account the proposals of the document “Cross-Border road corridors”. At the BEAC Transport Ministerial Meeting, June 21, 2016 in Arkhangelsk Ministers expressed their gratitude to the BEATA Steering Committee for the work on the harmonization of the Joint Barents Transport Plan.

The documents developed under the BEATA Steering Committee activities within the period 2013-2016, does not establish the strategic planning legal framework, are of advisory nature, and do not lay BEATA Member States under obligations to implement infrastructure projects.

Public authorities in Norway, Russia, Finland and Sweden, responsible for development of transport and transport infrastructure, express their gratitude to the Expert Groups that have worked on the document during the Finnish and Norwegian chairmanships, to the Russian experts, as well as the International Barents Secretariat for their active participation in the work over the draft of the Joint Barents Transport Plan.

1. INTRODUCTION

1.1. BACKGROUND

In light of the greater attention being paid to the High North, and the expected growth in key industries in the Barents Region, the Barents Euro-Arctic Transport Area Steering Committee took the initiative for a Joint Barents Transport Plan. Economic and social development in the Barents Region requires better transport connections, and the aim for the work has been a joint approach to look at the future need for transport in the Barents Region. Norway, Sweden and Finland have prepared studies on the need for transport infrastructure in the High North. Russia has federal plans to develop the infrastructure on their territory in the Barents Region. These studies and plans are mainly focused on national priorities, but also emphasize the need for a Barents approach in planning future transport solutions and interventions in this region. Presently, studies are being carried out and projects are being implemented over various transport issues, but there is an urgent need to form a common state approach to border crossing issues, involving attention to those issues at the highest political level. The studies also revealed the need for an integrated approach to cross-border transport system. Therefore, the BEATA Steering Committee proposed to develop a Joint Barents Transport Plan as a logical step resulting from various national studies and plans to create a joint document, defining the lines of development of the transport system in the Barents Region.



Figure 1. The Barents Region map

1.2. GOALS, OBJECTIVES AND METHODS TO CREATE THE JOINT BARENTS TRANSPORT PLAN

Public authorities in Finland, Norway, Russia and Sweden, responsible for development of transport and transport infrastructure note that the major part of the Joint Barents Transport Plan project development was done by the Expert Groups headed by T.Naymak – director of the Norwegian Public Road administration and J. Leskinen – manager on the planning of the transport system of the Center for economic development, transport and the environment in Lapland, Finland. In 2016 the Joint Transport Barents Plan was updated by the Russian experts.

The results of the experts' work form the basis of this document.

Drafting of the Joint Barents Transport Plan is based on the following priorities (documented in the mandate of the Expert Group on the establishment of the Joint Transport Barents Plan 2013):

- The plan should reflect the national priorities.
- The plan should cover all modes of transport, and the main emphasis should be made on cross-border transport routes between Norway, Sweden, Finland and Russia.
- The transport system must be assessed with regard to the relevant industries development forecast.
- The plan should reveal bottlenecks and obstacles to cross-border transportation, both of technical and administrative nature.
- The measures envisaged by the plan can be distributed over time, for example, for the a medium term (12-15 years) and a long term (30 years).
- When picking up measures the issues of environment and resources should be considered by using the so-called “four-step principle”:
 - Step 1: Measures which affect the demand for transport and the choice of modes of transport.
 - Step 2: Measures that provide more efficient utilization of the existing transport network.
 - Step 3: Improvement of infrastructure.
 - Step 4: New investment and major rebuilding measures.

The work has been performed on the basis of the existing results of the studies. The national priorities and strategies materialized in the approved plans became the operating platform for the experts. Based on this, the experts have developed a new regional approach and discussed common strategies aimed at strengthening of cross-border routes due to greater consideration of mutual interests.

PROPOSED OBJECTIVES FOR THE TRANSPORT SYSTEM IN THE BARENTS REGION

Each of the countries involved has its own national objectives for the development of their national transport systems, and they are not broken down to specific objectives for the Barents Region alone. Therefore, the national objectives of the countries involved must be the basis for a joint approach for the transport infrastructure development in the Barents Region. The common effort to develop a joint objective for the plan has revealed that although the national objectives are somewhat differently formulated, they are similar in their key elements. On this basis, the following joint objective for the four countries has been formulated:

Finland, Norway, Russia and Sweden have the ambition to develop an efficient transport system in the Barents Region with good internal connectivity between the Barents countries and with good external links to world markets. The transport system should facilitate the Barents regional development and create new opportunities for the key industries. The transport system should be developed in a manner that safeguards the environment and improves safety and accessibility for all.

1.3. SCOPE

Geographically the plan is limited by the area of the Barents Region, which includes the regions:

In Norway: the territory of the region of Northern Norway, including the counties:

Finnmark (48,631 km²)

Troms ((2,480.34 km²)

Nordland (38,482 km²)

In Sweden: the territories of the counties:

Norrbottnen (98,911 km²)

Västerbotten (55,401 km²)

in Finland: territories of the provinces:

Lappi (98,946 km²)

Ostrobothnia (35,508 km²)

Kainuu (21,500 km²)

In Russia: territories of the constituent entities of the North-West Federal District:

Murmansk region (144,902 km²)

Arkhangelsk region, including the Nenets Autonomous Okrug (589,913 km²)

Komi Republic (416,774 km²)

The Republic of Karelia (180,520 km²)

The time frames were determined to be long-term, but the measures envisaged by the plan can be divided in time, for example, medium-term (12-15 years) and longer-term (30 years).

All modes of transport were to be considered in the cross-border routes with regard to:

- development of the relevant industries;
- bottlenecks and obstacles;
- important tasks related to protection of the environment, climate, regional development and security.

2. OBJECTIVES OF THE BARENTS REGION TRANSPORT SYSTEM

The Joint Barents Transport Plan will be the basis for common policies through identification of efficient measures from a Barents perspective. Those measures should be based on joint objectives for the Barents Region.

The national objectives of the development of the BEATA countries transport systems do not contain specific provisions regarding the development of the Barents Region, therefore the joint goal for the Barents region was formulated based on the national goals. An attempt to define the overall objective of the Plan showed that despite certain differences in the wording of the national targets their key elements were rather similar.

2.1. NATIONAL OBJECTIVES

The national objectives for the national transport systems of each country are fairly similar, especially regarding the overall strategic objectives.

The strategic objective for the development and operation of the transport sector in **Russia** is to ensure the increase in transport accessibility and quality for the population, provide stable and safe operation of the transport infrastructure, implement a set of projects aimed to remove infrastructure restrictions of the socio-economic development of the constituents entities of the Russian Federation. In 2016, the following priorities for the medium term were outlined - to maintain the level of accessibility, quality and safety of transport services for the population, stable and secure functioning of the transport infrastructure, continue the implementation of strategically important infrastructure projects and improve the efficiency of the transportation industry operation.

The overall objective in **Norway** is to provide an efficient, accessible, safe and environmentally friendly transport system that covers society's needs for transport and as well as promoting regional development.

In **Sweden** the overall objective is to ensure the economically efficient and sustainable provision of transport services for people and businesses throughout the country.

The mission of the transport policy in **Finland** is to provide people with opportunities for safe and smooth everyday travel, to maintain the competitiveness of businesses and to mitigate climate change by reducing emissions. Transport policy is seen as part of a larger whole comprising businesses, the economy, employment and regional development.

These very similar overall strategic objectives are broken down to some main and sometimes also some secondary objectives in each country. These vary in form and structure, but contain functional objectives such as service level, mobility, reliability and accessibility, as well as impact objectives such as traffic safety and environmental sustainability.

To fulfil the overall strategic objective in **Russia** the following main objectives have been developed:

- harmonization (single transport space creation on the basis of balanced and effective development of transport infrastructure);
- competitiveness (availability and competitiveness of transport services for freight owners, logistics companies and other customers);
- mobility (availability, accessibility and quality of transport services for people);
- integration (into world transport space and Euro-Asian linkages system);
- safety and security (increasing the level of transport safety and security);
- sustainable development (reduction in the harmful influence of transport on the environment).

In **Norway** four main objectives have been developed:

- Improved access and reduced "transport distance costs"¹ to enhance competitiveness for industry and to contribute to maintaining the main features of the settlement pattern.

¹That include not only financial costs, but time and effort consumption associated with travel

- Transport policy must be based on a vision that there should be no transport accidents where people are killed or seriously injured.
- Transport policy should help to limit climate gases, reduce the environmental effects of transport, and meet the national environmental objectives and international environmental obligations.
- The system should be accessible for all users.

In **Sweden** the main objectives are divided between:

- Functional objective: Accessibility
- The design, function and use of the transport system will contribute to providing everyone with basic accessibility of good quality and functionality and to developing capacity throughout the country. The transport system will be gender-equal, meeting the transport needs of both women and men equally. Under this objective there are seven specifications.
- Impact objective: Health, safety and environment
- The design, function and use of the transport system will be adapted to eliminate fatal and serious accidents. It will also contribute to the achievement of environmental quality objectives and better health conditions. Under the impact objective there are five specifications.

The National Transport Plan in **Finland** is guided by the following main objectives:

- Service level objectives (whether the transport system meets the citizens' need for mobility)
- Economic development objectives (transport system development that cuts the transport costs of companies).
- Traffic safety objectives
- Climate and environmental objectives
- Equality objectives
- Cost-benefit objectives

The conclusion is that the overall main national objectives for the development of the transport system in each country are similar and that it should therefore be possible to develop a joint objective for the Joint Barents Transport Plan based on the national objectives.

2.2. JOINT OBJECTIVES FOR THE TRANSPORT SYSTEM IN THE BARENTS REGION

The experts offer the following joint goal for all four BEATA member states on the basis of the national objectives:

Finland, Norway, Russia and Sweden have the ambition to develop an efficient transport system in the Barents Region with good internal connectivity between the Barents countries and with good external links to world markets. The transport system should facilitate the Barents regional development and create new opportunities for the key industries. The development of the transport system should take into account protection of the environment and improving safety and accessibility for all.

3. KEY STUDIES, WORK AND PROJECTS OF STRATEGIC IMPORTANCE

3.1 MULTILATERAL AGREEMENTS AND FORUMS FOR COOPERATION

During the last decade, a number of national, bilateral and multilateral initiatives have produced research materials and other documents, relevant to the development of the Joint Barents Transport Plan. Some of them have completed their studies and strategic recommendations, while some are still ongoing. This chapter will provide an overview.

Multilateral cooperation has to a large extent taken place through EU programs, such as the Northern Periphery Programme, the Baltic Sea Programme and the Kolarctic ENPI. Because Russia is not part of the eligible area for the first two programs mentioned, the Russian side have not taken part in these projects to the same extent as the Nordic countries. Russian participation has only been possible on associate partner terms.

Other forms of multilateral cooperation that have been important are cooperation through such instruments as the Northern Dimension Partnership on Transport and Logistics (NDPTL), the Barents Regional Working Group on Transport and Logistics (BRWGTL) and of course the Barents Euro-Arctic Transport Area (BEATA).

This subchapter also includes a list of the **national plans and studies** which constitute the main input to experts' work.

3.2 MULTILATERAL AGREEMENTS AND FORUMS FOR COOPERATION

The Kirkenes Declaration is an agreement signed in 1993 at the Conference of Foreign Ministers on Cooperation in the Barents Euro-Arctic Region. Among many issues, the Declaration focuses on regional transport infrastructure and the importance of improving this infrastructure.

The New Kirkenes Declaration, adopted in 2013, emphasizes the need for improved transport networks in the Barents Region, in particular the further development of east-west transport networks.

The Barents Euro-Arctic Council (BEAC) is the forum for intergovernmental and interregional cooperation of Norway, Russia, Finland, Sweden, EU, Denmark and Iceland in the Barents Region, established in 1993. In 1998, Norway, Russia, Finland and Sweden signed the Memorandum of Mutual Understanding on the Development of the Barents Euro-Arctic Transport Area (BEATA). The BEATA Steering Committee on the federal level and the Barents Working Group on Transport and Logistics on the regional level are functioning as the BEAC working bodies.

The Arctic Council is the high-level intergovernmental forum that addresses issues faced by the Arctic governments and the indigenous people of the Arctic. It has eight member countries: Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the United States.

Northern Dimension Partnership on Transport and Logistics (NDPTL). The participants of the Partnership are Belarus, Denmark, Germany, Latvia, Lithuania, Norway, Poland, Russia, Finland, Sweden, Estonia, the European Commission. NDPTL activities are aimed to promote improvement of transportation and logistics in Northern Europe, including support for major infrastructure projects in the early stages, with the aim of promoting sustainable economic growth in the region. The partnership has published an infrastructure map where projects being part of the partnership portfolio are combined with the EU Transeuropean transport network (TEN-T). The NDPTL strategic management is carried out by the Ministers of Transport and Infrastructure, who conduct annual meetings; current management is performed by the Steering Committee, with working groups being subordinate to the former. The Secretariat of the Partnership is located in Helsinki (Finland).

The Conference of Peripheral and Maritime Regions of Europe (CPMR) comprises 160 regions from 28 countries that work together to ensure that EU institutions and national governments take account of their common interests. They also cooperate on practical projects. The Transport Working Group of the Baltic Marine Environment Protection Commission (HELCOM) is focusing on challenges and tasks, connected with the requirements of Annex 6 to the MARPOL Convention on sulphur content restriction in fuel, effective from January 1, 2015. They will also prioritize efficient rail transport and look into the possibilities for subsidized international air services as well as investigate further the possibilities for “fly on demand” routes in peripheral areas.

The Council of the Baltic Sea States (CBSS) is a forum for inter-governmental cooperation in the Baltic Region, established in 1995. Its members are Germany, Denmark, Iceland, Latvia, Lithuania, Norway, Poland, Russia, Finland, Sweden, Estonia, European Union. The Expert Group on Maritime Policy was established in 2010 within the CBSS framework. Besides, starting from 1992 five meetings of Transport Minister have been held under the CBSS aegis (the last one - in 2012 in Moscow).

The **Barents Traffic Safety Forum** is a stakeholder organization intended to promote the work on road safety in the Barents Region. It was originally founded in 2001 by road authorities in the Barents Region and has developed into an umbrella organization for road safety endeavours. All players active in the field of road safety are welcome to become members.

The Barents Regional Road Directors Meeting is a permanent forum for discussions on different road-related issues in the Barents Region.

3.3 NATIONAL PLANS AND STUDIES

A number of relevant documents comprise the basis for this Joint Barents Transport Plan. These are the main documents taken into account:

3.3.1 RUSSIA

- The Strategy of Development of Railway Transportation in the Russian Federation for the period until 2030²
- The Federal Target Programme “Development of the Transport System of Russia (2010-2020)”
- The Transport Strategy of the Russian Federation for the period until 2030³
- The Government Programme of the Russian Federation “Development of the Transport System”⁴
- The Russian Maritime Doctrine⁵
- The Strategy of Development of Maritime Transportation in the Russian Federation for the period until 2030⁶
- The Strategy for Socio-Economic Development of the Northwest Federal District in the period until 2020⁷
- The Complex Programme of Industrial and Infrastructural Development of the Republic of Komi, Perm Region and Arkhangelsk Region

3.3.2 FINLAND

- Finnish Government’s Transport Policy Report (2012)
- Finland State of Logistics (2012)
- Transport Needs of the Mining Industry (2013)
- Regional Transport Plan of Finnish Lapland (2011)
- Regional Transport Plan of Oulu Region
- National traffic and transport statistics

3.3.3 SWEDEN

- National plan for the transport system 2010-2021 (2010)
- Proposal for a new national plan for the transport system 2014-2025 (will be determined by the government in spring 2014) (2013)
- Forecast of Swedish freight flows in 2050 (2012)
- Freight, summary (2012)
- Transport needs for capacity building - 2025-2050 (2012)
- Railways’ need for increased capacity – suggestion for solutions for the years 2012-2021
- Future Capacity Demand (2011)

²Approved by the Directive of the Government of the Russian Federation No. 877-r, dated June 17, 2008

³Approved by the Directive of the Government of the Russian Federation No. 1734-r, dated November 11, 2008

⁴Approved by the Directive of the Government of the Russian Federation No. 319, dated April 15, 2014

⁵Approved by the President of the Russian Federation in June 17, 2015

⁶Approved by the Decree of the Government of the Russian Federation No. 2205-r dated December 8, 2010

⁷Approved by the Directive of the Government of the Russian Federation No. 2074-r, dated November 18, 2011

- Raw material and communications in the Barents Region (2011)
- Investigation of capacity and efficiency in the Swedish transport system - analysis of capacity challenges up to 2025, Trafikverket (2012)
- The Government's Bill. No. 2012/13:25: Investments for a strong and sustainable transport system (2012)

3.3.4 NORWAY

- New infrastructure in the North, the National Transport Administration (2010-2011)
- Part 1: Trends in key industries and transport needs up to 2040 (2010)
- Part 2: Proposed measures for transport infrastructure (2011)
- Proposal for a new National Transport Plan 2014-2023 from the National Transport Administration (2012)
- Maritime Infrastructure Report for Spitsbergen, Finnmark, Troms and Nordland, The Norwegian Coastal Administration (2012)
- Railway study on the Ofoten Line, The Norwegian Railway Administration (2012)
- The Government's White Paper No. 26 (2012-2013): National Transport Plan for the period 2014-2023 (2013)

4. GENERAL DESCRIPTION AND PERSPECTIVES OF THE BARENTS REGION⁸

4.1. AREA AND POPULATION

The total population of the Barents Region is approximately 5.2 million. The surface area of the Barents Region equals the combined area of France, Spain, Germany, Italy and the Netherlands. Average population density is only 3.5 inhabitants per square kilometer. It varies from 0.3 in the Nenets Autonomous District to 8 in Oulu. For comparison: France has 106 inhabitants per square kilometer.

The Sámi people make their home in all four states within the Barents Region. Two more indigenous peoples are found in Russian part of the Barents Region: the Nenets and the Vepsian.



Figure 2. Population by administrative entity

The largest city in the Barents Region is Arkhangelsk with 356,000 inhabitants, followed by Murmansk with a population of 307,000. The largest Nordic city in the region is Oulu⁹ (Finland) with 190,000 inhabitants, followed by Umeå (Sweden) with a population of 114,000. Population development in the past decade has been very positive for the main Finnish, Swedish and Norwegian cities in the Barents Region. However, a few Swedish cities have experienced a reduction in their population, as have the Russian cities of Murmansk and Arkhangelsk.

4.2. CLIMATE AND ENVIRONMENT

The focus on global climate change has led to an increased attention within the Northern regions. This is because these changes were expected to arrive earlier and to be more noticeable than in other regions. A comprehensive study of climate change in the Arctic under the aegis of the Arctic Council helped to develop important knowledge of the impact of climate changes regionally and globally.

All prediction scenarios considered indicate that the annual precipitation and temperature across the Barents area are likely to increase. This, in turn, is likely to result in a range of impacts, such as more rain, disappearing of permafrost, a greater frequency of storm events, more frequent freeze-thaw cycles, more frequent and vulnerable floods and landslides, as well as other effects.

Managers of infrastructure should be aware of these threats, and be ready to meet them to mitigate their impacts on the land infrastructure. These will probably lead to new and at times more expensive solutions for both construction and maintenance.

⁸The facts in chapter 4 are mainly based on the documents listed in chapter 3.4, national statistics and studies listed in the reference list in Chapter 11

⁹For Oulu and Umeå the population given is for the municipality

The Arctic Ocean has for centuries been of interest and explored by polar travellers. The melting of the ice is leading to increased access to resources in the Northern regions and new opportunities for shipping traffic. This results in an increased interest in exploiting the resources in the Arctic and increased maritime activity. In recent years we have seen the first commercial shipping between Europe and Asia through the Northern Sea Route.

The fisheries in this ocean region are among the world's richest. The governments of the region pay great attention to the environmental impact issues, related to the existing fishery activity along with the expected increase in shipping traffic and petroleum activity.

Requirements for maximum sulphur content in vessel fuel

From 1 January 2015, all ships in SECAs (Sulphur Emission Control Areas), which include the English Channel, North Sea and Baltic Sea, will be obliged to use fuel with a sulphur content of less than 0.1 %. The states of the region should monitor compliance with this requirement in a fair and non-discriminatory manner.

Consequences for shipping in the Baltic Sea

The impact of the new regulation on the transport system of the Baltic Sea is still uncertain, but in the short term it is likely to lead to shifts in transport modes and routes. Sea ports in neighbouring countries could be an alternative for cargos exported from Sweden and Finland.

4.3. REGIONAL ECONOMIC OUTLOOK



Figure 3. Key industries of the Barents Region

The scope and types of traffic flows depend on the spatial distribution of the population and the characteristics of the regional economy, which in turn determines the GDP in each particular region. In this respect, the Barents Region has great opportunities in terms of commodities due to the availability of rich natural resources such as oil, gas, ores and minerals, as well as fishery resources. Meanwhile, it should be noted that the resources of the region are not spread evenly. Most of the resources are concentrated in coastal areas, while the vast inland areas do not have such advantages.

The key sectors of the Barents Region industry suffered substantial short-term changes, caused by the global economic stagnation that began in 2008. The nowadays uncertainty factors have an impact on the regional economies, employment and traffic flows, and may be of temporary or permanent nature. Below is a brief description of the prospects for the development of the five key industries in the Barents Region.

Mining industry of the Barents Region plays an important role in the European economy and that of the world with regard to some ores, such as iron ore. Meanwhile, this industry is a great deal susceptible to global economic cycles. Nowadays, the mining companies in the Barents Region experience negative impact of low ore prices. The largest iron ore companies, such as LKAB in Sweden and Kostomuksha GOK in Russia were able to largely maintain their production volumes. Smaller businesses suffered to a greater extent and some even were closed. However, new applications are being filed in Sweden and Finland for permits to explore with a view to the change in the economic cycle.

Production of oil and gas in the Russian part of the Barents Sea, Komi Republic and the Nenets Autonomous District remains stable, with the forecasts to at least little increase in the coming years. In the Northern part of Norway there are still high expectations for future exploration activities, issuance of new permits and production growth in the coming years. Recently, the Norwegian Petroleum Directorate gas upgraded its forecast for the total volume of undiscovered resources from 16.3 to 18.5 billion barrels of oil. Thus, the share of production in the Barents Sea will increase.

Forestry enters a new era after a long period of decline in production and closure of enterprises, which lasted several decades. Forestry and forest industry is of great economic and sociocultural importance in the Barents Region, especially in Russia, Finland and Sweden. The forest in the north of the Barents Region grow faster than ever, due to climate warming, increase in carbon dioxide levels and logging of old forests, made a few decades ago. There is a potential for growth, since large forest areas in the eastern part of the Barents Region have not been used due to lack of transport. Currently, proposals are put forth to construct new, very large pulp and paper mills in Central and Northern Finland, for example, in Kemijärvi, worth of up to 1 billion euros each. Right now there is a high demand for long-fiber pulp from northern softwood for production of packaging materials and toilet paper. Besides, pulp and paper mills of new generation produce fibers and basic chemicals for a spectrum of other applications and produce more energy than they consume, - bioenergy.

Fishery/fish farming continue to be characterized by growth in Northern Norway, and amounts to nearly 30 per cent of the volume of created value in Norwegian seafood industry. In Russia fish farms in the Republic of Karelia and Murmansk are rapidly increasing production. The aquaculture has a great potential for growth, while commercial fishing shrinks on a global scale.

In addition to fisheries and aquaculture, fish meal pellets and equipment are produced in Norway, as well as services in that area are available. Besides, new areas of industries and processes are being developed on the basis of marine resources, such as marine biotechnology, biochemicals production and other similar products. In this connection, the possibilities associated with medicine and health care are worth to be mentioned.

Tourism – a very important source of jobs throughout the entire territory of the Barents Region. Relationship of transport and tourism in the Barents Region is featured in Section 6 of this Plan.

Mining, oil and gas and forestry industries are distinguished for highly cyclical character and clearly follow the ups and downs – sometimes rather dramatic – in the global markets. Those sectors, currently being at a low ebb, will finally begin to recover in the future and will show even greater demands for the development of transport communications. Meanwhile, transportation of cargo is primarily carried out by rail, sea and pipeline transport. Those activities have secondary effect on the roads. Road transportation, that provide services to those industries include, as a rule, the supply of materials for construction and maintenance of industrial sites.

Fisheries and tourism industries are stable enough, but still subject to some fluctuations in demand. Their growth potential in the future is very high, but it depends heavily on the quality and reliability of rail, sea and air transport links with the region. Locally, the passenger and freight traffic in those sectors use mostly road/street network.

Roads play the role of the most important internal communication channels between highly dispersed settlements in the region, especially for transportation of people and distribution of consumer goods. Cross-border transportation of passengers and goods in the Barents Region is also largely dependent on the road network, with the exception of several railways with high traffic capacity, serving export flows of raw material. Besides, transportation of certain goods from the region, that has to strictly honour delivery dates (e.g. fresh fish), largely extent depends on the highways.

The process of concentration of storage facilities, typical of the whole territory of Northern Europe, is also an important factor. Currently, the distribution of consumer goods is carried out from the warehouses, that have greatly reduced in number, though have grown in size and become more centrally managed. The development trend stimulates the growth of road freight transportation as a flexible and relatively inexpensive mode of goods delivery.

Reliable and efficient transport links, especially the motorway system, also have other features that widely contribute to regional development.

Currently, local communities and businesses of the four countries in the Barents Region operate in a fairly large isolation from each other. In case of improvement of the region's internal transport communications, they can expand markets, promote cooperation, and even foster unification of various business areas into cross-border

clusters, for example, joint marketing of tourism products of two or more countries.

Availability of universities and research centers in the region is a particularly important factor. The data obtained during the recent 20 years show that the metropolitan areas with strong universities and technology-oriented economies are the centers of growing population in the region, namely: Oulu, Rovaniemi in Finland, Tromsø and Bodø in Norway, Arkhangelsk, Murmansk, Petrozavodsk, Syktyvkar in Russia and Umeå and Luleå in Sweden. Closer cooperation of universities and research centers, supported by efficient transport communications, will provide even greater benefits for the region.

The following map shows the number of vehicles (trucks and passenger vehicles) between the countries¹⁰. The map provides specific information on the number of people and cargoes crossing the border. It can also be used to track changes in the situation. Statistics show that the annual average traffic flow across the border of Norway and Russia was much higher a few years ago¹¹.

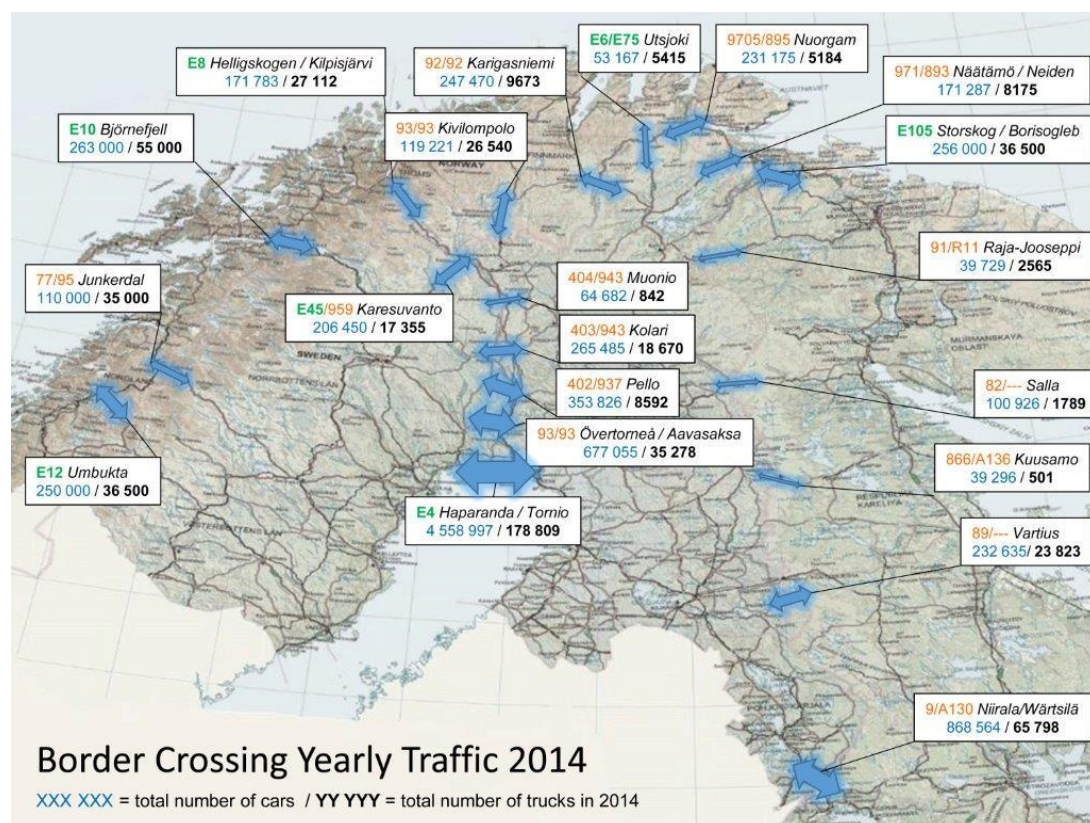


Figure 4. Annual traffic capacity¹² at the motorway border crossing points (passenger cars / trucks)

4.4.DEVELOPMENT OF THE ROAD SYSTEM IN BARENTS REGION

Road maintenance in winter period

The Barents Region and its road routes are located in the High North, often in the mountainous regions of fjelds. This creates significant problems for road traffic and road maintenance in winter. Often, the road may be closed during snowstorms and snowfalls in the mountainous regions of fjelds. On some routes, this problem is particularly serious. The table below shows the routes and points with the largest number of road closures and escorted traffic in the winter of 2013-2014. Data on the Highway E 8 demonstrate the situation in the winter of 2014-2015.

Motorway	Border	Location	Closures	Escorted traffic
E 12	NOR/SWE	Umbukta	50	17

¹⁰The map considers local border crossing. Some border crossings points demonstrate intense local crossing activities. The most intensive near-border flow in the form of cross-border commuting/shopping is observed at the border in Haparanda/Tornio, and at several other border crossings between Norway and Sweden/Finland.

¹¹ Border crossing statistics for different periods of time is specified in the relevant routes of section 5.

¹² According to government authorities of Finland, Sweden and Norway, responsible for the checkpoints. Countries' data may have some differences depending on the counting methods.

E 10	NOR/SWE	Bjørnfjell	24	18
Rv 77	NOR/SWE	Graddis	7	0
E 8	NOR/FIN		7	0

Table 1. The largest number of road closures and escorted traffic in 2013-2014.

Traditional measures to control the situation include construction of roads on high fills to prevent accumulation of snow on the surfaces. Snow guards also help a lot. Standard snow removal operations are carried out beyond the fields. Slippery road surfaces due to frost are common problem at the beginning of winter. An additional complication is that the need to save roads maintenance costs is likely to reduce the maintenance level of roads with low traffic intensity in winter.

The use of intelligent transport systems (ITS) and solutions in the field of data digitization

Easier access to information on weather and other conditions at the state roads for a foreign users facilitates travel planning and reduces the risk of road accidents in all the countries of the Barents Region. To this end, a European Datex2 standard for presentation and exchange of information on road conditions and realtime traffic had been developed. It allows to provide language-independent traffic information across the borders of the European states. The Datex2 data are also available to providers of road conditions and traffic information, allowing access to same information for the end users through car navigation systems and mobile phones.

Norwegian Public Roads Administration (NPRA) have been closely collaborating for many years with the Swedish Transport Administration on Datex2 implementation, and currently effective exchange of information between the two countries is established. Since February 2015, Norwegian traffic control hubs have access to Datex road network data in Sweden through the Web client «TrafikkNå» in the form of roads and traffic flows map display. Hopefully, similar information exchange systems between Norway and Finland will possibly be put in place during 2016. It is extremely important for traffic control hubs to ensure easy and fast access to information on the roads network including that of the neighboring countries, which is crucial in cases when the main road is closed due to weather conditions or accident and the roads networks of the adjacent countries are used for a bypass purposes.

Another example is the use of mobile communication – collision with deer warning system, testing of which is carried out in Northern Finland. This mobile app is designed for professional drivers who need to simply press a button when they see a deer beside the road. The app registers the deer's location and warns other car drivers approaching him, provided the app has been installed on their mobile phone. The warning is visible during a certain period of time after the animal has been spotted. The system is planned to be used over the entire territory of the deer grazing in Finland, but it can also be implemented in other countries in the Barents Region.

The traction control systems, which modern cars are equipped with, track differences in wheel speeds. In winter, those differences often indicate the slippery road surfacing. Such data, in all probability, can be collected and used to warn other road users, as well as be relayed to the road management authorities in order to ensure slipperiness control. The automotive industry is already working on that.

The interaction within the Working Sub-Group on logistics and intelligent transport systems under the auspices of the Working Group on Transport of the Intergovernmental Russian-Finnish Commission on Economic Cooperation, can be given as an example of interstate cooperation in the development of intelligent transport systems.

Within the framework of the Memorandum on cooperation in the exchange of information signed in 2014 by the Federal Road Agency, subordinated to the Ministry of Transport of Russia and the Finnish Transport Agency, a pilot project to establish an international intellectual transport corridor "Helsinki–St Petersburg" is being actively implemented.

The pilot project within the framework of the establishing of international intellectual transport corridor "Helsinki–St Petersburg" includes among other things:

- creation of an interface to exchange data on weather and road conditions (cross-border) in Russia and Finland (contractor on behalf of the Russian side: the Federal Road Agency);
- ensuring cooperation of the emergency call systems in an accident (service support by third-party providers);
- creation of a joint solution to make purchases or replenish phone account via the Internet;
- "InTrans" passenger information system on traffic routes.

In the future, intelligent transport corridor "Helsinki - St. Petersburg" can be extended as far as Stockholm (Sweden) and other countries in Scandinavia and Europe – northwards.

Converting data into digital form is an area that allows you to take advantage of the solutions developed for the

purpose of direct or indirect acceleration of various transport-related processes. A good example is the exchange of documents and data contained in the permit and authorizations, between the authorities and transport operators. Those procedures may include, for example, dispatch of documents for vehicles and export documentation in electronic format to the border crossings.

Meanwhile, conversion of data to digital form can not take place without the efficient operation of the telecommunication system. Some remote sections of roads in the region lack reliable mobile telephony, which prevents the use of advanced technologies. Besides, the lack of communication creates risks for road safety.

The Barents Region and its transport network is located in the High North. This creates significant problems for road traffic and road maintenance in winter. On some routes, the problem of road closures due to snowstorms and snowfalls is crucial. Use of ITS can help to optimize traffic, improving its reliability and safety in any conditions.

Traffic safety

Norway, Sweden and Finland approved the concept of zero mortality for all public roads. This makes the Barents Region road routes face a serious challenge, as there are many road sections in the network that do not exactly meet the accepted standards. Driving on some roads is a particularly difficult mission for foreign truck drivers, who do not have driving skills in the northern conditions. Every year in winter several accidents take place, for example, on the E8 road to Kilpisjärvi, when foreign trucks end up in a ditch.

Arrangement of high quality recreation areas for commercial carriers is a necessary measure to improve safety on the roads in the Barents Region. The distances between population centres in the Region are great, and the traditional recreation areas, for example, at gas stations, are few. Besides, now the control over the time of rest of commercial vehicle drivers has been tightened.

4.5. TRANSPORT SAFETY

The objectives of the transport security include stable and safe functioning of the transport system, protection of interests of an individual, society and state in the sphere of transport system against unlawful interference, including terrorism.

Transport security is provided by the entities of the transport infrastructure and carriers through the implementation of the system of legal, economic, organizational and other measures in the sphere of transport industry, determined by each state, that correspond to threats of committing acts of unlawful interference.

In connection with the growing threats of terrorism, the Barents Region countries may decide to establish a joint expert group to coordinate the work to be carried out in the area of transport security in the air, rail, sea and road transportation.

5. MAIN CROSS-BORDER ROUTES OF THE BARENTS REGION

INTRODUCTION

The first two maps in this chapter show transport networks prioritized by the EU and the Russian Federation.

The experts have defined main cross-border routes of great importance to the Barents Region development. The transport network in the Barents Region should be branched and provide a sufficient number of efficient transport routes to enhance the competitiveness of trade and industry and to ensure the attractiveness of the Barents Region for living, tourism and entrepreneurship.

It should be noted that some routes, for example, the Bothnian Corridor encompassing road and rail from Helsinki to Stockholm, only partly lie within the Barents Region. The transport plan focuses on the Barents part of the route.

Some of the routes overlap somewhat. In these cases the overlapping part is included in only one of the route descriptions. Reference is made in discussions of the other route(s) to where descriptions can be found.



Figure 5. Prioritized road network by the EU and the Russian Federation



Figure 6. Prioritized rail network by the EU and the Russian Federation

Table 2 provides a brief presentation of the transport routes considered most important by the experts:

Route /Chapter ¹³	From – To	Route name if existing	Name of roads and rail sections	Length (km)
5.1	Oulu-Haparanda/Tornio – Umeå	The Bothnian Corridor	Road: E8, E4, E75, Rail: Bothnia line, Haparanda line and the main line through upper Norrland, Tornio – Oulu line	Road: 766 Rail: ~800
5.2	Luleå – Narvik		Road: E10 Rail: The Iron Ore line, the Ofoten line	Roads: 520 Rail: 473
5.3	Vorkuta – Kotlas– Syktyvkar – Arkhangelsk – Vartius – Oulu		Road: Regional Roads Kochkoma – Tiksha – Ledmozero – Kostomuksha – state border (Lytä), 89, E8, E4, E10, the E6, Rail: line from Vorkuta to state border (Lytä) – Chum – Synya – Sosnogorsk – Ukhta – Mikun – Kotlas – Konosha – Obozerskaya – Kochkoma – Ledmozero – Kostomuksha line. Branch roads from Obozerskaya to Arkhangelsk; from Mikun to Syktyvkar.	Roads: 230 Rail: 1517
5.4	Arkhangelsk – Murmansk – The European Continent	The Northern Maritime Corridor	Sea route, therefore no number	Approx. 3,500 NM
5.5	Luleå/Kemi/Oulu – the European Continent	The Motorway of the Baltic Sea	Sea route, therefore no number	Approx. 1,500 NM
5.6	Petrozavodsk – Murmansk – Kirkenes	-	Roads: E105 (National Road R-21 “Kola” (section state border N/R – International automobile border –crossing point “Borisoglebsk” – Pechenga – Murmansk –	Roads: 1140 Rail: 850 km

¹³ The routes are not listed in order of priority

			Petrozavodsk) Rail: Oktyabrskaya railway – Murmansk – Petrozavodsk line	
5.7	Rovaniemi-Salla – Kandalaksha	-	Roads: E75, 82, Regional Road Kandalaksha – Alakurtti – Salla border crossing point, E105 (R-21 Kola) Rail: Kemi – Rovaniemi – Kemijärvi line	Roads: 355 Rail:
5.8	Kemi – Rovaniemi-Kirkenes	-	Roads: E75, 971, 893	Roads: 702
5.9	Kirkenes – Mosjøen	National routes through Northern Norway	Roads: E6 Rail: The Nordland line, The Meråker line	Roads: 1684 Rail: 803
5.10	Haparanda/Tornio – Tromsø	The Northern Lights Route	Road: E8, E6, 99 Rail: Tornio – Kolari railway	Roads: 620 Rail: 183
5.11	Karesuando – Alta		Road: 93	Roads: 272
5.12	Vasa – Umeå – Mo i Rana	The Blue Road	Roads: E 12 Rail: Storuman – Hällnäs line	Roads: 492 Rail: 167
5.13	Skellefteå – Bodø	The Silver Road	Road: 95, 77, E6, 80	Roads: 379 Rail: 140
5.14	Murmansk – Raja Jooseppi – Ivalo		Roads: Regional Road “Kola” – Verkhnetulomsky – Lotta border crossing point, 91	Roads: 300
5.15	Svappavarra – Pajala – Kolari		Road: E10, E45, 395, 99	Roads: 160
5.16	Kajaani – Petrozavodsk:		Roads: A-121, E 105 (R-21 “Kola”), Regional Road Olonets – Värtsilä Rail: The Kajaani – Niirala line, the Värtsilä – Petrozavodsk line	Roads: 559 Rail: 283
5.17	East-West flight services in the Barents Region			

The routes are divided by three types of transport: road, rail and sea. Air transport is considered separately (Chapter 5.17), as it is difficult to include it in the specified routes.

Technical and functional standards of the routes differ significantly, both within one route and between routes. In some cases the standard of the routes near the state borders is poor. Furthermore, the volume of traffic varies considerably both within one route and between routes. The traffic volumes are also minimal near the national borders.

The experts would like to stress the importance of the following three transportation routes:

- The Iron Ore line/The Ofotbanen line (Chapter 5.2)
- The Northern Maritime Corridor with Murmansk as a central hub (Chapter 5.4)
- The Bothnian Corridor (Chapter 5.1)

The following Chapters 5.1–5.15 will describe each route in detail.

5.1. "THE BOTHNIAN CORRIDOR": OULU – HAPARANDA/TORNIO – UMEÅ

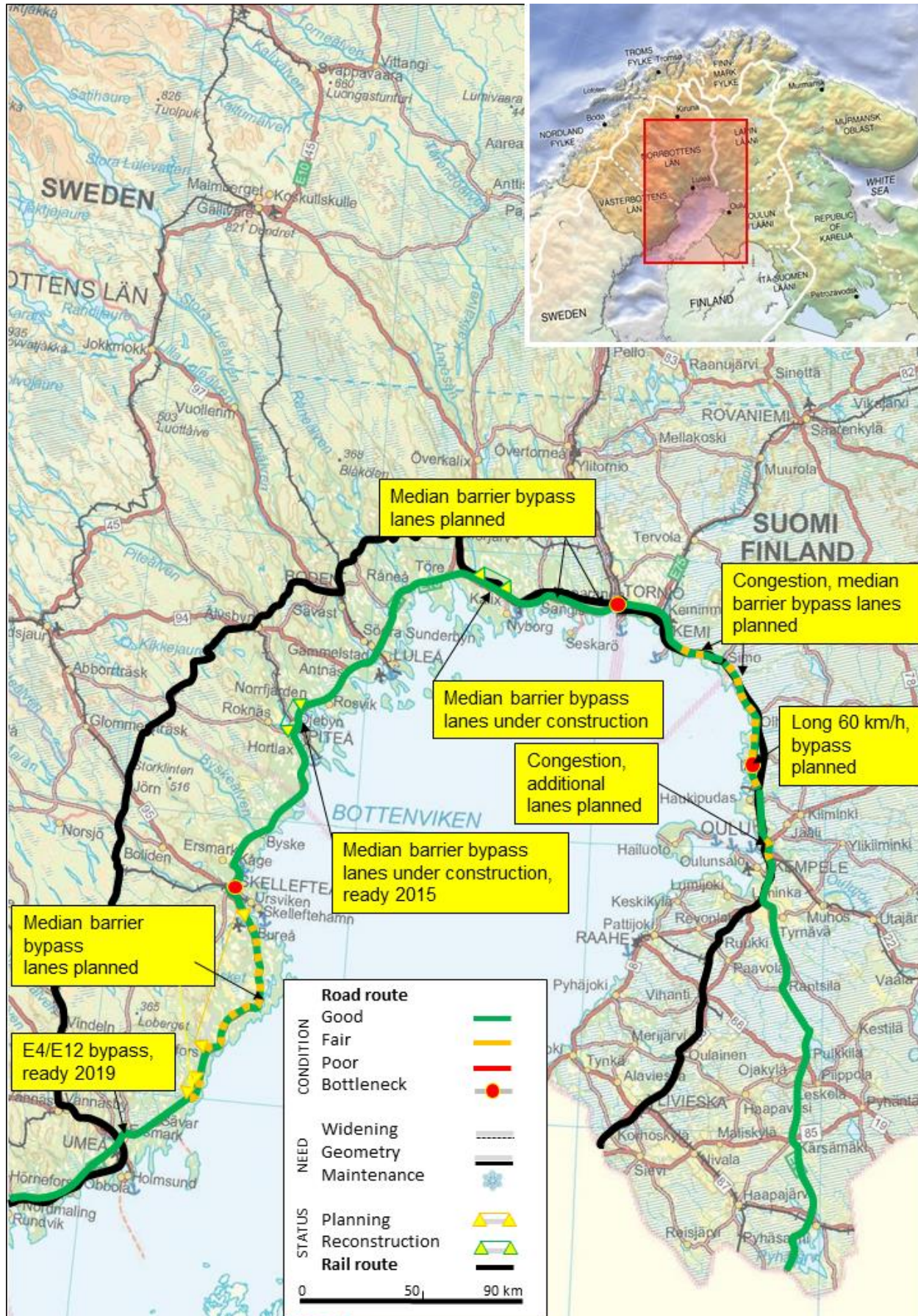


Figure 7. The Bothnian Corridor

Consists of:**Road** E4, E8, E75**Railways:**

Bothnia line, Haparanda line, main line through upper Norrland and Helsinki – Tornio line

Brief facts:**Roads**

Sweden (E4) Border Västerbottn/Västernorrland- Border Sweden/Finland

Length: 452 km

Width: 9 – 21.5 m

Speed limit: 90 – 110 km/h

Number of vehicles crossing the border per day: (Haparanda/Tornio): 7750

Finland (E75, E8) Border Sweden/Finland – Border Pohjois-Pohjanmaa/Keski-Suomi

Length: 314 km

Width: 10 – 12.5 m, about 70 km in Kemi and Tornio and in Oulu it is motorway

Percentage of the road with a width of 8 m or more: 100%

Speed limit: 100 km/h, 60 or 80 in some places, 120 on motorways in good driving conditions

Average number of vehicles per day where traffic is at its peak:

Umeå	8,200
Skellefteå	5,300
Piteå	8,900
Luleå	9,400
Kalix	5,100
Haparanda	5,700
Tornio	11,000
Kemi	12,500
Oulu	47,500

Railway

Length

Sweden

Main line through upper Norrland 626 km (Bräcke-Umeå-Boden)

Bothnia line 185 km (Nyland-Umeå)

Haparanda line 161 km (Boden-Haparanda)

Finland

The total length of the Bothnian Corridor primary rail network in Finland is 812 km. About 40% of this distance is in the Barents Region

Average number of passenger trains per day:

Sweden

Umeå – Vännäs: 32

Vännäs – Boden: 12

Boden – Haparanda: 0

Finland

Kemi - Oulu: 14

Average number of cargo trains per day:

Sweden

Umeå – Vännäs: 24

Vännäs – Boden: 32

Boden – Haparanda: 4

Finland

Tornio - Kemi	4
Kemi-Oulu:	6
Oulu – South:	14

Maximum permitted axle load:

Sweden: 25 tonnes

Finland: 22.5 tonnes

Gauge:

Sweden: 1,435 mm

Finland: 1,524 mm

Speed limit:

Sweden: 250 km/h

Finland: 140 km/h¹⁴

Signalling system:

Sweden: ATC/ERTMS¹⁵/EBICAB 900

Finland: ATP-VR/RHK

Electrified/Not electrified:

Sweden: Electrified

Finland: Electrified except for Tornio-Kemi

Single or double track:

Sweden: Single track

Finland: Single track

Ports

See Chapter 5.5

Airports

Number of passengers per year:

Umeå	846,000
Skellefteå	225,000
Luleå	979,000
Kemi	97,000
Oulu	701,000

General information

Number of inhabitants in cities along the Corridor:

Umeå	117,000
Skellefteå	72,000
Piteå	41,000
Luleå	75,000
Kalix	17,000
Haparanda	10,000
Tornio	22,000
Kemi	23,000
Oulu	131,000

5.1.1. GENERAL DESCRIPTION

The Bothnian Corridor encompasses road and rail from Helsinki to Stockholm. In this document only the part of the Corridor that is within the Barents Region is described.

The Bothnian Corridor is a strategically important link within the transnational transport system of goods in the Northern Europe. The Corridor is proposed to be included in the TEN-T core network for both rail and road. It stretches out on both the Swedish and the Finnish side of the Gulf of Bothnia and connects east-westbound and north-southbound transnational links in Sweden, Finland, Norway and Russia.

The Corridor is the artery connecting the north of Sweden with the rest of the country and the continent. Northern Sweden supplies much of Europe and even the world with raw materials and a large part of this goes through the Bothnian Corridor. The Corridor also encompasses 85% of the population of Norrbotten and Västerbotten, or about

¹⁴ Maximum speed on most of the Bothnian Route is 140 km/h, 120 km on the short non-electrified section Kemi-Tornio/Haparanda

¹⁵ Automatic Train Control/European Rail Traffic Management System

300,000 people, which means that the corridor is vital for regional and national passengers. In Northern Finland the population is not as concentrated in the Bothnian Corridor as in Sweden, but major industrial centres are located on the coast of the Corridor. Also in Finland the Corridor is the main link between Northern Finland and the rest of the country. The road is very important for transports between Northern Finland and the main ports in the south.

The Corridor is the functional connection and serves an important function:

- For commuting, healthcare-related travel and education-related travel
- For business travel (in particular the airports).
- For recreational travel and the tourism industry.
- For regional freight and long-distance freight traffic to/from Norrbotten/Västerbotten counties.
- For transit traffic to/from Norway, Finland, Eastern Europe and the rest of the Barents Region.

The Bothnian Corridor is already of great importance for transnational goods flows within the EU and to/ from the EU. As European integration continues to expand, the importance of the Corridor will increase further. It is important for the economy and growth of the Barents Region and it connects its main industrial areas, main cities and hubs.

The coastal region of the Gulf of Bothnia is very industrialized, both on the Swedish and Finnish side. There are large stainless steel factories, large forest industry mills, paper mills and other important industries.

5.1.2. INFRASTRUCTURE AND STANDARD

Roads

The E4 is Sweden's most important road, connecting the whole country from North to South. It follows the coastline from Stockholm through the main cities up to Haparanda, a distance of 1,020 km. The road E4 has the same designation as it continues across the border to Finland, then as the E8 between Tornio and Kemi and finally as the E75 from Kemi via Oulu to Helsinki.

Since the E4 is of both national and international importance its standard is quite high. In Sweden, most of it has been upgraded to at least 13 meters with a central barrier for higher traffic safety and accessibility, but there are still some parts, especially in the north, that are only 9 meters wide. In Finland most of the road is 10 meters wide, while so far only one section has been upgraded with a central barrier. 70 km of the northern part of the E75 road is four-lane motorway between Tornio and Kemi and in Oulu.

Railways:

The entire Bothnian Corridor primary railway network is not electrified, since there are some shorter parts missing. It has an automatic train protection system - ATC or better. In Sweden both the Bothnia line and Haparanda line have ERTMS installed.¹⁶ The maximum permitted axle load is 25 tonnes in Sweden and 22.5 tonnes in Finland.

The average speed limit is low and the railway network is steep in some parts, which together cause problems for freight transport operations.

In Sweden the railway from Härnösand up to Umeå is of good standard, thanks to the new Bothnian link. North of Umeå the main line through Northern Norrland has a lower standard and capacity. The Haparanda line between Boden and Haparanda/Tornio was opened for traffic in early 2013.

In Finland the Seinäjoki–Oulu rail section has several line sections over 10 kilometers without crossing sections, but this 335-kilometer rail section still has about 100 level crossings which are mostly equipped with safety equipment. The northernmost Oulu-Tornio rail section has about 70 crossing sections, most of which do not have safety equipment.

In Finland the railway standard is not adequate on the first 20 km from the border with Sweden. The railway is not electrified between Haparanda/Tornio and Kemi. In Haparanda/Tornio the facilities to handle the rail gauge difference are inadequate. The Haparanda rail gauge changer is no longer functional.

Most European countries use a standard gauge of 1,435 mm, whereas in Finland the gauge is 1,524 mm. Therefore trains cannot cross the border in Haparanda/Tornio without a change of

¹⁶European Rail Traffic Management System is a standardized system for signalling, control and train protection to enhance cross-border interoperability.

wheel sets or lifting cargo from one wagon to another.

The Russian rail gauge is 1,520 mm, which makes it possible to use the same wagons on Finnish and Russian railways.

From Kemi to Oulu the railway has a single track. More than 300 km of the rail to the south of Oulu has been under reconstruction for many years and the work will continue for several years. Some 100 km of the reconstructed railway will be double-track.

The building of a new railway track from Umeå to Luleå, the North Bothnia line, has been considered. If such an investment is made in the future the rail capacity challenges in this part of the Bothnian Corridor will be solved.

5.1.3. TRAFFIC

Roads

The traffic volumes throughout the Corridor fluctuate. Road traffic volumes varied between 3,500–7,500 vehicles from Haparanda to Umeå, with the exception of the road section Luleå–Piteå, which had 9,000 vehicles. The share of heavy vehicles was about 15-20% of the total traffic volume from Haparanda to Stockholm.

In Northern Finland the highest traffic volumes in the road network are on the E75 in Oulu where annual daily traffic volumes were almost 50,000 vehicles in 2011. Between Kemi and Oulu, the traffic volumes are generally from 6,000 to 11,000 vehicles per day, about 1,000 of them being heavy vehicles.

Railways:

The number of freight traffic operations exceeds the number of passenger traffic operations in the northern part of the Bothnian Corridor. The Bothnian Corridor primary rail network mostly consists of single-track rail sections with the exception of a few double-track rail sections. The Bothnian rail corridor constitutes the primary freight corridor in Sweden and is especially important for Swedish primary industry, such as the steel, forest and paper industry.

Freight transport volumes reached about 5 million tonnes according to the most recent commodity flow survey. A significant share of the freight volumes is transported through the corridor from the northern part of Sweden to the ports on the west coast and in the south, from where transport volumes continue to other parts of Europe. Transports of steel are especially significant between Luleå and Borlänge. The main line through Northern Norrland is today the most congested single-track line in Sweden.

The highest freight traffic volumes in the Bothnian Corridor primary rail network in Finland are in the northern part of the Ostrobothnian rail line. The significant freight traffic volumes on these rail sections are primarily the result of heavy transit traffic from Russia to the Port of Kokkola.

In the remaining northern part of the Bothnian Corridor primary rail network, freight traffic volumes of 3.2-3.8 million tonnes and 2.4-2.9 million tonnes were in the northern part of the main line and southern part of the Ostrobothnian line, respectively. Freight traffic volumes on the rail sections north of Oulu were about 1.6 million tonnes in 2010.

5.1.4. KEY CHALLENGES

Roads

- Increase accessibility (speed) and traffic safety.
- Improve the horizontal and the vertical curves in some places.
- Reach the environmental quality standards in Umeå and Skellefteå.

Railways:

- There is a serious lack of track capacity, carrying capacity and limited speed standard along the railway systems in the Corridor. In Sweden especially between Umeå and Boden.
- Find an effective solution for the different gauges between Sweden (1,435 mm) and Finland (1,524 mm).
- Electrify the railway section between Tornio/Haparanda and Kemi.

5.1.5. PLANNED DEVELOPMENT

Roads

- Bypass in Umeå E4/E12, 2015.
- 2+1 road with central barrier on some sections of E4 between Umeå and Haparanda.
- Reconstruction of crossings on E4.
- Improve the capacity of the E75 in Oulu by upgrading the road to six-lane motorway.
- 2+1 road with central barriers on several sections of E75 between Kemi and Oulu

Railways:

- Measures to improve the capacity Umeå – Boden
- Upgrading of stations in Sweden
- The improvement works on the 300 km long railway between Seinäjoki and Oulu will be completed by 2017.

5.1.6. FUTURE POTENTIAL

The Corridor is important today and its importance will grow in the future due to the expansion of the industries in the northern areas of the Barents Region. The forecast in Sweden and Finland shows a significant growth in the northern areas due to the industrial expansion.

Legend:

- Road route**
 - Good: Green line
 - Fair: Yellow line
 - Poor: Red line
 - Bottleneck: Red circle
- NEED**
 - Widening: Dashed line
 - Geometry: Solid black line
 - Maintenance: Blue star
- STATUS**
 - Planning: Yellow trapezoid
 - Reconstruction: Green trapezoid
 - Rail route: Black line

Scale: 0, 50, 90 km

Roads: E 10

Railways:

The Iron Ore line and the Ofoten line

Brief facts:

Roads

Length: 520 km

Width: 6-13 m (Sweden)

Width: 6-8.5 m (Norway)

Speed limit: 50-100 km/h

In Sweden: 90/100 km/h

In Norway: 60/70/80 km/h

Number of vehicles crossing the border per day at Riksgränsen/Björnfjell: 850

Average number of vehicles per day where traffic is at its peak: 4,000 (Kiruna) and 3,600 (Rombakken)

Railway

Length: 473 km

Average number of passenger trains per day: 7 (4-10)

Average number of cargo trains per day: 19-50 depending on which part

Maximum permitted axle load: 30 tonnes Gauge: 1,435 mm

Maximum speed: 135 km/h Signalling system: ATC/FATC¹⁷

Electrified/Not electrified: Electrified

Single or double track: Single track

TEUs at Narvik rail terminal: 55,000¹⁸

Ports

See Chapters 5.4 and 5.5

Airports

Number of passengers per year

Luleå	979,000
Gällivare	34,000
Kiruna	200,000
Harstad/Narvik	552,000

General information

Number of inhabitants in cities along the Route:

Luleå	75,000
Boden:	19,000
Överkalix	4,000
Gällivare	18,000
Kiruna	23,000
Narvik	19,000

5.2.1. GENERAL DESCRIPTION

The Route consists of both road and rail. It stretches from Luleå in the north of the Baltic Sea to Narvik, located on the Atlantic coast in northern Norway (a distance of 520 km by road). The Route consists of varying landscapes and climates. It begins and ends at the sea, stretches from coast to coast and passes through sparsely populated forest and mountain areas.

The Route is important for the economy and growth of the Barents Region and connects industrial areas, cities and

¹⁷ Full Automatic Train Control

¹⁸ Statistics for the year 2012

hubs. The Route serves and connects mining fields and industries in the area between the coast and ports of Luleå and Narvik. The Route has large freight volumes, since 90% of Swedish iron ore production is located in this part of Northern Sweden. It is also important for the local communities due to the border trade and businesses.

The Route serves an important function:

- For regional freight and specifically ore traffic from the mining areas to ports.
- For transit traffic:
 - transport of consumer goods (rail), general cargo (rail) and fish (rail and road) between Southern and Northern Norway via Sweden.
 - rail/sea between the Barents Region and the European continent and between Asia and America on rail and sea.
- For recreational and tourism industry.
- For local and regional commuting, healthcare-related travel (Gällivare and Luleå hospitals) and education-related travel.
- For business travel.

Important hubs/nodes: Luleå (port), Boden, Gällivare, Kiruna, Narvik (port, rail freight terminal)

Both road and rail lack alternative routes for freight traffic in the Route if infrastructure breakdowns or vehicle accidents occur. The railway is especially sensitive to disturbances north of Gällivare since there are no re-routing options for trains. South of Gällivare the inland railway can be used, but with lower loads and only with diesel locomotives.

Heavy vehicles are more sensitive to disruption since they can only choose alternative routes that have an adequate load-bearing capacity. For example, a blockage between Gällivare and Svappavaara results in a route extension of 70 km. A blockage between Kiruna and Svappavaara results in a route extension of 700 km.

5.2.2.INFRASTRUCTURE AND STANDARD

Roads

The E10 is one of Sweden's, Northern Norway's and the Barents Region's main cross-border routes for long-distance passenger and freight transport. The road is included in both the national road networks and the Trans-European Networks (TEN-T). The E10 also acts as an important artery for passengers and freight to industries, workplaces, municipal and regional centres.

The road follows the route Luleå-Töre-Överkalix-Gällivare-Kiruna-Riksgränsen-Narvik. The length is altogether 520 km.

Steep sections on the E10 in combination with a narrow road make it difficult for heavy vehicles to pass and ascend the hills.

The custom office is only open in daytime.

The road is temporarily closed several times per year due to winter storms. In high-risk periods the road is closed for safety reasons at night. In the winter time the traffic quite frequently has to be accompanied by a snow-clearing vehicle.

Railways:

The Iron Ore line/The Ofoten line is an electrified, single-track line divided into three sections due to the iron ore transports: the northern circuit, southern circuit and middle section. The gauge is 1,435 mm. The road has an ATC/FATC signalling system.

There are 47 crossing sections in Sweden and 5 in Norway. Nearly half of these are too short and need to be rebuilt, especially due to the 750 meter long iron ore trains.

The Ofoten line is Norway's northernmost railway, it stretches from Narvik to Riksgränsen. The Ofoten line has no other connection to the Norwegian rail network, it only connects to the Iron Ore line.

The Ofoten line is 42 km long, and the track is steep and curvy. The height difference between Narvik and

Riksgränsen is 521 m over a stretch of 42 km, giving an average gradient of 12.3%.

The Iron Ore line extends between Boden and Riksgränsen, where the Ofoten line begins. The Iron Ore line is known as Sweden's most beautiful railway and is a major transit route to mountain facilities for those arriving by night train from South. It is the only railway in Sweden that allows 30-tonne axle load and trains with a weight of 8,600 tonnes.

In the ports of Luleå and Narvik there is a need for infrastructure investments on land in order to be able to increase the freight volumes. Luleå also requires major investments within the fairway in order for larger vessels to operate.

5.2.3. TRAFFIC

Roads

The average number of vehicles per day varies between 850 and 4,000, cargo transport between 160 and 500 vehicles/day. The highest values are between Kiruna and Svappavaara. The average number of vehicles per day varies between 850 vehicles at the border and 3,600 vehicles close to Narvik.

Railways:

The Iron Ore line/The Ofoten line is Sweden's most heavily trafficked railway due to iron ore trains. Northern Circuit (Kiruna-Narvik) has 4-6 passenger trains per day depending on season and it carries approximately 19 million metric tonnes of ore per year. Southern Circuit (Luleå-Boden-Gällivare-Kiruna) has 10 passenger trains per day and it carries around 7 million metric tonnes of ore per year. Between Kiruna and Narvik there are 22 ore trains per day in both directions and between Malmberget and Luleå 10 ore trains per day in both directions.

The other freight transport by rail is largely related to the container services "Arctic Railway Express" and "North Rail Express" between Narvik via Sweden to Oslo.

The volumes for non-ore commodities are not large, at least compared to the ore volumes, but they serve as an important supply line for consumer goods, fish exports and other manufactured goods for different economic activities throughout Northern Norway north of Narvik.

The traffic requirements along the 473 km long track have increased since both longer and heavier trains will operate on the track. Since the Iron Ore line is single-track, crossing sections have a key role for efficiency and capacity.

The forecasts show a huge increase in cargo flows, especially from the mining and seafood industries. The highest increase will take place on the northern circuit between Kiruna and Narvik, since most mining companies, both existing and upcoming, are planning for shipments from Narvik. There are also plans for increased regional passenger traffic and increased investments in tourism.

All these plans will result in significantly more trains on the line and a high capacity utilization, and difficulties in operating and maintaining the line.

5.2.4. KEY CHALLENGES

Roads

The common challenges for the E10 are:

- Increase the width of the road in some sections to 8 meters
- Improve the horizontal and vertical curves in some places
- Lower the gradient in some places with steep hills
- Traffic safety, especially for inhabitants where the road passes through villages
- Drifting snow in the winter season
- Winter maintenance

Railways:

- Improve robustness and reliability to an acceptable standard.
 - Improve punctuality to an acceptable standard
 - Increase capacity. Possibly, in future double track will be necessary along the entire length of the railway.
- Expected demand from the mining fields in Northern Sweden is 31 train pairs in 2020, an increase of 50%.

- Increase capacity of the power supply infrastructure
- Ensure increased maintenance without affecting traffic
- Prepare for 750 meter long trains including extending crossing sections to 1,000 meters.
- Develop the passenger traffic on one of Europe's most beautiful railways in combination with serving important bulk and container flows.
- The development of the railway is closely interlinked with that of the port of Narvik and Luleå and planning needs to be coordinated. Port capacity in Narvik is very limited after a new mining company in 2013 started using the port as its export gateway. The port of Narvik needs to be expanded for transshipment of products from the Kaunisvaara and other fields.

5.2.5. PLANNED DEVELOPMENT

Roads

E10 In the Swedish Transport Administration's current long-term plan for existing infrastructure investments 2010-2021, the following is planned for the E10:

- New bypass in Kiruna, due to mining expansion and movement of the city
- E10 – Improvement of the roads plan, profile and width between Gällivare and Kiruna
- E10 – Road widening and load-bearing capacity measures in relation to Svappavaara-Kiruna (Mertainen) section

In Norway the construction work for a new bridge over the Rombaksfjord has started (the Hålogaland bridge). The total cost for this project will be about EUR 400 million. The distance from the border to the port will be reduced by 7 km.

Railways:

Sweden

In 2013 a study of choice of measures was initiated. Planned investments:

Riksgränsen – Kiruna – Gällivare – Boden – Luleå Crossing sections:

- Kiruna freight yard - 2013
- Four new crossing sections
- Proposal for further investments in Sweden ¹⁹: Riksgränsen – Kiruna – Gällivare – Boden - Luleå
- Double-track study Kiruna – Riksgränsen (Northern Circuit)
- ERTMS ²⁰system – 2018/2019
- Third track in Kiruna 2015
- Kiruna travel centre – 2017
- Gällivare freight yard – 2013
- Two new crossing sections

Norway

Planned investments:

- Double-track assessment will be complete in 2013.
- Work on Narvik terminal – Fagernes will be complete in 2013.
- Increase the axle load on the line between Narvik station and Narvik terminal (2.5 kilometers) to handle heavier trains from Northland Resources
-
- Narvik station will be extended to 750 m in 2017
- New signal/safety system at Narvik station
- The crossing sections at Bjørnfjell and Rombak will be extended to 750 m in 2015
- Measures to increase the power supply for the Ofoten line
- 2 new crossing sections – Søsterbekk and Djupvik

5.2.6. FUTURE POTENTIAL

This is an important route today and its importance will grow in the future due to the expansion of the industries in

¹⁹ Proposed in new national infrastructure plan 2014-2025

²⁰ The European Rail Traffic Management System (ERTMS) will be the new standard for the European railway system. A common standard is necessary to ensure interoperability and the system comprises all aspects of management, safety and communication. ERTMS will first be implemented on all high speed lines, transit routes and eventually on all European railways.

the northern areas of Barents. The forecast in Sweden and Norway indicates a significant growth in the northern areas due to the industrial expansion. It might also be an important route for Finnish mining in the future, since they will have access to the ice-free port in Narvik, via the route.

In addition to the important role of the railway for bulk transports for the mining industry, the railway is important for transport of containers.

There is a potential for transport of larger volumes of seafood on the railway in future years.

5.3. ROUTE: VORKUTA – SYKTYVKAR – KOTLAS ARKHANGELSK – VARTIUS – OULU

Route "Vorkuta – Syktyvkar – Kotlas – Arkhangelsk – Vartius – Oulu" is mainly rail. Route's road part on the Russian territory passes on route sector from the Finnish city Oulu, through International automobile border-crossing Point Lyttä on the territory of the Republic of Karelia by road of regional subordination Kochkoma – Tiksha – Ledmozero – Kostomuksha – state border (Lyttä) to the Federal road P-21 "Kola".

Consists of:

Roads:

Regional Road Kochkoma – Tiksha– Ledmozero – Kostamuksha – state border (Lyttä), National Road 89, National Road 22, E8.

Railways:

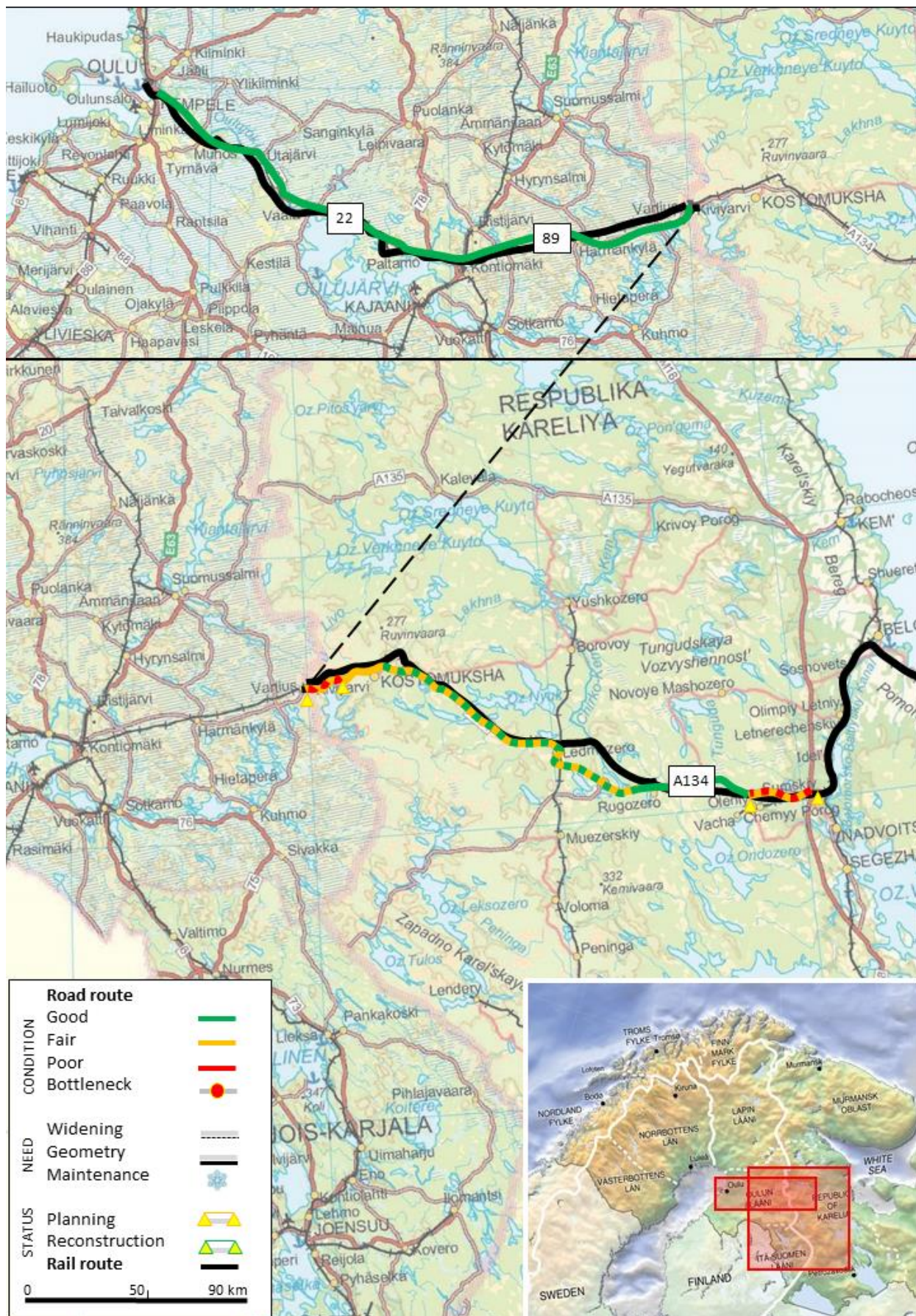
In Finland from Vartius to Oulu

In Russia:

from Vorkuta to Kostomuksha (Chum – Synya – Sosnogorsk – Uhta – Mikun – Kotlas – Konosha – Obozerskaya – Kochkoma – Ledmozero). Branch roads from Obozerskaya to Arkhangelsk; from Mikun – to Syktyvkar.



Figure 9. Vorkuta - Syktyvkar - Kotlas Arkhangelsk - Oulu



10. Oulu – E105, road route and part of rail route

Brief facts: Roads

Total length: 480

Length: Length in Russia 230 km, 250 km in Finland (Vartius - Oulu)

Width: 12.5 m – 7 m

Speed limits: 120-80 km/h, 50-60 km/h in urban areas

Average number of vehicles per day at the border: 700 (Russia – Finland)

Average number of vehicles per day where traffic is at its peak: 10,000 in Oulu

Rail in Finland:

Length: 261 km

Number of average passenger trains per day: 12 between Kontiomäki and Oulu, none to Russia

Average number of cargo trains per day:

Oulu-Kontiomäki: Five pairs of cargo trains per day (8.8 million tonnes/year) Kontiomäki-Vartius three pairs of cargo trains per day (5.5 million tonnes/year)

Electrified in Finland

Single trackATC²¹ in Finland

Railways in Russia:

Length: 2025 km

There is a developed network of passenger traffic, connecting Arkhangelsk, Syktyvkar, Vorkuta and other cities in the region with the largest cities of the Russian Federation.

Single-track lines, with double-track inserts.

The railway is not electrified except for the section Konosha – Belomorskaya – Kochkoma.

Ports

See Chapter 5.5

Airports

Number of passengers per year at main airports:

- Oulu 1.1 million
- Kajaani 80,000
- International airport “Arkhangelsk” (Talagi) 802,758 (2015)
- Kotlas (Arkhangelsk Region)
- Syktyvkar (Komi Republic).

General information

Population (municipalities)

– Oulu	131,000
– Arkhangelsk	349,000
– Vorkuta	75,000

5.3.1. GENERAL DESCRIPTION

Route Vorkuta–Vartius–Oulu consists of railway and road. The road and the railway are included in the proposed TEN-T comprehensive networks.

5.3.2. INFRASTRUCTURE AND STANDARD

Roads

The road route starts from the Bothnian Corridor in Oulu as road 22 to Kajaani. The paved area of the road is at least 8 meters wide. About 150 km from Oulu the route continues for another 100 km as road 89 to the Russian border in Vartius Lyttä. Road 89 has a paved width of 6.3 meters for about 20 km, while for the remainder the paved area is 7.5 to 8 meters wide.

On the Russian side the route continues for about 240 km via to Petrozavodsk via the public Regional Road Kochkoma – Tiksha – Ledmozero – Kostomuksha – state border, passes through Kostomuksha, Ledmozero, Tiksha, and adjoins the public National Road R-21 Cola. The road is paved to a width of 7 – 12 m.

Railways:

²¹ Automatic Train Control

The 166 km long railway line between Oulu and Kontiomäki is quite old, and still has wooden sleepers. Railway line from Kontiomäki to the state border with Russia on Finnish territory was completed in 1976. The railway is an electrified single-track railway. The railway has an automatic train control system, but the technology is over 20 years old.

The Russian section of the railway from Vorkuta to Malenga is part of the The Severnaya Railway (Northern Railway) infrastructure – a branch of the Russian Railways, JSC.

The Russian section of the railway from Malenga to Kostomuksha is part of the Oktyabrskaya Railway (Oktyabrskaya Railway) infrastructure – a branch of the Russian Railways, JSC.

The Kostomuksha – Kochkoma section is practically not involved in the international transport of goods.

Border-crossing points

This route on the Finnish-Russian border has rail and automobile border-crossing point “Lytä” (Kivijärvi station (Russia), Vartius station (Finland)). It works 24 hours a day.

Air travel

Reconstruction of the airport complex is underway in the Arkhangelsk International Airport. Reconstruction of the airport apron and parking was completed in 2015. The next step is the reconstruction of the runway with artificial covering with a length of 2,500 meters. As of 2016, the airport has regular flights to Moscow, St. Petersburg, Murmansk, Syktyvkar. The question of organization of regular flights to Petrozavodsk is under consideration.

In 2014 the Komiaviatrans airlines opened a regular passenger service on the Syktyvkar - Kotlas - Arkhangelsk section with a frequency of flights 3 times a week.

5.3.3. TRAFFIC

Roads

Average number of vehicles per day is almost 10,000 in Oulu, between 3,000 and 1,300 on national road 22 and between 300 and 700 on national road 89. The average daily number of border-crossing vehicles in 2012 was 662 passenger cars and 55 lorries or buses. The number of border crossing vehicles has remained stable for the last few years.

On the Russian side average number of vehicles per day is 1,200 on the road section Kostomuksha –Lytä, and 400 – 600 on the road section from Kostomuksha, Ledmozero and Tiksha to Kochkoma.

Railways:

In Finland the Oulu-Kontiomäki railway serves both cargo and passenger transports. There are five pairs of cargo trains per day transporting a total of 8.8 million tonnes of cargo per year. Kontiomäki – Vartius serves only cargo transports, with three pairs of cargo trains per day transporting 5.5 million tonnes per year.

In Russian city Kostomuksha located in 30 km from the state border, the iron ore is produced and processed into pellets. Pellets are transported by rail, mainly to the Russian consumers. On the Russian part of the route oil, coal, ferrous metals, timber, construction materials, fertilizers, and paper are transported. The major carriers are: PJSC "Severstal", JSC "Vorkutaugol", JSC "Intaugol" and others.

5.3.4. KEY CHALLENGES

Roads

In Finland:

- Congestion problems on national road 22 in the urban Oulu region
- Poor road safety close to Oulu
- Need for improvements of road conditions of the road sections passing through the municipal centres
- Need for improvement of the conditions for cyclists

In Russia:

- Restrictions for international transports near Kostomuksha in Russia
- Poor status of the section 11 km – 35 km of the Regional Road Kochkoma – Tiksha – Ledmozero – Kostomuksha – state border (Lytä); this road section needs to be reconstructed.

Railways:

In Finland:

- Modernization is needed
- Outdated safety equipment, wooden sleepers on the western section

In Russia:

- Improvement of transport service and development of the capacities of the railway lines;

5.3.5. PLANNED DEVELOPMENT**Roads in Finland:**

- National road 22 between Kajaani and Oulu will be upgraded with additional lanes and improved intersections in Oulu;
- Some bypass lanes with central barrier will be created in the rural area close to Oulu;
- Improved safety in municipal centres;
- Improved safety for cyclists;

Roads in Russia:

- Within the framework of the Federal target program "Development of the Republic of Karelia for the period till 2020" it is planned to bring the section km 11 – 44 km road Kochkoma – Tiksha – Ledmozero – Kostomuksha – state border (Lytä) to standard transport–operational status.

Construction of railways in Russia:

- Konosha – Medgora, public railway tracks with a length of 370 km (Kargopol, Konosha, Medvezhiegorsk, Pudozh Districts).
- Bovanenkovo – Kharasavey, public railway tracks 130 km long (Yamal District);
- Vorkuta (Khalmer-Yu) – Ust–Kara, public railway tracks 210 km long (Vorkuta, Priuralsky District);
- Obozerskaya – Belomorsk public railway tracks 353 km long (Plesetsk, Belomorsk, Onega Districts);
- Sosnogorsk – Indiga, public railway tracks 612 km long.

In order to increase the capacity, the construction of second tracks is planned on the following sections:

Obozerskaya - Arkhangelsk	45.9 km
Obozerskaya - Belomorsk	353.0 km
Chum-Inta - Konosha	268.4 km

5.4. “THE NORTHERN MARITIME CORRIDOR” ARKHANGELSK – MURMANSK – THE EUROPEAN CONTINENT

Country	Port	Cargo (1000 tonnes)	TEU	Passengers (except cruise)	Cruise passengers	Depth	Population
Russia	Murmansk	22 045	37 381	17693		14,2	307 000
Russia	Arkhangelsk	3 758	30 789	5319		9,2	351 000
Russia	Kandalaksha	830	0	0		10	36 000
Russia	Vitino	0	0	0		10	700
Russia	Varandey	6582	0	0		17	50
Russia	Naryan-Mar	158	0			17	24 535
Russia	Onega	80	0	259242		8	20 051
Norway	Kirkenes	2 417	0	167 454	0	13,8	10 000
Norway	Honningsvåg	77	0	14 241	139 000	5/15	3 000
Norway	Hammerfest	4 818	547	57 127	22 000	2/15	10 000
Norway	Alta	666	1 190	37 901	11 591	10,3/12,5	20 000
Norway	Tromsø	968	3 467	303 002	105 490	5,9/15	71 000
Norway	Narvik	19 416	126	0	7 537	13,5/26	14 000
Norway	Bodø	1 146	17 872	345 315	7 363	3,4/7,6	50 000
Norway	Mo i Rana	4 151	0	0	0	12	26 000
Norway	Mosjøen	1 545	23 154	21 526	0	8	13 000
Norway	Sandnessjøen	909	6,657	11 344	0	8/20	6 000

Table 3. Freight and passenger turnover in the Corridor²²²³²⁴

²² The statistics on the Russian ports is provided by the Ministry of Transport of the Russian Federation for the year 2015, based on the "Survey of cargo transportation via sea ports of Russia, the Baltic States, Ukraine for 2015" and "Survey of cargo traffic and passengers by water transport of Russia 2015".

The statistics on Norwegian ports is provided by the Statistics Norway (cargo turnover) for the year 2012 and by the Norwegian Coastal Administration (passenger turnover) for the year 2012.

²³ The TEUs for ports in Norway are estimated based on an national average weight of a TEU.

For the port of Mosjøen the actual number of TEUs is used.

²⁴ Port Vitino activity is suspended in 2014

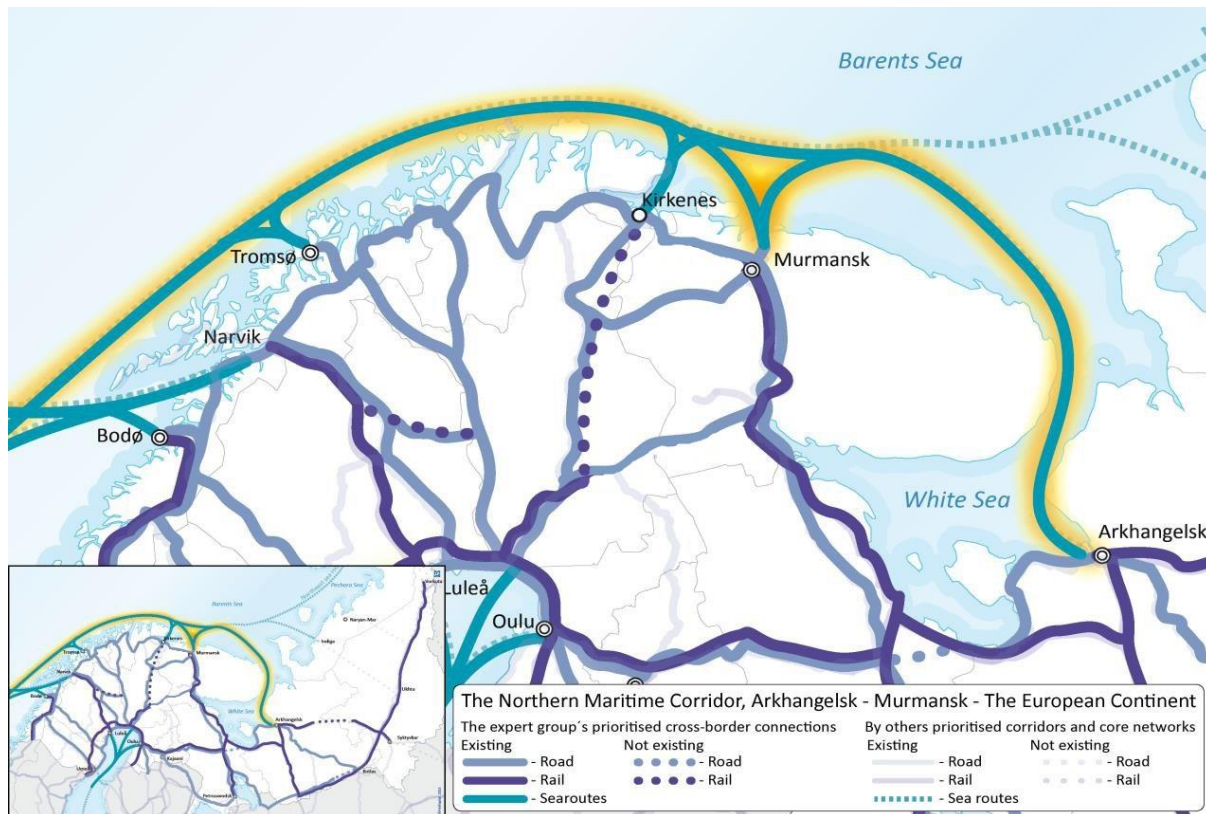


Figure 11.

The Northern Maritime Corridor: Arkhangelsk – Murmansk – The European Continent

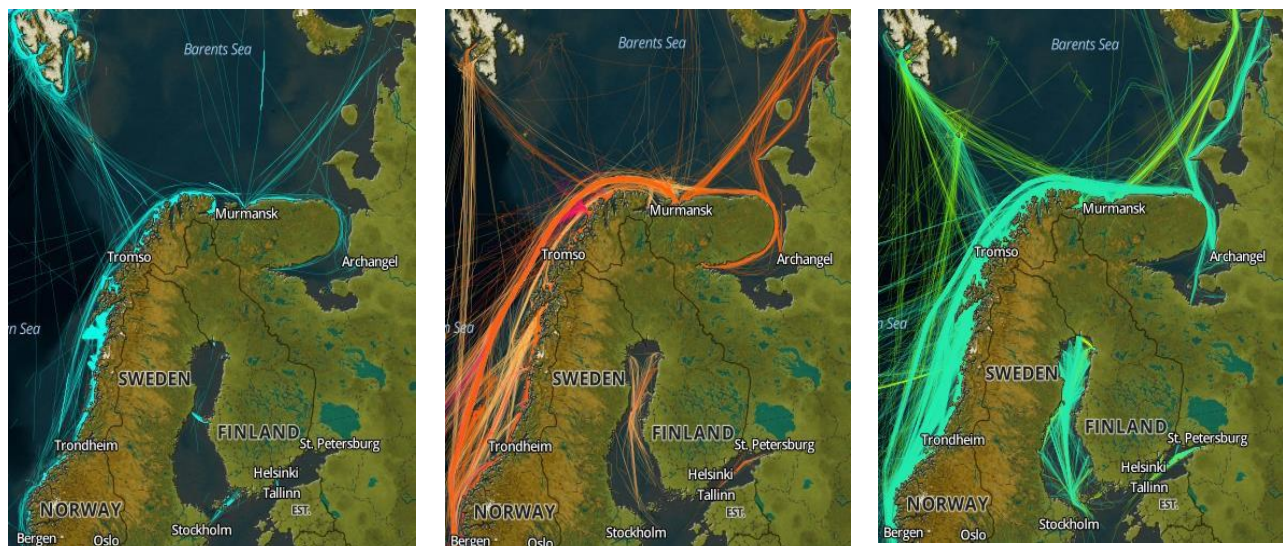


Figure 12. Traffic density

5.4.1. TRAFFIC AND INFRASTRUCTURE

Maritime transport is involved in a major proportion of international trade.

The deep-water ports of the Northern Maritime Corridor (primarily Murmansk and Narvik) have significant potential for growth and for shipment of cargo by sea.

There is a significant market for container shipping from the countries of Southeast Asia to the European market. The ports of the Northern Maritime Corridor could support imports of goods to the BEAC countries and other European countries.

Another factor that favours the development of the ports located in this Corridor is the abundance of seafood in the Barents Region, given the expected growth in worldwide demand for seafood.

The Northern Maritime Corridor is conventionally connected to the Northern Sea Route in the east.

The water area of the Northern Sea Route is understood to be the aquatic space adjacent to the northern coast of the Russian Federation, covering internal waters, territorial sea, the contiguous zone and the exclusive economic zone of the Russian Federation and bounded by division lines across maritime areas with the United States and the parallel Cape Dezhnev in the Bering Strait, west meridian of the Cape of Desire to the Novaya Zemlya archipelago, eastern coastline of the Novaya Zemlya archipelago, and the western boundaries of the Matochkin, Kara, and Yugorsky Straits.

The Northern Maritime Corridor and the Northern Sea Route shorten the transport route between Asia and Europe by as much as 40% compared to the route via the Suez Canal.

The fairway standard

No common fairway standard exists for the Russian and Norwegian part of the Northern Maritime Corridor, but there are no big challenges related to this since the standards in both the countries are considered good. A common fairway standard maybe considered in the future. The capacity in the Northern Maritime Corridor is unlimited.

5.4.2. SAFETY AT SEA

The expected increase of activity in Barents within the petroleum, metal and mineral industries, as well as increased transit transports, makes it important to ensure a sufficient level of safety and sustainability in the northern waters. Shipments of petroleum could multiply under favourable conditions.

Maritime activity covers a vast geographical area with harsh climatic conditions. Challenges such as icing, winter darkness, summer fog, remoteness, a limited access to infrastructure and communication require custom-designed solutions for maritime safety, emergency preparedness and search and rescue response for these waters.²⁵²⁶²⁷

The experts Group point in particular to the following:

- The need to develop a functioning system of communication (broadband satellite communications) in polar waters
- The need for more hydrographical surveys and development of complete charts, improvement of infrastructure for navigation and improved forecasts related to weather, waves and ice conditions.
- The need for a joint traffic monitoring system. The establishment of a joint Barents VTMS (Vessel Traffic Monitoring and Information System), including seamless sharing of traffic data from AIS, Satellite AIS and other relevant sources.
- Harmonization of national rules, regulations and procedures in the area, to achieve greater predictability and lessen the administrative burden on mariners.
- Extension of the newly established Barents Ship Reporting System (Barents SRS) to cover the entire Barents Sea Region
- The need for an improved system for search and rescue to ensure:
 - Early warning
 - Efficient detection equipment
 - Efficient mobilization and availability of rescue resources
 - Efficient coordination and execution of rescue operations
 - Efficient personal rescue equipment
 - Efficient use of non-governmental (non-SAR) ships being in the area of any emergency situation

5.4.3. DESCRIPTION AND POTENTIAL OF RUSSIAN PORTS NORTHWESTERN FEDERAL DISTRICT OF THE RUSSIAN FEDERATION

There are 8 sea ports in the District; the ports of Murmansk, Arkhangelsk, Kandalaksha, Vitino, Varandey, Nayan-Mar, Onega and Mezen are located in the Barents Region.

Port of Murmansk

The port of Murmansk is the northernmost deep-water ice-free port in Russia.

In 2015, the Port of Murmansk transhiped 22 045 thousand tonnes of cargo. Major handled cargoes are: coal, ore, chemical and mineral fertilizers, oil products for export, as well as containers in cabotage.

The Arctic icebreaker fleet is based in the port.

²⁵ Source: Report on opportunities and challenges in connection with increased sailings in the Polar Sea of the Expert Group of the Ministry of Interior of Norway ("Økt skipsfart i Polhavet – muligheter og utfordringer for Norge"), Utenriksdepartementets faggruppe, April 2013

²⁶ Source: Preliminary project report, Russian – Norwegian Barents Logistics and Transport, June 2013

²⁷ Source: Project report SAR operations in the Norwegian part of the Barents Sea and Polar Sea, December 2012

In addition, within the framework of sub-programme “Maritime transport”²⁸ the distant lines berth has been reconstructed, the bank of the passenger area of Murmansk Port has been protected, and the passenger ship terminal building is being reconstructed (completion date is September 2016).

For further development of the Port it is planned to construct a coal terminal on the western shore of Kola Bay, at the mouth of the Lavna River with the first phase design capacity of 5 million tons. Currently the railways on the eastern and western shores of the Kola Bay are under construction.

In addition, on the western shore of the Kola Bay it is planned to construct an offshore field supply base of OJSC “NK “Rosneft” and the center of the large marine structures construction of OJSC “NOVATEK”.

Port of Arkhangelsk

The port of Arkhangelsk is situated on the delta of Severnaya Dvina river and is essential and integral part of the Arctic transport system of Russia. In 2015 the Port of Arkhangelsk transhiped 3 758 thousand tonnes of cargo. Major handled cargoes are: general, timber, containers, as well as petroleum products for export.

Port of Arkhangelsk is a port of year-round navigation, where ice conditions are roughly equivalent to those of the Gulf of Finland. Ice escort is needed during winter.

Port of Kandalaksha

The sea port of Kandalaksha is located in the northern part of Kandalaksha Bay in the White Sea.

In 2015 the Port of Kandalaksha transhiped 830 thousand tonnes of cargo. Major cargo is coal for export.

The waters around the port are protected from winds on all sides by islands, the port is only open to Kandalaksha Bay to the southeast. The port operates year-round, the waters of the port freeze in early December and melt in early May.

Port of Vitino

The port of Vitino is located at Kandalaksha Gulf of the White Sea and is specialized for transshipment of bulk petroleum cargo, including gas condensate. Ice escort is needed during winter.

Currently, cargo handling in the port is not carried out.

Port of Naryan-Mar

In 2015, the port of Naryan-Mar transhiped 158 thousand tonnes cargo. Major handled cargoes are: bulk and petroleum products. From the port of Naryan-Mar transports can continue inland along the Pechora River from May to October. In 2015, the general navigation period was 169 days (5.5 months).

Port of Varandey

The seaport of Varandey was built in 2000 is aimed for oil export by sea. In 2015, the cargo turnover of the port was 6 582 thousand tonnes cargo.

Port of Onega

In 2015, the cargo turnover of the seaport of Onega was 80,2 tonnes; the cargo consisted mainly of timber

Port of Mezen

The cargo turnover of the port of Mezen was 8.6 thousand tonnes in 2015.

5.4.4. DESCRIPTION AND POTENTIAL OF NORTHERN NORWEGIAN PORTS

Because of long distances and a population that is sparsely distributed over the whole region, it has proven difficult to direct the cargo and passenger flows to a smaller number of hub ports in Northern Norway. In the three northern Norwegian counties, there are 76 municipalities connected to the sea and most of them have their own port. The ports described below are therefore fairly numerous and small compared to the ports described in the neighbouring countries. However many of the smaller Norwegian ports play an important role in domestic, and to a certain extent also in international, logistics. The total freight turnover of the ports in Northern Norway is 43 million tonnes (Nordland county 33 million tonnes, Troms county 2 million tonnes and Finnmark county 8 million tonnes).

There is a regular passenger service calling at 25 ports in Northern Norway twice a day, operated by the shipping company

Hurtigruten (the Norwegian Coastal Express).

From the Norwegian island of Spitsbergen substantial volumes of coal from both Norwegian and Russian mining companies are exported (Norwegian volumes in latest years between 1-3 million tonnes). The island of Spitsbergen is strategically located in terms of search and rescue in the Barents Sea.

²⁸ Subprogramme of the Federal Targeted Programme “Development of Russia’s Transportation System (2010-2020)”

Port of Mo i Rana

The port of Mo i Rana handles general cargo and containerized export products from the local iron ore and metal industry. A volume of 3,3 million tonnes of iron ore is annually transported by rail on the Nordland line from Krutfjell to the port of Mo i Rana for further transport to the processing sites.

Port of Mosjøen

Volumes through Mosjøen are mainly metal exports. Mosjøen is the largest port for containerized industrial cargo in Northern Norway.

Port of Bodø

Bodø is important mainly with respect to domestic container traffic of consumer goods. The national railway through Norway ends in Bodø and rail cargo from Oslo is reloaded here to ships for further connections north to Tromsø and Alta. The port of Bodø has daily ro-pax connections to the Lofoten islands which are considered the second most important tourist destination in Northern Norway. Bodø is an attractive cruise port along with several ports in Northern Norway. Bodø is a prioritized port by Norwegian authorities. Development of the port is directed towards improving both passenger and freight capacity and service.

Port of Narvik

The port of Narvik is a strategically important node in the Trans-European Network - Transport (EU TEN-T).

Narvik is a bulk port and is the main embarkation and disembarkation port for the mining company LKAB, mainly for iron ore pellets and filler material for pellet production in Kiruna.

With an annual turnover of 19 million tonnes of cargo, Narvik is by far the largest port in Northern Norway. The port has expanded enormously in recent years, and this process is expected to continue. Studies are ongoing in the port of Narvik to increase the port's capacity.

Port of Tromsø

Tromsø is both the largest cruise port in Northern Norway and one of Norway's largest fishing ports. Tromsø is an important port in Northern Norway for containerized consumer goods.

Tromsø is a prioritized port by Norwegian authorities. Its expansion and development is ongoing. This comprises both a new port section to serve the petroleum industry, increased cargo capacity and improved facilities for cruise liners starting and finishing their cruises in Tromsø.

Port of Alta

The port of Alta is mainly important as a container port for domestic cargo.

Port of Hammerfest

Apart from the export volumes of liquified natural gas from the Melkøya gas plant (4.5 million tonnes), Hammerfest is a small port. Hammerfest handles cargo for the petroleum industry and serves the fishing fleet and cruise liners.

Port of Honningsvåg

As the nearest port to Northern Norway's largest tourist attraction, the North Cape cliff, Honningsvåg is an important cruise port.

It also serves the fishing fleet, and a new port section is planned to receive oil from the oil fields north of Finnmark. The port has future development potential with respect to serving petroleum fields.

Port of Kirkenes

Cargo volumes through the port of Kirkenes are primarily iron ore for export to the EU. Fishery-related activities however represent the port's main source of income today.

Despite its location in the far north, Kirkenes is ice-free throughout the year thanks to the Gulf Stream. Kirkenes is in international comparison a small port, but its strategic location gives it substantial growth potential.

Several private Norwegian initiatives exist to develop the port and industrial areas in Kirkenes (KILA/

Tømmerneset/Pulkneset). The rationale for these initiatives is an expected rise in traffic of petroleum, ores, minerals and containers through the Northern Sea Route (if the acceptable prices, safety and quality are ensured), an expected increase in Norwegian and Russian petroleum activity in the Barents Sea, and an expected increase in shipping of ore and industrial products from the region. Investments from 2014 to 2020 are stipulated to 0.7-1.4 billion EUR.

Although Kirkenes is a small port compared to Murmansk, it is still a possible future transshipment port for international cargo originating in or destined for Northwest Russia or between Asia and continental Europe. Between Yokohama and Rotterdam about 3 million containers are transported per year²⁹, and some of these volumes may be transported via the Barents Region in the future. There is currently no dedicated container terminal in Kirkenes. A future international container terminal would require large investments, but water depth in Kirkenes ensures profitability of container shipment.

5.4.5. CURRENT CONNECTIONS BETWEEN PORTS IN NORTHERN NORWAY AND RUSSIAN PORTS IN THE NORTHERN BASIN

The number of sailings between the port of Murmansk and ports in Northern Norway is currently about 120 each way per annum according to AIS ³⁰statistics (some of these sailings call at several ports in Northern Norway).

Kirkenes is the last port of call in Norway in most of the cases. Only one regular container feeder service (weekly service) between Murmansk and Northern Norway was reported in 2012.

There is a potential to develop maritime relations between Russia and Norway both in respect to cargo and passengers. There is currently no passenger traffic between these neighbouring countries.

²⁹ Source: Ocean Shipping Consultants

³⁰ Automatic Identification System

5.5. CORRIDOR: “THE MOTORWAY OF THE BALTIC SEA”: LULEÅ/KEMI/OU LU – THE EUROPEAN CONTINENT

Brief facts:

Country	Port	Cargo (1000 tonnes)	TEU	Passengers	Depth	Population
Finland	Raahe	5,526	4,500	0	10	23,000
Finland	Oulu	2,825	35,000	0	12.2	131,000
Finland	Kemi	1,816	12,000	1,700	10	23,000
Finland	Tornio	1,959	21,000	0	9.1	22,000
Sweden	Umeå	2,300	19,000	100,000	13	117,000
Sweden	Skellefteå	1,800	0	0	8.5/13	72,000
Sweden	Piteå	1,600	200	0	11.5	41,000
Sweden	Luleå	9,000	0	1,500	11.9	75,000
Sweden	Kalix	269	0	0	5.6/6.6	17,000

Table 4. Freight and passenger turnover in key ports

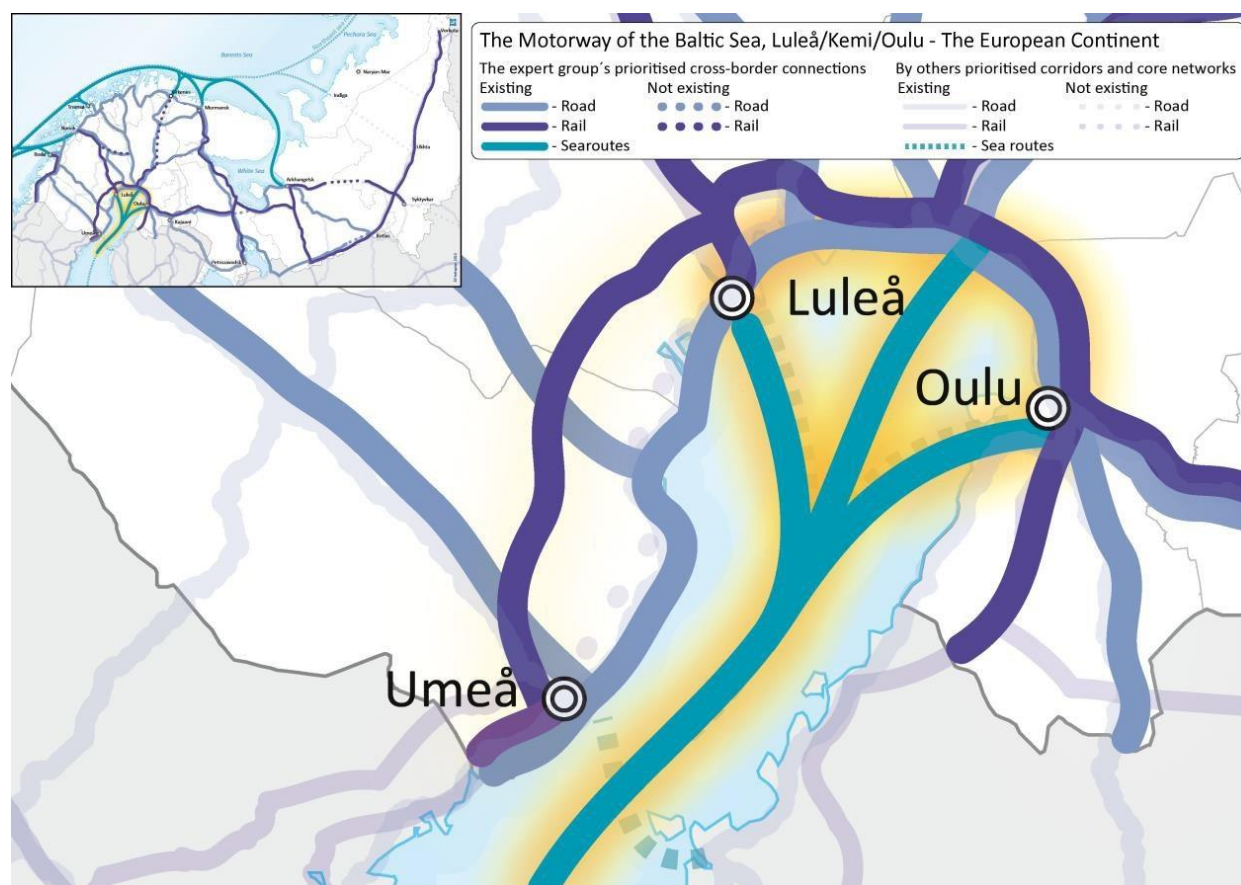


Figure 13. The Motorway of the Baltic Sea

Traffic density in the Corridor:

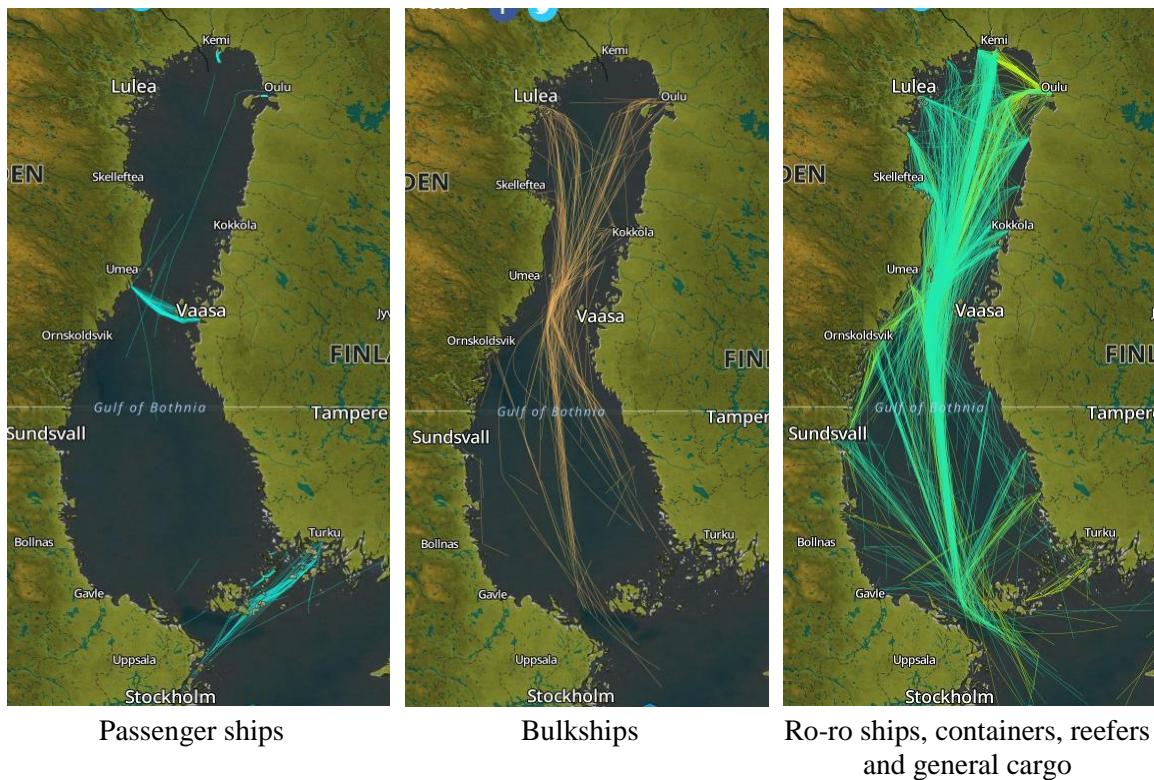


Figure 14. Traffic density in the Corridor

5.5.1. CURRENT TRAFFIC AND INFRASTRUCTURE. FUTURE PLANS AND POTENTIAL

The sea corridor in the Gulf of Bothnia is essential for the transports of raw materials and especially the products of the industries situated along the Bothnian Corridor. The Baltic Sea offers a direct connection southwards to the rest of Europe.

The traffic volumes in the Bothnian Corridor transport network in the short term (until the year 2020), include mining products, timber, chemicals and other commodities produced in the area. The main transport in the Corridor is cargo, but Kemi, Luleå, Umeå also have passenger traffic.

The Corridor is very important for the industries situated along the Bothnian Corridor. Most of the customers of these industries are located in Europe or on other continents, and are impossible to reach otherwise. It is not economically feasible to use long distance railway transports from the industries along the Bothnian Corridor to ice-free Atlantic ports. In spite of some challenges, the future potential of the Corridor is good.

5.5.2. KEY CHALLENGES

Shallow waters

A general problem for navigation in the region is that the Gulf of Bothnia is very shallow. And as the land is rising at the rate of about 1 metre in 100 years, the fairways and ports must be dredged regularly to keep them navigable. There are plans to dredge the fairways to the port of Oulu and Kemi to 12 metres and in Luleå to 15 metres.

Icebreaking

One of the key challenges for navigation, in addition to the shallow waters, is winter ice. The Baltic Sea, including the Gulf of Bothnia, is subject to icy conditions every winter. Therefore all ships calling at the ports need to be ice-classified during the stipulated conditions and/or time periods. Ice-breaking ships tend to be slower or less fuel efficient than ordinary ships, which implies higher transport costs and therefore has a certain impact on trade and on the competitiveness of the industries in the region.

Icebreakers have to be used to keep the fairways open during the winter season. The ice-breaking service is delivered by Swedish and Finnish authorities as equal counterparts and under one command. The number of vessels not required to wait exceeded 90% in 2011. For the vessels that had to wait, the average waiting time was 3.16 hours.

Sulphur Directive

The Sulphur Directive, regulating sulphur content in the Baltic Sea, entered by the International Maritime Organization (IMO) is effective from 2015. A study conducted by the Finnish Transport Administration reported an equivalent increase in costs for shipping for 25-40%.

An ongoing investigation by the Swedish transport authorities, however, suggests that LNG ships and establishing LNG terminals in ports could limit the reduction in traffic arising from the Sulphur Directive. One other result is the estimate that most ships will use desulphurized oil, it will be sufficient and that the fuel price will increase significantly. This may be partly be compensated by slower speeds, bigger ships, mixed loading etc.

5.5.3. DESCRIPTION AND POTENTIAL OF THE NORTHERN SWEDISH PORTS

A large proportion of Sweden's foreign trade goes via ship and the ports have an important share in this link. Sweden, with its long coastline, has a good potential to use maritime transport relatively close to the customer. The freight volumes handled by these ports vary significantly and some of the ports have specialized in handling only certain types of goods.

Port of Luleå

Luleå is the port in the Gulf of Bothnia with the strongest position in the TEN-T network. A large proportion of the cargo through Luleå consists of foreign volumes.

The port of Luleå handles large volumes of bulk cargo, mainly iron ore pellets from Malmberget and incoming coal. TEN-T funding has been granted for studies in Luleå to increase capacity.

Port of Skellefteå

The port of Skellefteå handles mainly bulk, forest products, smelting materials and finished products to and from the Rönnskär, as well as smelter, and slabs, scrap and lumber.

Port of Piteå

The port of Piteå handles mainly forest products, paper products such as kraftliner, and pulp.

Port of Umeå

The port of Umeå primarily handles forest products (half the volume) and general goods (about 25% of the volume). The RoPax connection over the Kvarken strait to Vaasa in Finland is important both for freight and passenger traffic.

5.5.4. DESCRIPTION AND POTENTIAL OF THE NORTHERN FINNISH PORTS

Maritime transport is important both for domestic transport, foreign trade and international passenger traffic. Both the long coastline and the scattered production/settlement have contributed to the development of a large network of ports. The two ports of most importance are Kemi and Tornio. These two ports handle about 10% of Finnish exports. Paper, wood products and minerals constitute the main commodities through the Northern Finnish ports.

Port of Kemi

The port of Kemi serves mainly the forest industry, mines and chemical transports. It is currently planned that the port will also handle shipments for the initial phases of mining operations in Kolari and perhaps also in the long term shipments from other mines.

Port of Tornio

The port of Tornio mainly handles steel products and supplies for the steel industry. Tornio mainly serves the Outokumpu stainless steel mill.

Port of Oulu

The port of Oulu has moderate cargo volumes. It handles oil and bulk, paper, pulp and cement.

Port of Kokkola

About half of the cargo handled in the port of Kokkola consists of transit traffic from Russia.

Port of Raahe

The port of Raahe handles large volumes of bulk cargo, including steel from the Ruukki steel mill and iron ore from Gällivare going out via the port of Luleå, and other minerals, steel products and sawn wood products.

5.6. ROUTE: PETROZAVODSK – MURMANSK – KIRKENES

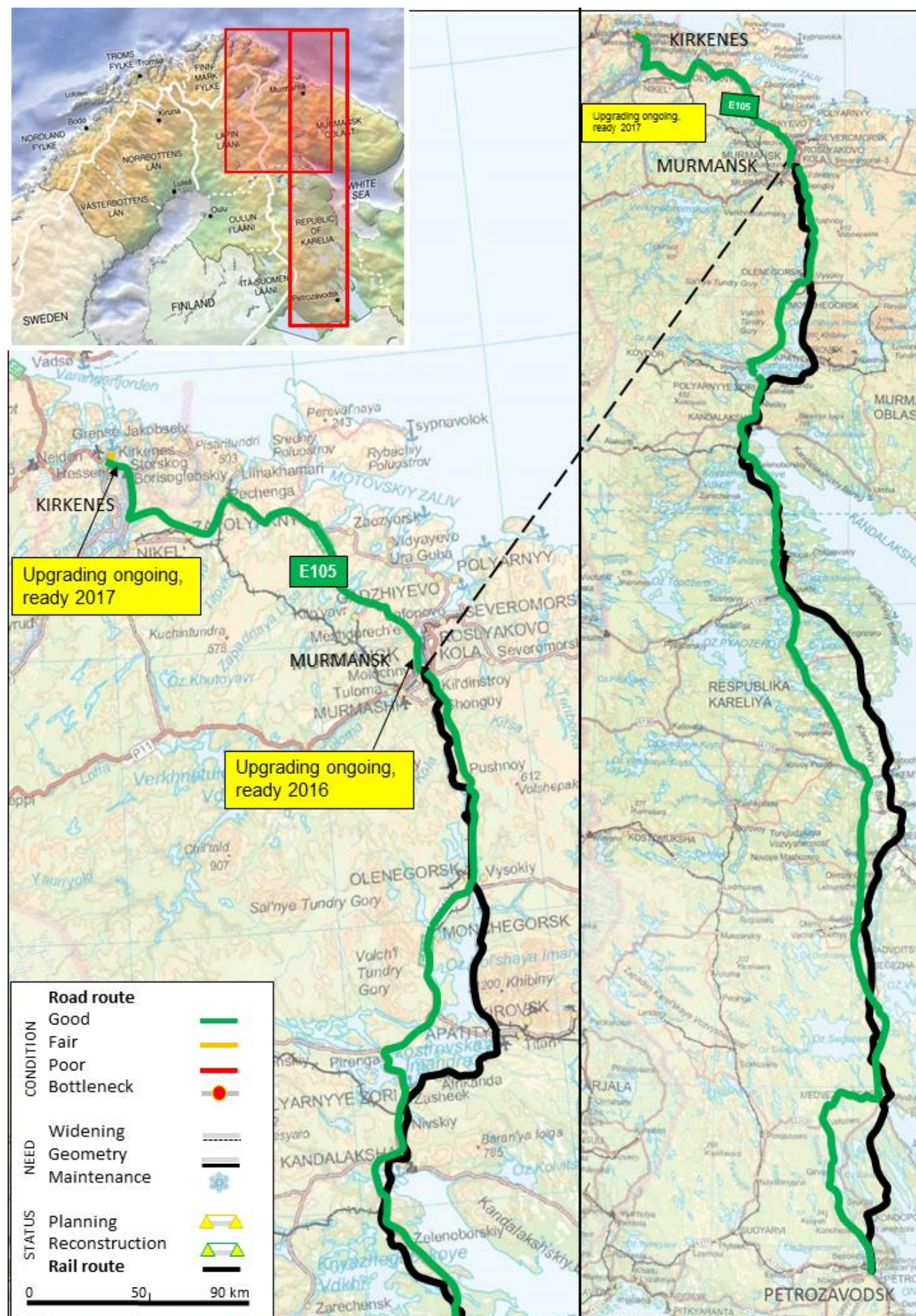


Figure 15. Petrozavodsk – Murmansk – Kirkenes

Consists of:**Road:**

Norway: E105 (9 km)

Russian Federation: E105 (National Road R-21 “Kola” (section state border N/R - International automobile border-crossing point “Borisoglebsk” - Pechenga - Murmansk – Petrozavodsk))

Rail:

The Russian section of the railway from Petrozavodsk to Murmansk is part of the Oktyabrskaya Railway infrastructure - a branch of the Russian Railways, JSC.

Brief facts: Road

Total length:	1,140 km
Length:	Petrozavodsk – Murmansk – 925 km
Length:	Murmansk to Kirkenes – 215 km (9 km in Norway)
Width:	8.5 m (Norway) and 11–12 m (Russia)
Speed limit:	60–80 km/h (Norway) and 60–110 km/h (Russia)
Number of vehicles crossing the border per day:	338 (2014)
Average number of vehicles per day where traffic is at its peak:	
Kirkenes:	7,100
Murmansk	11,000
Petrozavodsk:	14,000

RailwayMurmansk – Petrozavodsk line

Length: 850 km

There is a developed network of passenger traffic, connecting Murmansk, Petrozavodsk and other cities in the region with the largest cities of the Russian Federation.

Average amount of cargo per year: 27.2 million tonnes

Electrified

Single-track lines, with double-track inserts.

Kirkenes – Bjørnevatn line³¹ Single track

Length: 8.5 km

Ports

The freight flow coming from Central Russia by rail to Murmansk, then routed through the port of Murmansk by sea to the point of destination.

Airports

Kirkenes: 300,000 passengers/year (2011)

Murmansk: 751,258 (2015) passengers (a 12.6% increase compared to 2014)

General information

Population of main cities:

Petrozavodsk	262,000
Kandalaksha	36,000
Murmansk	307,000
Zapolyarny:	16,000
Nikel:	13,000
Kirkenes:	10,000

5.6.1. GENERAL DESCRIPTION

The route is the only border crossing between Russia and Norway and is very important for the regional “people to people” cooperation in this part of the Barents Region. The route therefore plays an important role in the northern political cooperation and in the growth of business and industry in the border area and in Northern Norway in

³¹ Owned by a private mining company, Sydvaranger Gruve AS. In 2012, the company produced 1.98 million tonnes of iron ore concentrate. The ore is shipped from Bjørnevatn to Kirkenes by rail.

general. The route encompasses National Road R-21 “Kola” (section state border N/R - International automobile border-crossing point “Borisoglebsk” - Pechenga - Murmansk - Petrozavodsk) in Russia and the road section Kirkenes — Elvenes — check-point “Storskog” in Norway.

E105 is the major transportation route connecting Scandinavia and Asia. This route runs from north to south (from Kirkenes through St. Petersburg, Moscow to the Black Sea) and has access to transport systems of several countries, as well as Pan-European transport corridors NoNo. 2 and 9, the international transport corridor North-South and the corridor Europe - Western China which is under construction at the moment.

The railway section Murmansk- Petrozavodsk is one of the most important directions of the transport system of the north-west of the Russian Federation.

There are civil airports in Petrozavodsk, Murmansk and Kirkenes.

5.6.2. TRAFFIC

Road transport

Murmansk – Kirkenes

The export of goods from Norway to Russia via Storskog has varied from year to year, but in the past three years it has been between 6,000 and 7,000 tonnes per annum. Import of goods from Russia to Norway via Storskog reached 6,600 tonnes in 2007. In recent years this has decreased to only 1,800 tonnes. The main types of goods transported by road over the border are fish, timber products, products for the mining industry and maritime equipment. Russian road transport in the route is primarily general cargo, food products and passenger transport between the cities in the region. There are several Russian bus companies offering transport between Murmansk and Kirkenes.

The route is very important for passenger transport between Kirkenes, Murmansk and the other towns just over the border on the Russian side. Border crossings via Storskog/Borisoglebsk have increased in recent years more than twice: from 141,920 passengers in 2010 to 313,073 in 2014. This increase may primarily be attributed to the introduction of visa free regime for residents of both the countries residing within a radius of 30 km from the border. The total number of vehicles crossing the border at the International automobile border-crossing point “Borisoglebsk” increased from 44,842 in 2010 to 123,347 in 2014.

Rail transport

This section of the October Railway runs from St. Petersburg in the south via Petrozavodsk and Kandalaksha to Murmansk city and the coast of Murmansk in the north. The total distance between St. Petersburg and Murmansk is 1 140 km, and the section between Petrozavodsk and Kola has a length of 1,054 km. It has 52 stations. The railway was electrified in 2005.

The volume of cargo transportation by rail through the port of Murmansk in 2014 amounted to 20.1 million tonnes. In the freight flow consisted primarily of coal exports. In accordance with the General Scheme of Railway Development, the volumes of freight transportation by rail via the port of Murmansk are projected to reach 26.9 million tonnes by 2020.

Air transport

Petrozavodsk has a regional civil airport with services to St Petersburg and Moscow. International airport “Petrozavodsk” (“Besovets”) is part of the national core Russian aerodrome-airport network and is considered as an option for an alternate airport for airports of the Northwestern Federal District: Saint-Petersburg, Murmansk and Arkhangelsk. Aerodrome “Petrozavodsk” (“Besovets”) is a joint civil and military aerodrome.

Murmansk Airport is an international airport which is operated by several airlines. The airport has regular domestic air service to Moscow, St. Petersburg, Arkhangelsk and Cherepovets; In summer, additional flights open to a number of Russian cities southwards.

As of 2016, there no regular connections to Finland and Norway due to low passenger demand. From October, 2014 air flights on the route Tromsø – Murmansk were cancelled. Starting from May 16, 2015, Murmansk Airport has been providing summer regular charters flights on the route Murmansk – Helsinki. The Murmansk Airport has one runway with a length of 8 202 ft.

Border-crossing points

This Route has the International automobile border-crossing Point “Borisoglebsk” at the Russia-Norway border. It works 24 hours a day.

5.6.3. KEY CHALLENGES

The introduction of the visa free regime for the residents of the border area has simplified border crossings for the local population.

Customs and visa procedures and rules must, however, still be viewed as a main challenge for transport in the route. Additional factors are limited capacity and long waiting times at the Storskog/Borisoglebsk border-crossing point. There are plans to extend and streamline the border stations on both Norwegian and Russian sides to cope with future growth. So, in Norway, reconstruction works have already been started on the road section from the Storskog border crossing point to Kirkenes, the road widening and levelling is provisioned, as well as the reconstruction and building of the road tunnel. The works are planned to be completed in 2018. In Russia, reconstruction works are under way at the moment immediately in the border area, which include the road widening and levelling. This measure promotes improvement of the crossing capacity of the Route.

As a result, the road on the Norwegian side will then have a good-standard status and be open to modular vehicle combinations (25.25 m / 60 t) from the border down to Kirkenes and to the border of Finland (Neiden). On the Russian side, the permitted total weight for heavy goods vehicles is 44 tonnes (38 t) and the permitted length is 18 m. Differences in vehicle regulations for heavy goods vehicles between the two countries might hamper the development of international cargo transport over the border.

The transport service of the railways of the Murmansk- Petrozavodsk section needs to be improved and the crossing capacity of the railway tracks needs to be developed.

A need to extend the runway at Kirkenes Airport to 2,200 m has been identified in order to accommodate larger aircraft.

5.6.4. PLANNED DEVELOPMENT

In total EUR 46 million will be invested on the 10 km stretch of the E105 from Hesseng to Storskog/Borisoglebsk in Norway. On the Russian side, the improvement works have been in progress since 2008 and have encompassed the entire 230 km stretch between the Norwegian border and Murmansk. The general volume of the funding is EUR 60-55 million.

Within the frameworks of implementation of the Federal Targeted Programme “Development of Russia’s Transportation System (2010-2020), reconstruction of the section of the road R-Cola 21 in close proximity to the International automobile border-crossing point “Borisoglebsk” is provisioned, with bringing the technical parameters of the road to technical category II with the lanes which will ensure the capacity needed for the existing traffic, and the traffic safety.

Reconstruction of other parts of the E105 in Russia is also planned.

The Federal Targeted Programme “Development of Russia’s Transportation System (2010-2020) provides for the development of the Murmansk transport hub to create a year-round deep sea hub - a centre for processing of container and bulk oil cargoes and transshipment of coal and fertilizers, integrated in the international transport corridor “North - South”.

The Programme provides for:

- construction and reconstruction of port infrastructures on the shores of the Kola Bay, including construction of terminals on the west shore for transshipment of coal, oil and oil products;
- construction of a container terminal on the east shore, reconstruction of the coal terminal, construction of a storage and distribution area related to the container terminal;
- creation of a logistics centre;
- development of the railway infrastructure, including construction of the Vykhodnoy- Lavna railway line, construction of 10 railway stations and parks, reconstruction of the lay-out of tracks of 4 stations, reconstruction of railway approaches (from the Volkhovstroy station);
- development of road infrastructure, including development of the road network of the city of Murmansk;
- reconstruction of the road “Kola”;
- implementation of works on federal property objects, in the following 3 stages:

Stage I - the railway line - Vykhodnoy station - the bridge over the Tuloma river - Murmashi 2 station - Lavna station;

Stage II - dredging of the water area and water approaches for the coal terminal. The base of the servicing fleet with the necessary coastal infrastructure;

Stage II - dredging of the water area and water approaches for the oil loading terminal.

In order to increase the capacity, it is planned to build the second track on the Murmansk - Petrozavodsk section with a length of 327 km (Medvezhyegorsk District, the city of Petrozavodsk, Prionezhye District, Segezha District, Polyarnye Zori, Olenegorsk, Kondopoga District, Segezha, Kondopoga, Kem, Belomorsk District, Kandalaksha, Louhi District, Kola District, Murmansk, Kem District, Apatity).

The Government of the Murmansk Region is considering the possibility of organizing ferry service on the route Kirkenes - Murmansk - Kirkenes. One of the prerequisites for the project realization is a 72-hour visa-free stay of tourists in the Murmansk Region.

The project of reconstruction of the infrastructure in the seaport of Murmansk involves the creation of modern conditions and improvement of the quality of service for passengers of ferry boats plying this route.

It is advisable to consider the renewal of the Norwegian ferry (cruise) Hurtigruten lines to Murmansk, as well as other international cruise lines that end in Kirkenes or swing at the North Cape Cliff (in average, about 110 cruise ships visit the North Cape Cliff within a season).

It is also planned to extend the runway at Kirkenes Airport, Høybuktmoen in 2018-2023. This is connected with the expectations of a significant increase in the Norwegian petroleum activity in the southeastern part of the Barents Sea. It is also planned to reconstruct Murmansk Airport.

5.6.5. FUTURE POTENTIAL

Potential of the existing infrastructure

To some extent, any future development of the Route close to the border will depend on the content and progress of the cooperation between Norway and Russia on business policy in the border regions.

Tourism already plays a significant role in the economy of the Barents Region and it is a sector with great potential for further growth. Cooperation across the borders is, however, a prerequisite for such growth. Developing cross-border infrastructure and reducing bureaucratic barriers along the national borders in the Region will facilitate practical cooperation with regard to tourism.

In the near future the potential lies primarily in an increase in private road traffic. Visa-free border crossing and the possible development of a common residence and labour market may give rise to greater transport needs in the Region.

Today, the railway runs as far as Murmansk and onward to the town of Nikel which is close to the Norwegian border. The distance between Nikel and Kirkenes is approximately 40 km.

The question of the expediency of the railway construction in the area between Nikel and Kirkenes, in the case of a further increase in traffic volumes, can be considered in an integrated feasibility study, which shall include:

- evaluation of the prospective cargo base, which is to involve, in particular, the railway routes under consideration;
- necessary levels of investment and the list of infrastructure measures;
- information about potential investors and the expected pattern of the project;
- evaluation of the commercial and budget efficiency for a potential participant of the project.

5.7. ROUTE: ROVANIEMI – SALLA – KANDALAKSHA

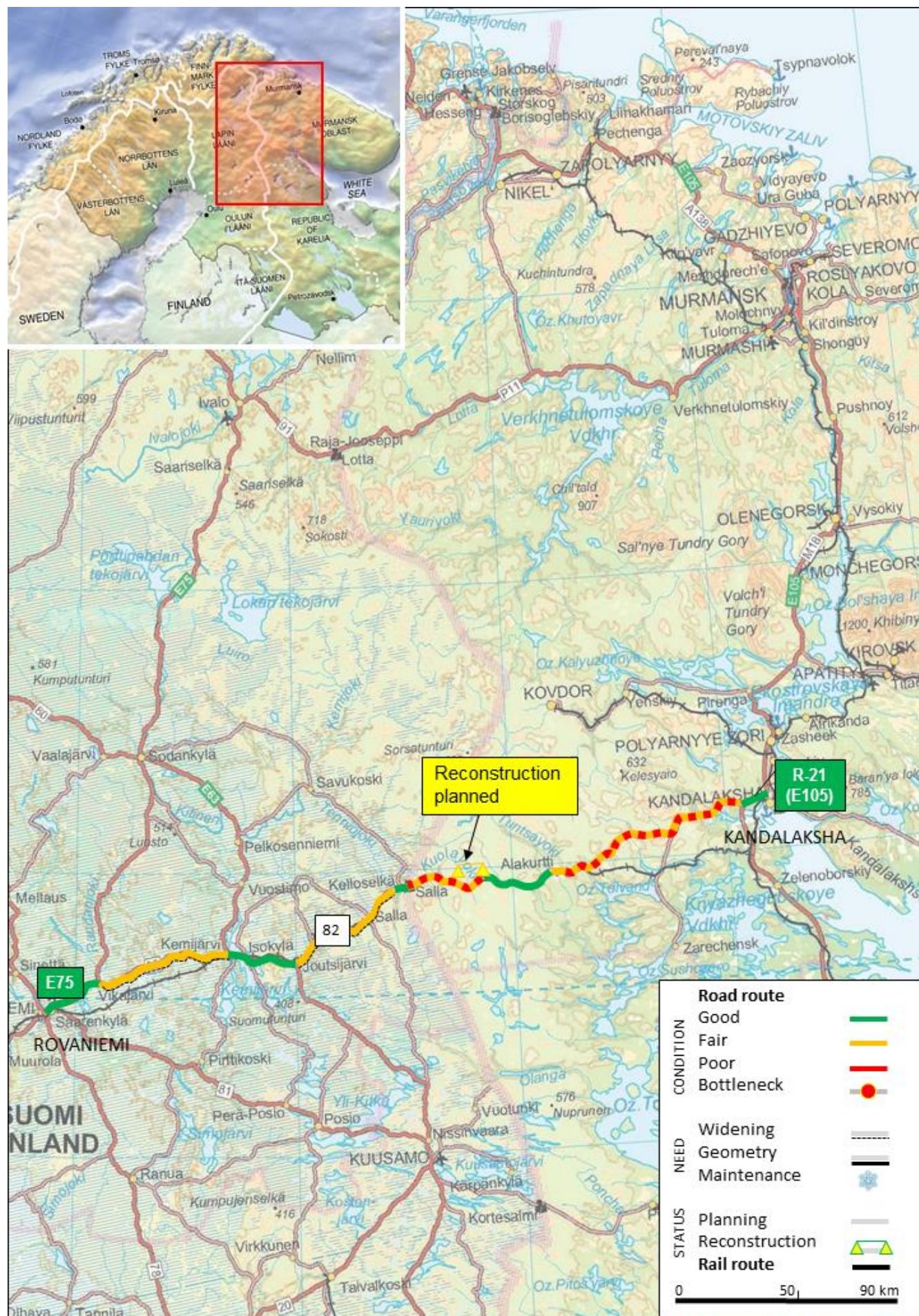


Figure 16. Rovaniemi – Kandalaksha

The Rovaniemi – Kandalaksha Route was adjusted in the Joint Barents Transport Plan in accordance with the proposals of the document “Cross-Border Road Corridors”, discussed at the High-Level BEATA Meeting held in Rovaniemi in 2015.

Consists of:

Road:

Finland: National Road 82

Russia: Regional Road Kandalaksha – Alakurtti - Salla border crossing point, E105 (R-21 Kola), E75.

Brief facts: Road

Distance Rovaniemi -Kandalaksha: 355 km Width: 10 m. 6.5 m, 7 m in Russia

Percentage of the road with a width of 8 m or more: 58% in Finland: Speed limit: 100 or 80 km/h, 50 to 60 km/h in urban areas and 90-30 km/h on the Russian side

Number of vehicles crossing the border per day: 299 (2014) Average number of vehicles per day where traffic is at its peak: 21,100 in Rovaniemi, 2,000 in Alakurtti

Railway

In Finland: Distance from Rovaniemi to Kellosoelkä: 82 km

Average number of passenger trains per day: 2 trains between Rovaniemi and Kemijärvi Average number of cargo trains per day:

3 trains between Rovaniemi and Kemijärvi

No regular trains beyond Kemijärvi Electrification as far as Kemijärvi is planned.

Single track Gauge - 1,524 mm

Automatic Train Control

In Russia: Ruchi Karelskie – Alakurtti – Kandalaksha line

Alakurtti – Ruchi Karelskie line (102 km): single track, non-electrified, low-density.

Section: Ruchi Karelskie – Kandalaksha (28 km) is included in Route 5.6.

Ports See Chapters 5.4 and 5.5

Airports Rovaniemi 400,000 passengers/year

General information

Population of the cities

Rovaniemi	61,000
Kemijärvi	8,000
Salla	4,000
Alakurtti	3,000
Kandalaksha	36,000

GENERAL DESCRIPTION

The Route starts in the town of Rovaniemi, passes through Kemijärvi to the municipal centre of Salla and to the Russian border-crossing point at Salla. From there the Route continues via Alakurtti to Kandalaksha.

The Finnish part of the road is included in the proposed TEN-T comprehensive road network. This road is part of the road connection between Bodø and Murmansk, which is often called as the Barents Road.

5.7.1. INFRASTRUCTURE AND STANDARD

Road

The road from Rovaniemi to the Russian border is 173 km long and the road on the Russian side from the Finnish border to Kandalaksha is 166 km long. The paved road width varies between 6.5 and 10 m.

The road is somewhat narrow on the Finnish side. On the Russian side, the road is wide enough, but the condition of the pavement on many sections of the road is poor.

In 2014, in Russia the road sections to Kandalaksha were reconstructed, as well as paved with asphalt.

Rails:

There is at present a 279 km long railway connection from the Bothnian Corridor to Kellosoelkä, near the Russian border at Salla. Regular rail transports end at Kemijärvi.

The railway is electrified from Kemi to Rovaniemi, currently electrification of the railway section to Kemijärvi is under way.

On the Russian side, Alakurtti – Ruchi Karelskie line operates (102 km): single track, non-electrified, low-density.

5.7.2. TRAFFIC

Road

Average number of vehicles per day reaches 20,000 in Rovaniemi and about 1,000 on the Finnish side close to the border. The average daily number of border-crossing vehicles in 2014 was 293 cars and five trucks or buses. The number of border crossings in 2014 was nearly twice as much as in 2010. The average number of vehicles per day on the Russian side is 440, 30% of which are heavy vehicles.

Rails:

There are six daily trains transporting mainly round timber from the terminal in Kemijärvi to the paper mills in Kemi and Oulu. Another six cargo trains transport round timber from the Rovaniemi timber terminal to the same mills.

One night train serves passengers to and from Kemijärvi. The annual number of passengers from Rovaniemi to Kemijärvi is around 30,000.

Passenger traffic on the Ruchi Karelskie — Alakurtti line is stopped. The Alakurtti station is functioning, but the traffic here is very insignificant. A freight train comes here not daily. Usually consists of no more than ten cars. Shunting locomotives (TEM7A, etc.) assigned to the depot of Kandalaksha are operated on the line. The cargo arriving to the Alakurtti station is predominantly fuel (petrol and diesel). The line 102 km long has one intermediate interstation left - the Nyamozero station.

5.7.3. KEY CHALLENGES

Roads

- Section Vikajarvi – Kemijärvi is too narrow for the volume of traffic
- The road standard is poor in some sections between the Finnish border and Alakurtti.

5.7.4. PLANNED DEVELOPMENT

Rails: The electrification between Rovaniemi and Kemijärvi is planned to be finalized soon.

5.7.5. FUTURE POTENTIAL

Today the use of the Route is limited mainly to tourism and business travel between Russia and Finland. Cargo transport is very limited.

5.8. ROUTE: KEMI – ROVANIEMI – KIRKENES

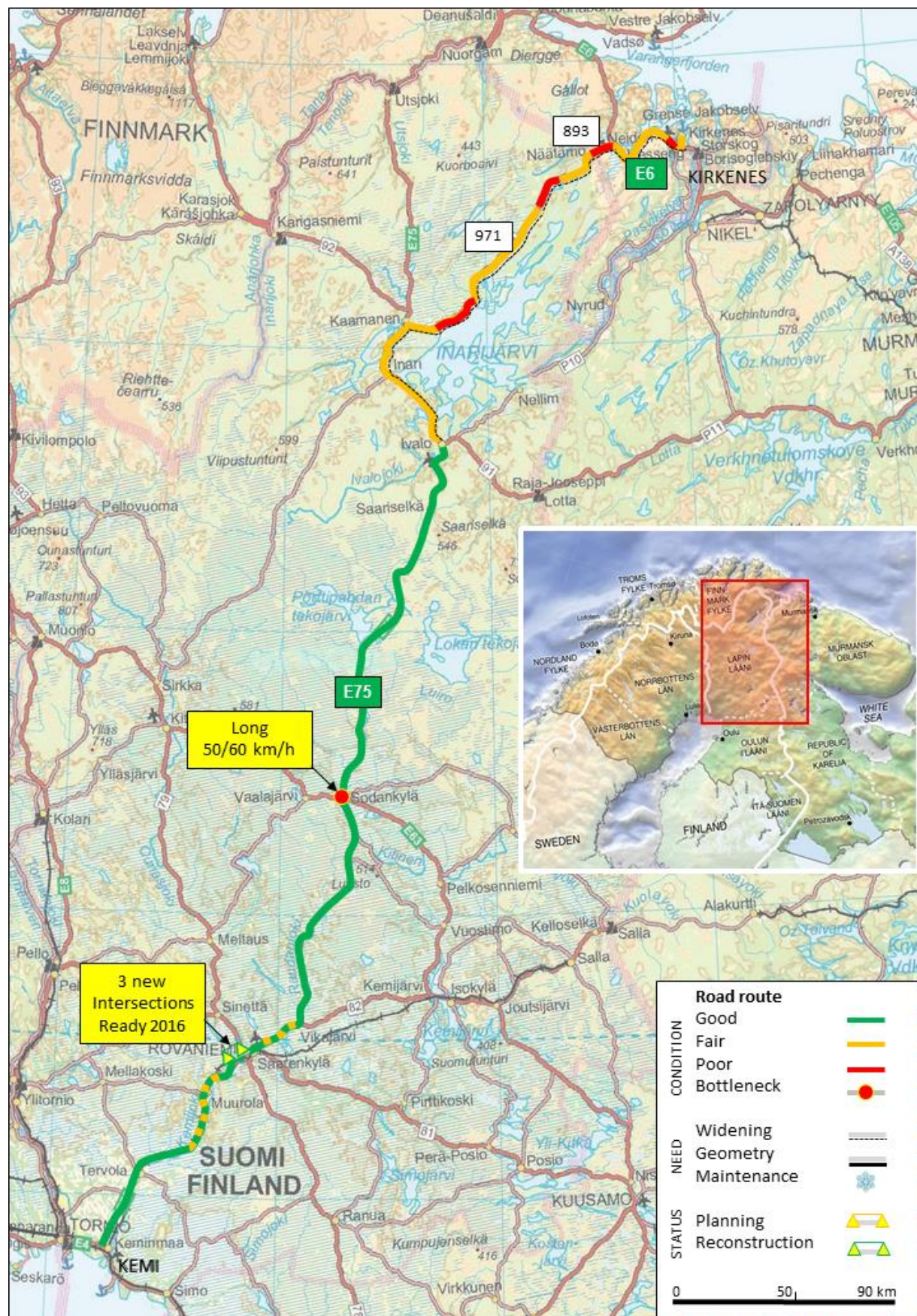


Figure 17. Kemi – Rovaniemi-Kirkenes

Consists of:**Roads:**

E75, National Road 971, National Road 893 and E6

Rails:

No railway exists today, but is an option in the future. There are several options for the route of the new railway. The shortest and cheapest one is to bypass Lake Inari from the south. Kemijärvi can be the starting point of the railway instead of Rovaniemi.

Brief facts: Roads

Length: 702 km

Width: 10 m–5.5 m

Speed limit: 100 or 80 km/h, 50 km/h in some urban areas

Number of vehicles crossing the border per day: 500

Average number of vehicles per day where traffic is at its peak: 20,000 in Rovaniemi

Ports

See Chapters 5.4 and 5.5

Airports

Rovaniemi	400,000 passengers/year
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Ivalo	150,000 passengers/year
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Kirkenes	301,000 passengers/year
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General information

Population of the cities

Rovaniemi	61,000
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Sodankylä	9,000
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Ivalo (municipality of Inari)	7,000
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Kirkenes	10,000
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5.8.1. GENERAL DESCRIPTION

For information on rail see Chapter 5.8.6

The road route starts from the Bothnian Corridor in Kemi and runs parallel to the Barents Road to Rovaniemi. From Rovaniemi it runs north as the E75, passes by Rovaniemi Airport and runs through mostly forest-covered countryside to Sodankylä and further to Ivalo and Inari. Those three towns are the only municipal centres and the road runs through all of them. Before Ivalo there is the Saariselkä holiday resort, which during high season has more inhabitants than Ivalo. Between Sakelarides and Ivalo, close to the road is Ivalo Airport, which serves Saariselkä holiday resort and the rest of Northern Lapland. There is also some tourist traffic destined for Finnmark including the main tourist attraction in Northern Norway, the North Cape Cliff.

There are two operating mines and several advanced mining projects in Central Lapland north of Sodankylä along the E75. The transports to and from the mines are operated by lorry and are directed mainly to the port of Kemi. A significant amount of timber is transported on the E75 to Rovaniemi, where it is loaded onto trains and transported to paper plants in Kemi and Oulu.

20 km north of Inari the road route leaves the E75 and becomes National Road 971 to the border crossing in Neiden and from there to the E6 via the town of Kirkenes. The route is part of the proposed TEN-T comprehensive road network as far north as National Road 971, which is not included in TEN-T.

The road route is a lifeline for the northernmost parts of Finland. It is the only road suitable for heavy transports between the municipalities of Utsjoki and Inari and the rest of the country. The lack of railway increases the importance of the road route for all transports between Northern and Central Lapland and the southern parts of Finland.

5.8.2. INFRASTRUCTURE AND STANDARD

The distance from Kemi to the Norwegian border in Neiden is 590 km. The E75 road has an 8 m wide pavement

almost all the way from Rovaniemi to Ivalo, but it needs some widening in places. The most urgent need for widening is close to Rovaniemi because of the relatively large number of cars on the road. Between Ivalo and Inari, the E75 is only 7 m wide, and there is a need for widening.

National Road 971 from E75 to Neiden has only a 5.5 to 6 m wide pavement and therefore must be widened before any significant amount of international transport can use it.

5.8.3. TRAFFIC

The highest average number of vehicles per day is near Rovaniemi, with almost 20,000, and the lowest is on National Road 971, with only 250. The average daily number of border-crossing vehicles in Neiden in 2012 was 492 cars and 22 trucks or buses. The number of border crossings has been growing over the last few years. The traffic in Kirkenes is described in Chapter 5.6.

5.8.4. KEY CHALLENGES

The standard of National Road 971 from the E75 to Neiden is not adequate for cargo transports. The horizontal curvature is particularly poor in many places. The road is also too narrow.

5.8.5. PLANNED DEVELOPMENT

There is an ongoing study which aims to determine the measures needed to prevent the E75 from deteriorating under heavy loads coming from the mines in Sodankylä.

So far, no plans have been made to improve the standard of National Road 971.

In the medium long term, a new railway may be built from Rovaniemi or Kemijärvi up to Sodankylä to serve the new mines in Central Lapland. Both the forest industry and the mines would benefit from the possibility to use train transport in the future. The future railway route from the present railway to the mining area at Sodankylä will be determined in the regional land use plan within the next three years.

5.8.6. FUTURE POTENTIAL

This route is very important for the transport of timber to the forest industry, and for the mines to import the raw materials they need and to export their products. The E75 is of crucial importance to these industries. To keep the transport costs low, the total weight of the cargo must be maximized. There are initiatives for testing 100 tonnes or more on public roads in this route.

Some investigations have been made into building a new railway connecting Kirkenes to the Finnish railway system and thus making Kirkenes an important hub for Finnish exports. However, the studies have failed to indicate a positive cost-benefit ratio for such a venture and such a project is therefore not included in Finnish transport plans.

In its 2012-2013 study “Traffic requirements for the mining industry” Finland has evaluated the construction of a new rail link between Rovaniemi – Sodankylä – Kirkenes for the shipment of ore and minerals from the Pajala/Kolari – Sodankylä – Savukoski belt via the port of Kirkenes.

A link of this type will entail construction of approximately 460 – 470 km of new railway.

Much of the freight that will be carried on this railway will be the same ore and minerals that are planned to be transported through the Svappavara – Pajala – Kolari Route, discussed in Chapter 5.15.

From a Barents point of view, a railway line from Finland to Kirkenes will provide a more complete railway network in the Barents Region, in particular if a connection from Kirkenes to the Russian railway network is constructed.

5.9. NATIONAL ROUTE THROUGH NORTHERN NORWAY, KIRKENES – MOSJØEN

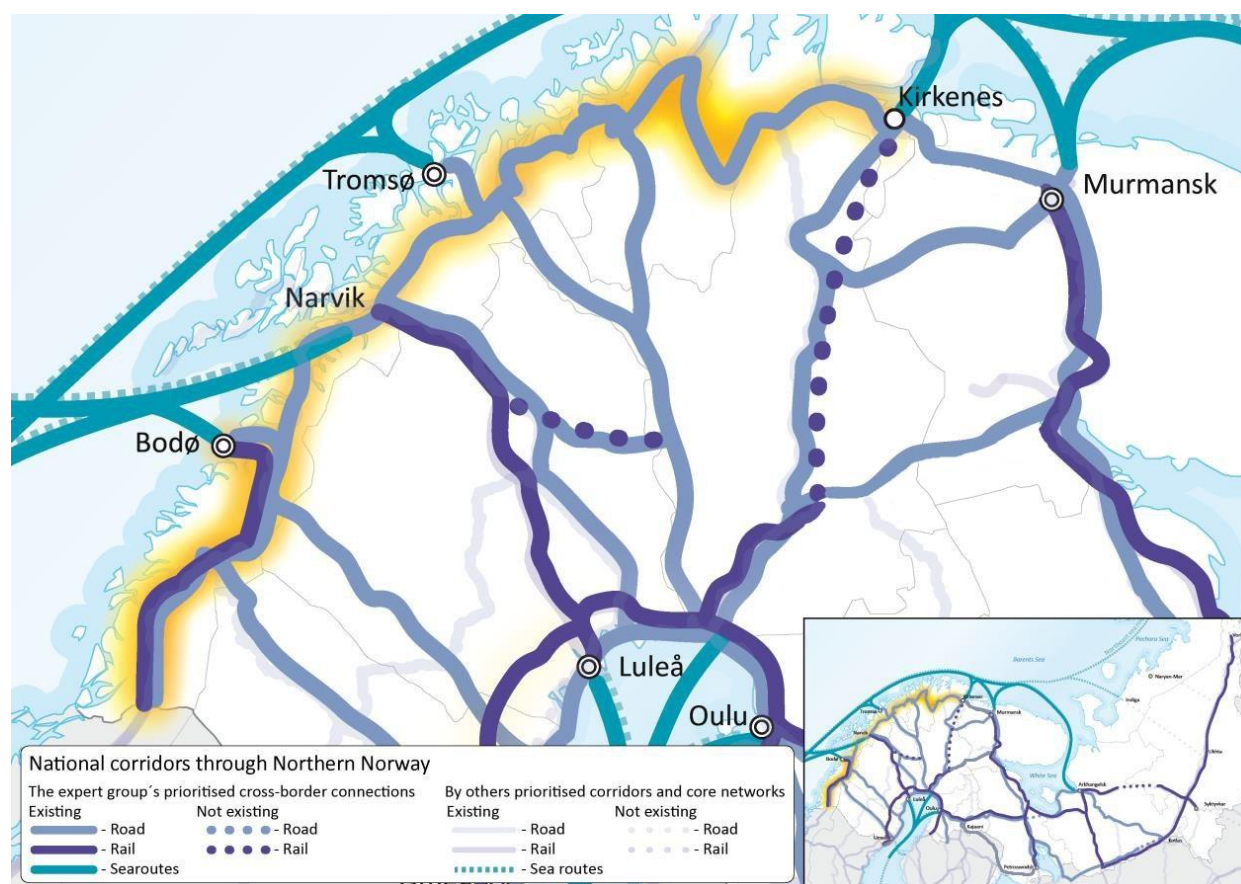


Figure 18. National routes (rail and road) through Northern Norway, Kirkenes - Mosjøen

Consists of:

Roads:

E6

Rails:

The Ofoten line, the Nordland line and the Meråker line

Brief facts:

Roads

Length: 1,684 km (Nordland, Troms and Finnmark)

Width: 5.6 – 8.5 metres

Speed limit: vary between 50 – 90 km/hour

Amount of traffic: 300 – 13,000 vehicles/day

Rail:

The Nordland line:

Length: 727 km (Trondheim – Bodø)

Propulsion: Diesel

Number of tracks: Single track, no CTC, few crossing sections

The Meråker line:

Length: 74 km (Hell – Storlien/Riksgrense)

Propulsion: Diesel

Number of tracks: Single track

Ports

See Chapter 5.4

Airports

Number of passengers per year at main airports in the route:

- Tromsø 1.8 million

- Bodø 1.6 million
- Evenes 600,000
- Alta 350,000
- Kirkenes 300,000
- Bardufoss 200,000

5.9.1. GENERAL DESCRIPTION

The route is characterized by long distances and low population density. It is the only national freight haulage route between Northern and Southern Norway and it is very important for regional and local traffic in this part of the country.

There is a railway in the southern section of the route – the Nordland line that runs between Trondheim and Bodø.

The Meråker line connects to the Nordland line in the east-west direction. It is about 74 kilometres long and is not electrified. On the Swedish side it connects to Mittbanan which is electrified.

The road connections from neighbouring countries connect to this national road route, which thus has a distribution effect. Hauliers from the foreign corridors mostly include the E6 in their route to their final destinations.

5.9.2. TRAFFIC

The E6 route has low traffic volumes with the exception of traffic through cities and towns. Long stretches of the route have an average number of vehicles per day of below 1,500 vehicles.

Traffic increases towards the cities Mosjøen, Mo i Rana, Narvik and Alta where the traffic volume rises to over 8,000 vehicles per day. The proportion of heavy vehicles varies. It is the highest on the low traffic sections of the E6, where it is up to 25%.

The railway that runs to Bodø transports both freight and passengers. Total rail freight to and from Bodø amounts to about 350,000 tonnes annually.

5.9.3. KEY CHALLENGES

Road standard

Road width is of great importance for the accessibility of industrial haulage vehicles. Sections where the asphalted surface is less than 6 metres, are prioritized for improvement. The same applies to bottlenecks. Several tunnels and bridges are of such poor quality that they will have to be improved within a few years. Road strengthening and surface renewal works will be carried out. The high level of industrial freight imposes rigorous requirements on the road with respect to its traffic regularity. To achieve this, sections that are exposed to avalanches must be secured, and problematic mountain passes must be improved.

Railway standard

The Nordland line is currently serviced by three pairs of trains daily, each approx. 425 metres long. Freight trains provide the design criteria for the development of the railway. It is an objective to double the quantity of goods carried by rail by 2020 and to triple this indicator by 2040. The railway will be further developed to allow for freight trains of up to 600 metres long. New, longer crossing sections will be built. Completion of remote control of the railway will make the train service more efficient and reduce the vulnerability to knock-on delays on long sections. Assessing electrification from an overall national and environmental perspective will be an important task.

The Nordland line connects to the railway network of Sweden via the Meråker line. The Meråker line is just south of the Barents Region, but it is included in this route description because of its potential importance for the export of seafood from Nordland. It is believed that the Meråker line in combination with the Nordland line could constitute an important route to the markets in Central and Southern Sweden and further south to Western Europe.

The Meråker line has some major shortcomings today, but it is now prioritized for upgrading by the Norwegian government. Currently, the Meråker line lacks electrification and has low axle load. It is not equipped with no automatic train control. The line has too few crossing sections and a steep slope, which necessitates the use of two locomotives.

Also it lacks a triangle track for efficient transportation of cargo from Northern Norway. All these factors make the Meråker line an unprofitable option for cargo owners. Currently 2-3 trains normally run in each direction. Planning for electrification is in progress.

The Meråker line is interesting from a wider Barents point of view. The Ofoten line connection to Sweden will be

utilized almost 100% from now onwards. The Nordland line/the Meråker line combination may therefore be a better routing for seafood in the future.

5.9.4. PLANNED DEVELOPMENT

Upgrading is planned for several sections of the E6. The largest ongoing and future projects are:

- Development/rebuilding of the E6 in the area of Helgeland (southern part of the route)
- Development of the stretches north and south of Kråkmo mountain
- Development of the road through the small town of Ballangen
- Shortening of the road/ construction of a new bridge close to Narvik, “the Hålogaland bridge”
- Avalanche protection in Nordnes - Skardalen section
- Building of new tunnel through Sørkjosfjellet mountain
- Construction/upgrading west of Alta
- Construction of a new bridge in the village of Tana

Renewal measures for roads, bridges and tunnels are also planned on a number of other sections of the E6.

Completion of remote control on the Nordland line will make the train service more efficient and reduce the vulnerability to knock-on delays on long sections.

5.9.5. FUTURE POTENTIAL

The route is of great importance for transport between Northern and Southern Norway. An efficient national route will be a key factor for connecting Northern Norway to national and international markets.

5.10. ROUTE: "THE NORTHERN LIGHTS ROUTE": HAPARANDA/TORNIO – TROMSØ

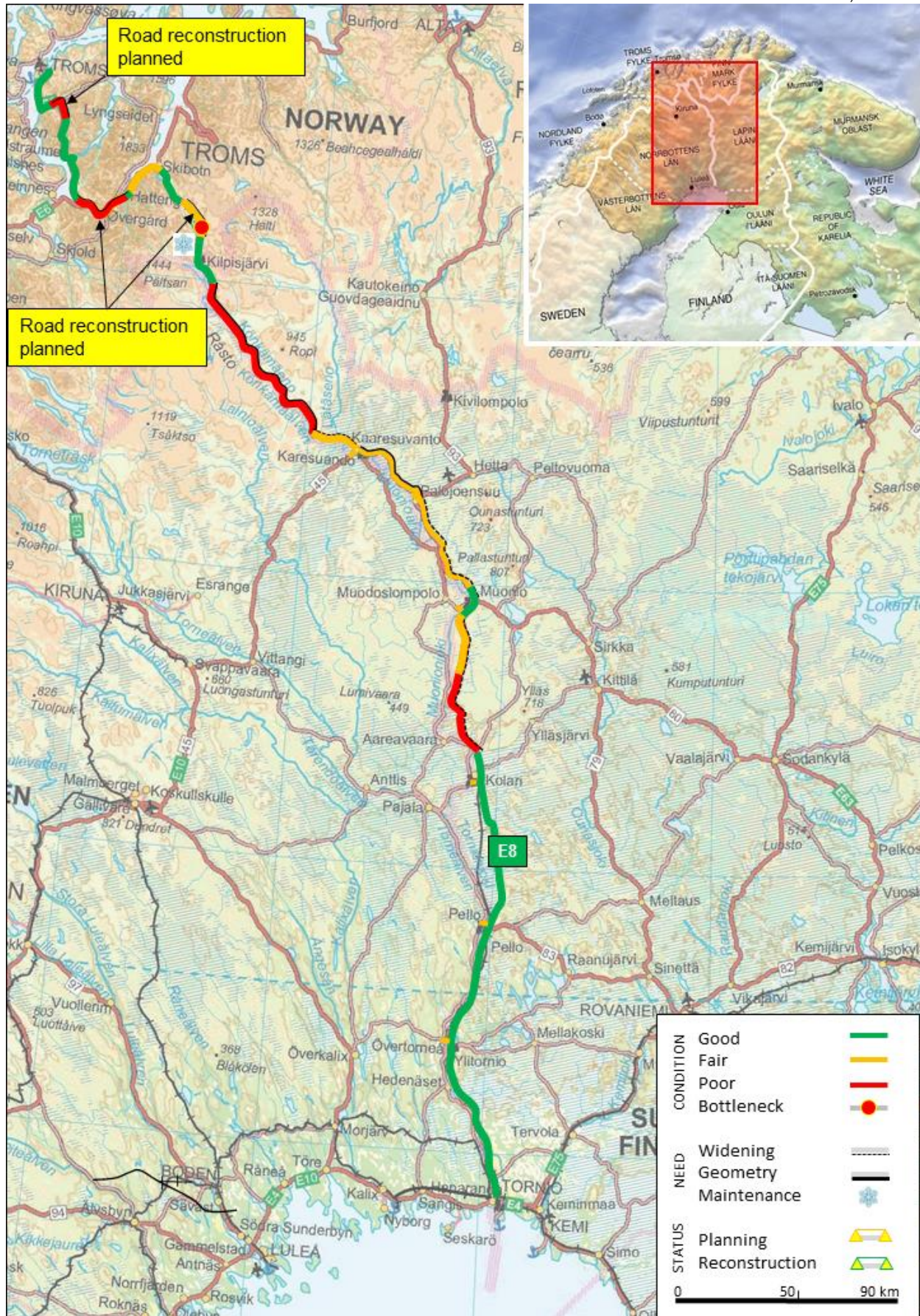


Figure 19. The Northern Lights Route: Haparanda/Tornio – Tromsø

Consists of:

Roads:

E8, National Road 93 and National road 99

Rails:

There is no transit railway traffic from Tornio to Tromsø.

The Tornio – Kolari line is operating.

Brief facts:**Roads**

Length:

Length: 620 km between Tornio and Tromsø (470 km in Finland and 150 km in Norway)

National Road 99 in Sweden between Haparanda and Karesuando: 364 km Width: varies between 6.5 – 8.5 m on the E8 and 6 – 10 m on National Road 99.

Speed limit: mostly 80 – 90 km/h but down to 60 km/h over shorter distances (in Norway), mostly 100 km/h in Finland (80 km/h in winter), in Sweden 80-100 km/h.

Number of vehicles crossing the border per day: on the E8 about 500 vehicles of which 20% are heavy. Border-crossing Sweden/Finland National Road 99 in Karesuando: 560

Average number of vehicles per day where traffic is at its peak: 10,000 vehicles close to Tromsø.

Rails:

Length Tornio – Kolari: 183 km

Average number of passenger trains per day: three in a tourist season.

Average number of cargo trains per day: 2

Non-electrified Single track

Automatic Train Control

Ports

See Chapters 5.4 and 5.5

Airports

Tromsø	1.8 million passengers/year Kittlā	260,000 passengers/year
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General information

Population of the cities Tromsø 71,000

Tornio 22,000

5.10.1 GENERAL DESCRIPTION

The Route connects to the Bothnian Corridor at the Gulf of Bothnia on the border between Sweden and Finland. From here, the Route goes north to the Norwegian Sea and the coast of Troms and western Finnmark in Norway.

Furthest to the south, the Route consists of parallel roads on both sides of the river Torne which forms the border. On the Finnish side this is the E8, while on the Swedish side it is National Road 99. The fact that this Route has six (6) border crossings between Sweden and Finland makes it unique. National Road 99 in Sweden and the E8 in Finland must be viewed as one road which functions as an interconnected unit.

There is extensive cooperation between transport authorities on border crossings. Also the local cooperation on a community level between the countries is strong and affects the movements and transports across the border.

The E8 runs northwards through the river Torne (Tornedalen) on the Finnish side to Kilpisjärvi. Immediately after Kilpisjärvi, the E8 crosses the border with Norway, and the road runs down to Skibotndalen until it meets the E6 and continues further along the coast to Tromsø.

The roads in the Route generally are insufficiently wide. Many stretches need levelling. This applies especially to sections of the E8 in Skibotndalen that are defined as bottlenecks due to difficult gradients, where heavy goods vehicles can become stuck when driving in winter conditions. On the Norwegian side the E8 is open for modular vehicle combinations up to 25.25 metres in length and a total weight of up to 60 tonnes, while National Road 93 is open for heavy goods vehicles up to 19.5 metres in length and a total weight of up to 50 tonnes.

On the Finnish side, the northern parts of the route are difficult for heavy transports because of the insufficient width and high horizontal and vertical curvature.

The road is prone to accidents, especially in winter.

There is also a railway in the Route from Tornio on the Finnish side, located close to the Swedish border, up to

Kolari. The railway was originally built to meet the needs of mining transport, but currently it is used for the transport of timber and for tourism.

There is an advanced iron-ore mining project in Kolari and this railway will probably be used by the mine when it opens. The mines usually require transports of large and heavy cargo. An optimal route for such cargo is difficult to find because of weak bridges and some bottlenecks in the road network.

There are reasonably large airports at both ends of the Route in Kemi, Tornio and Tromsø. Just outside the Route there are airports both in Kittlā on the Finnish side and Pajala on the Swedish side.

The towns of Tornio/Haparanda and Tromsø lie at the end of the Route. Apart from these, there are no towns in the Route, but there are several hubs such as Ylitornio, Pello, Pajala, Kolari, Muonio, Kaaresuvanto and Skibotn.

Kolari serves as an important regional transport hub.

5.10.2 TRAFFIC

The E8/National Road 99 is important for both cargo and private transport. The lack of a rail service in the Route gives the roads an added importance. The roads are important both for long-distance transport between several countries and for regional and local transport within the individual countries.

Since there are six border crossings between Sweden and Finland connecting the local communities, there is a lot of local traffic over the border river.

From the Norwegian side, seafood products are transported through the Route. These products are destined for the Swedish and Finnish markets, but also more and more often these products are destined for Russia and Southern European countries.

From the Finnish side, a certain amount of timber and other construction materials are transported to Norway.

The Route is important for travellers to and from several main tourist resorts that lie close to the Route on the Finnish side (Levi and Ylläs).

The Route is important for travellers visiting Norwegian tourist attractions such as the North Cape Cliff. The port of Tromsø is a turnaround port for cruise ships.

Petroleum industrial activity in the northern regions is resulting in transport of materials both by road and sea.

The Route also has a function as a transit corridor for transports between the counties of Troms and Finnmark and the southern part of Norway. Freight is transported via Finland and Sweden since roads are of better quality and the speed limits are higher than on the domestic north-south corridor in Norway.

5.10.3 KEY CHALLENGES

The challenges of the Route have nothing to do with the lack of capacity. The main challenge for transport of people and goods is an unacceptable road standard. The deficiencies in road standard are generally as follows: narrow roads, an excessive horizontal and vertical curvature on certain stretches, difficult gradients on some sections and a poor load-bearing capacity on certain stretches.

There are also challenges on a local level in terms of facilitating the smooth movement of both local residents and tourists over the six border bridges.

The mountain crossings between the east and west regions can be subject to adverse weather conditions during winter, which again can create problems of accessibility and regularity of traffic. There are few possible alternative roads and significantly longer driving distances will be required.

The airport in Tromsø requires expansion of the terminal to be able to facilitate an increase in air travellers.

5.10.4 PLANNED DEVELOPMENT

The E8 has a high priority from the Norwegian side. Spending of approximately EUR 53 million is planned over the next four years and a significant increase in investments is expected till 2023:

- Close to Tromsø on the E8, construction of about 10 km of new road in Ramfjorden is planned. A new access road will be built to the port terminal in Breivika/Tromsø.
- Work on modification/improvement of the most difficult gradients in Skibotndalen in Norway began in 2013, thereby one of the worst bottlenecks will be removed.
- Improvement works are planned on some stretches between Skibotn and the national border with Finland through to 2023. As part of this work, the second bottleneck in Skibotndalen will be removed.
- Significant modification/improvement of the E6/E8 at the southernmost part of the stretch between Skibotn – Nordkjosbotn is expected during the same period. This will provide considerable improvement in accessibility and reduced travel time.

Planned Finnish measures are mainly focused on the northernmost section between Palojoensuu and Kilpisjärvi. The road should be widened and both vertical and horizontal curvature improved. In many places the load-bearing capacity should also be improved. The costs are estimated to be EUR 50 million, but no decision has been made with regard to financing.

National Road 99 is being reconstructed from 2013-2015 between Kaunisvaara and Autio due to the mining expansion in the area.

There are plans to expand the airport terminal in Tromsø, but it appears that this will not happen for six years.

5.10.5 FUTURE POTENTIAL

During the past five years there has been an increase of approximately 19% in the number of heavy goods vehicles crossing the borders. Nothing indicates that this growth will diminish in future years. On the contrary, it is expected that transport for the seafood industry will increase significantly in the next 30 years and the increased activity in the petroleum industry in the Barents Sea can be expected to increase the volume of goods transported in the Route. Tourism is an important industry both in Northern Finland and Northern Norway. Preparations are being made for greater collaboration between tourist organizations in all three countries, which will lead to the growth of traffic in the Route.

Strategic discussions between the road authorities in Sweden and Finland about the role of National Road 99 and the E8 must take place, since there are two parallel roads in the southern part of the Route, which are connected with six border bridges.

There is one major mine in the Route in Kaunisvaara, Sweden and an advanced iron ore mining project in Kolari, Finland. Several other mining projects are expected to start during the next decade. The mining industry will create additional transports in the Route, both on the railway and on the roads.

In the long term, a new railway along this Route may also be put on the agenda, but currently there is no rationale for a railway. However, development of mineral reserves in the north-western parts of Lapland may change this situation in the future.

5.11. ROUTE: PALOJOENSUU – ALTA

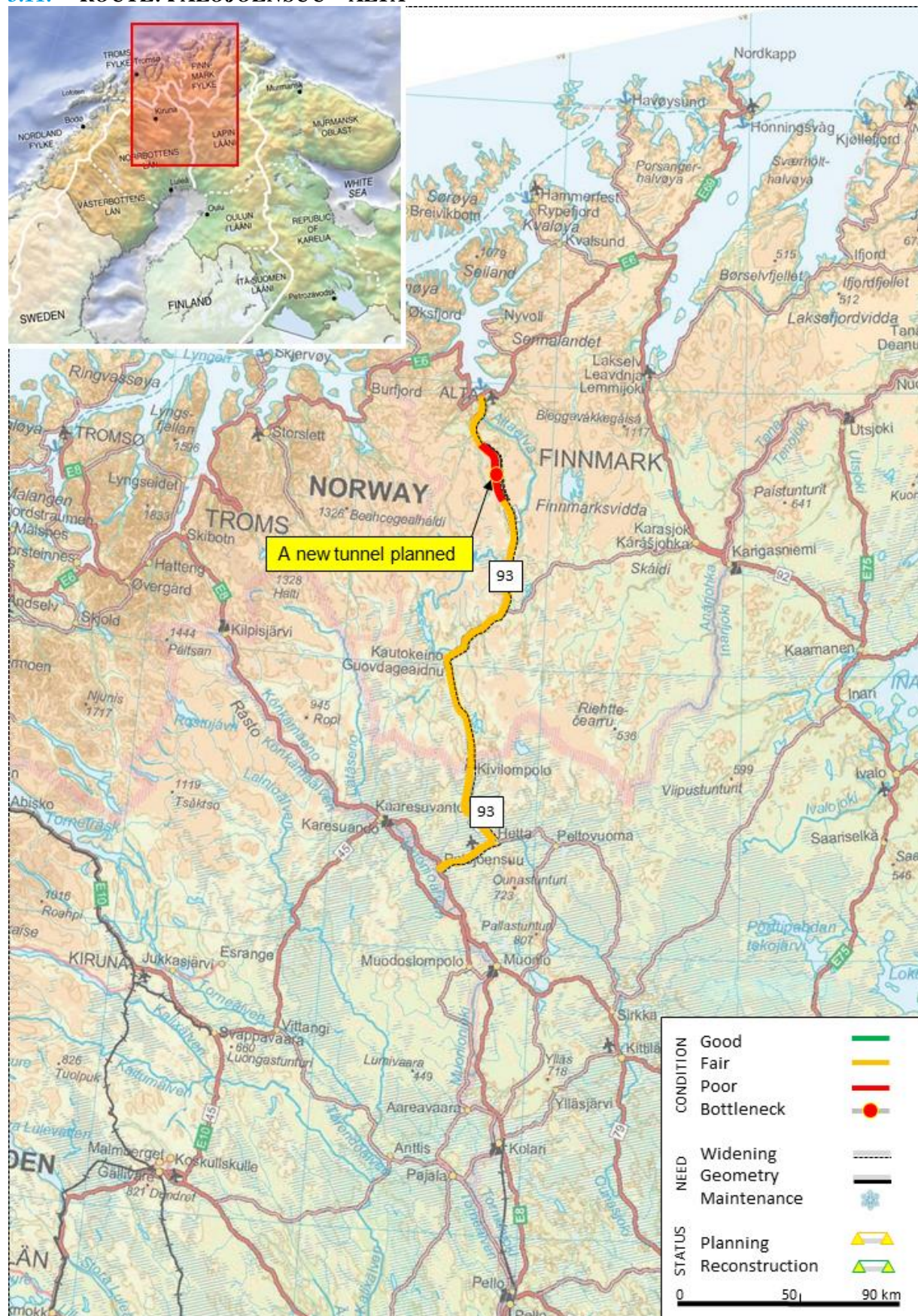


Figure 20. Palojoensuu - Alta

Consists of:

Roads:

E8, National Road 93

Brief facts: Roads

Length: 235 km (63 km in Finland and 172 km in Norway)

Width: varies between 6.5 – 8.5 m on the E8 and on National Road 93 it reduces to 5.5 m

Speed limit: mostly 80 – 90 km/h but down to 60 km/h over shorter distances (in Norway), mostly 100 km/h in Finland (80 km/h in winter)

Number of vehicles crossing the border per day: 400 (2014)

of which 20% are heavy vehicles.

Average number of vehicles per day where traffic is at its peak: 3600

Ports

See Chapter 5.4

Airports

Alta Airport 350,000 passengers/year

Kittlä Airport 260,000 passengers/year

General information

Population of the cities

Alta 20,000

5.11.1. GENERAL DESCRIPTION

The Route connects to “The Northern Lights Route” (Route 5.10) in Palojoensuu and goes north to Alta where it connects to the E6.

The Route consists of National Road 93 in Finland and Norway. The road is open to vehicles up to 19.5 metres in length and total weight up to 50 tonnes.

The Route is important for both cargo and private transport. The lack of a rail service in the Route gives the road an added importance. The road is important both for long-distance transport between several countries and for regional and local transport within the individual countries.

5.11.2. TRAFFIC

Average daily traffic in the Route is less than 500 vehicles with the exception of the section close to the city of Alta where traffic increases.

5.11.3. KEY CHALLENGES

The challenges of the Route have nothing to do with the lack of capacity. The main challenge is an unacceptable road standard. The deficiencies in road standard are as follows: narrow roads, an excessive horizontal and vertical curvature on certain stretches, difficult gradients on some sections and a poor load-bearing capacity on certain stretches. National Road 93 has an approximately 5 km section near the village of Kløfta which is classified as a bottleneck due to the road narrowness combined with the excessive vertical and horizontal curvature and a risk of landslides. In certain periods during winter, mountain crossing is challenging, but the road is rarely closed due to poor weather conditions. There are few possible detours if the roads are to be closed due to weather conditions, accidents or vehicle breakdowns, especially in the northern part of the Route. On the Finnish side there is one bridge on National Road 93 that represents a bottleneck for the use of 76 tonne trucks. Finnish National Road 93 is not wide enough to accept an increase in transports.

5.11.4. PLANNED DEVELOPMENT

In the next ten year period it is planned to remove the bottleneck close to Kløfta. The bottleneck bridge on the Finnish side will be replaced by a new bridge.

Other measures to improve the road standard must be planned simultaneously.

5.11.5. FUTURE POTENTIAL

During the past five years there has been an increase in the number of heavy goods vehicles crossing the border in this Route. Nothing indicates that this growth will diminish in future years. On the contrary, it is expected that transport for the seafood industry will increase significantly in the next 30 years and the increased activity in the petroleum industry in the Barents Sea can be expected to increase the volume of goods transported in the Route. Tourism is an important industry both in Northern Finland and Northern Norway.

Continuing the E45 numbering up to the E6 in Alta would be logical.

5.12. ROUTE: "THE BLUE ROAD": VASA – UMEÅ – MO I RANA

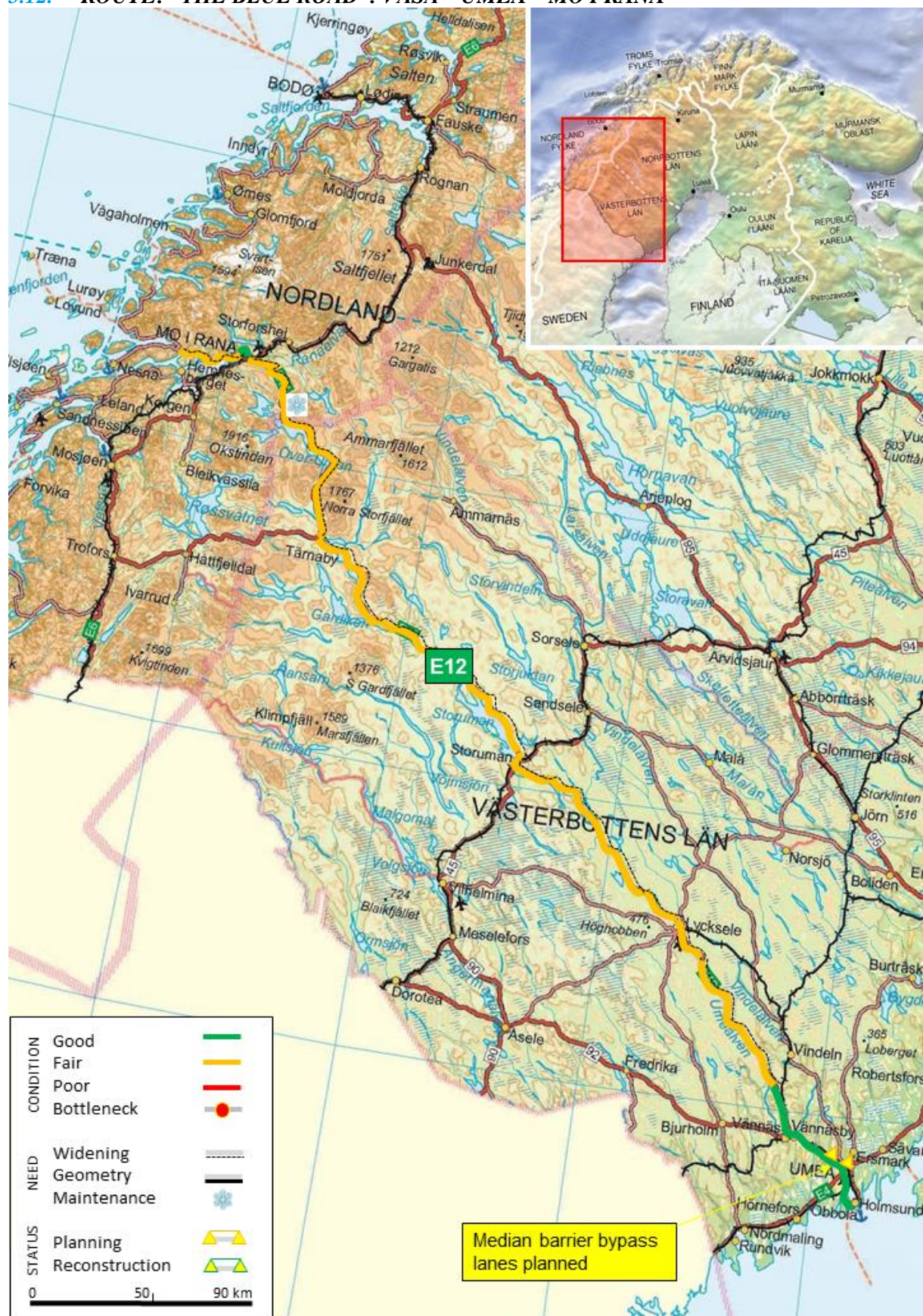


Figure 21. Vasa – Umeå – Mo i Rana

Consists of:

Roads:

E12

Rails:

There is no transit railway traffic from Umeå to Mo i Rana.

The Hällnäs – Storuman line is operating.

Brief facts:

Roads

Total length: 492 km (Umeå - Mo i Rana)

Length

Sweden: National border–Umeå (Holmsund) 452 km Norway: (Mo i Rana – National border) 40 km Width: 6–14 metres (Sweden), 7.5 – 8.5 m (Norway)

Percentage of the road with a width of 8 m or more:

Speed limit: 90-100 km/h (Sweden), 50 – 80 km/h (Norway)

Number of vehicles crossing the border per day: 620 Sweden/Norway, Sweden/Finland: Ferry

Ferry traffic

Average number of vehicles per day where traffic is at its peak: 10 000 Umeå, 7,500 Mo i Rana

Railway

Sweden (Storuman – Hällnäs line)

Length

Sweden: 167 km Storuman-Hällnäs, 47 km Vännäs-Holmsund

Average number of passenger trains per day: 8 Average number of cargo trains per day: 6

Maximum permitted axle load: 22.5 tonnes

Gauge: Sweden: 1,435 mm Maximum speed: 90 km/h Signalling system: System M, ATC

Electrified/Non-electrified: Non-electrified Single or double track: Single track

Ports

See Chapters 5.4 and 5.5

Airports

Mo i Rana 103,000 passengers/year

Umeå 846,000 passengers/year

General information

Population of the cities (municipalities) Mo i Rana 26,000

Umeå 117,000

5.12.1 GENERAL DESCRIPTION

This Route consists of both road and railway (separate sections). It begins in Mo i Rana, Norway, traverses Sweden via Umeå and ends in Vasa, Finland, with a ferry link between Sweden and Finland.

“The Blue Road” is sometimes described as going through Finland and all the way to Karelia. The eastern part is, however, mainly a tourist route and its importance is considered too minor to include it in this description.

The E12 road is included in the proposed TEN-T comprehensive networks and is about 910 km in length. The section within Finland is Finnish National Road 3. The road follows this route: Mo i Rana – Storuman (Sweden) – Lycksele (Sweden) – Umeå (Sweden) – Holmsund (Sweden) – (ferry) – Vaasa, (Finland) – Tampere (Finland) – Hämeenlinna (Finland) – Helsinki.

On a local and regional level, the E12 acts as an artery for passenger/freight transport to larger industries, workplaces, and municipal and regional centres.

The ferry line has one departure per day. It risks being withdrawn because a commercial company operates it, and it is unprofitable due to the low passenger number.

There is no government support, since this is only available for domestic connections. It is a principle, especially in

Sweden, that international travel should not be supported by taxpayers. However, the city of Vaasa supports the ferry route.

There is a 260 km railway line between Storuman and Hällnäs. In Hällnäs, it connects to the main railway through Northern Sweden and continues to the port of Umeå. The missing rail link between Storuman and Helgeland (Norway) is approx. 280 km.

5.12.2 INFRASTRUCTURE AND STANDARD

Roads: E12

On the E12, there are some sections with steep slopes, which combined with the narrowness of the road make it difficult for heavy vehicles to pass and to get up the hills. This becomes a bottleneck also for other traffic.

Rails:

The line between Storuman and Hällnäs is of a low standard, but it is proposed to upgrade it in the years to come in the proposal for a new national transport plan 2014-2025. One section, Lycksele-Hällnäs, has recently been upgraded, which made it possible to increase the speed up to 90 km/h.

5.12.3. TRAFFIC

The main volume of transport in the Route consists of goods from Norway to Sweden and Europe. The freight consists largely of fish and steel reinforcement bars. There is a small proportion of industrial items from Sweden to Norway.

The road has a traffic volume of approximately 620 vehicles per day of which 10% are heavy vehicles at the border between Norway and Sweden. Modular vehicle combinations of up to 25.25m and a total weight of up to 60 tonnes are permitted.

The route is very important for the tourist industry.

There are no scheduled flights between the towns along this route.

5.12.4 KEY CHALLENGES

The traffic volumes vary considerably between different sections of the road. The traffic is the heaviest towards the cities of Mo i Rana, Umeå, Vaasa and Helsinki. The lightest traffic is at the border crossing between Norway and Sweden.

The capacity of the road is generally sufficient, but the geometrical standard varies considerably. On the Norwegian section of the road the aim is to obtain a width of 8.5 m. Currently just 17% of the road complies with this objective.

The current traffic safety situation is acceptable.

- Nickel Mountain AB aims to establish a mine in Rönnbäcken. The investment cost will be SEK 11 billion. This will create 750 new jobs.

The project will have the following effects/consequences:

- 1,600,000 tonnes of magnetite iron ore will be transported to Mo i Rana (166 km). This means 260-280 heavy vehicles each day.
- In addition, 100,000 tonnes of nickel will be transported. This means 16 heavy vehicles each day.
- The transport of iron ore may start in 2018.
- Duration of the project is 20 years.

This activity will mean that load-bearing capacity must be increased both on the Norwegian and Swedish sides. The road from the border to Mo i Rana must be built with a width of 8.5 m.

The estimated cost in Norway will be EUR 48 million. The cost in Sweden has not yet been calculated.

5.12.5 PLANNED DEVELOPMENT

The upgrading of the Umskard tunnel will be completed in 2014.

No comprehensive measures have been proposed until 2017. But other necessary measures – such as increasing load-bearing capacity and widening – will be carried out in the period 2018 – 2023.

Besides, it had been proposed to build a new airport at Mo i Rana, which will allow to handle larger aircraft e.g. Boeing 737.

5.12.6 FUTURE POTENTIAL

As mentioned above, the Route has great importance for the mining industry. As a result of the Sulphur Directive which will come into force for the ships in the Baltic Sea, this will probably create traffic along the E12 from Sweden to Mo i Rana. Aquaculture will increase in volume and create more traffic. The tourist industry will also expand.

5.13. ROUTE: "THE SILVER ROAD": SKELLEFTÅ – BODØ

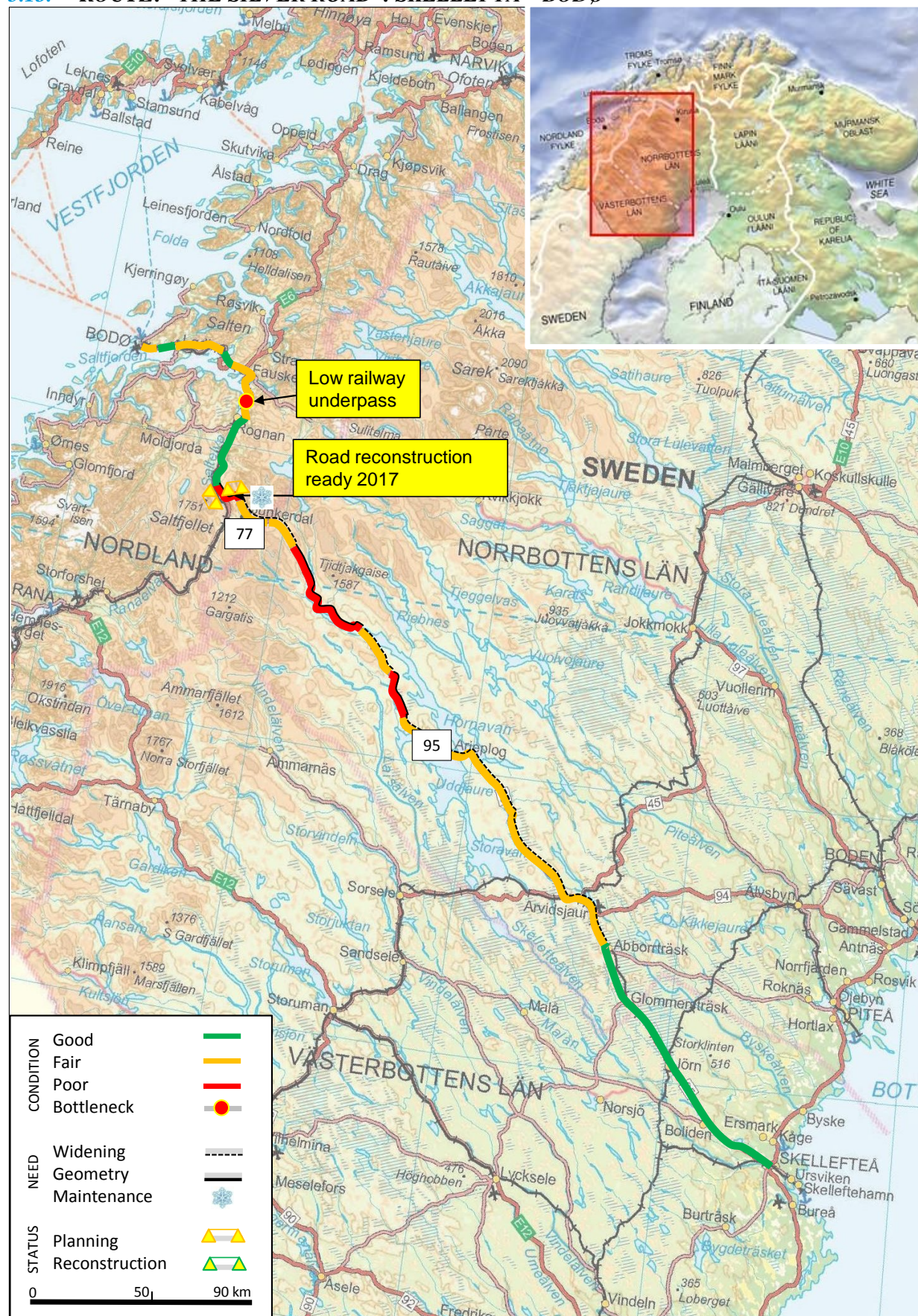


Figure 22.

Skellefteå – Bodø

Consists of:**Roads:**

National Road 95, National Road 77, E6 and National Road 80

Rails:

No direct railway connection from Skelleftå to Bodø.

The Bastuträsk – Skelleftham line, The Jörn – Arvidsjaur line, and The Nordland line Saltdal - Fauske – Bodø are operating.

Brief facts: Roads

Total length: 379 km

Sweden: Skelleftå (E4) – Swedish/Norwegian border – National Road 95

Sweden: 355 km

Width: 6-9 metres, narrowest section near the border Speed limit: 90-100 km/h

Number of vehicles crossing the border per day: 220, 40 heavy vehicles

Average number of vehicles per day where traffic is at its peak:

Skelleftå 6,700

Arvidsjaur 6,400

Arjeplog 3,500

Swedish-Norwegian border – E6, National Road 77

National Road 77 24 km (140 km Swedish/Norwegian border – Bodø)

Width: 6.5-7.5 m

Speed limit: 80-90 km/h

Number of vehicles crossing the border per day: 390, 26% are heavy

Average number of vehicles per day where traffic is at its peak:

Bodø 31,000

Fauske: 10,000

Rails:

Length:

Bastuträsk-Skellefthamn 66 km electrified

Jörn – Arvidsjaur 75 km not electrified, no maintenance or traffic today Average number of passenger trains per day: 0

Average number of cargo trains per day: 0 Partly electrified

Single track

Ports

See Chapters 5.4 and 5.5

Airports

Skelleftå 225,000 passengers/year Bodø

1.6 million passengers/year

General information

Population (municipalities)

Skelleftå	72,000
Arvidsjaur	5,000
Arjeplog	3,000
Rognan	3,000
Fauske	10,000
Bodø	50,000

5.13.1 GENERAL DESCRIPTION

This route consists of both road and railway (short sections in the Swedish coastal area). It starts in Bodø and ends in Skelleftå, passing Arjeplog and Arvidsjaur municipalities.

It is an important east/west link between the Atlantic coast and the Bay of Bothnia, and also has an important role for the communities along the road. There is little cross-border traffic today, but there is a substantial potential for increase in export/import if a tunnel through the Tjernfjellet mountain is built. The current standard is quite uniform

except for this 3 km long stretch of extremely poor standard. This bottleneck makes certain transports impossible and makes heavier transports in general choose other and longer routes.

Removal of the bottleneck is now high on the national agenda in Norway and an agreement has been reached to start planning within the next four years. Some minor funds have already been made available for building the tunnel, but more funds are needed in future budgets.

There are two short railway stretches on the Swedish side. They are of minor importance and will not be described further in this document.

On the Norwegian side the Nordland line runs next to the E6. The Nordland line is the Norwegian national railway North - South. Cargo for export on the Nordland line crosses the border in Southern Norway. In the future there is also a potential for a border crossing in Central Norway if the railway here (the Meråker line) is upgraded. Such upgrading is already planned. See chapter 5.9 for more information on the Nordland line and the Meråker line.

5.13.2 INFRASTRUCTURE AND STANDARD

Road: Road: National Road 95 The road has a low geometrical standard and is narrow in some sections.

Road: Road: National Road 77 In terms of geometry, the alignment of the road is very poor, especially the section (Tjernfjellet) close to the E6. The gradient is very steep, which is combined with sharp horizontal and vertical curves. In winter, heavy vehicles face severe problems. In bad weather, drifting snow may be a problem.

5.13.3 TRAFFIC

The traffic volumes between different sections of the road vary considerably. The traffic volume is the highest towards the towns of Bodø, Skelleftå and Arvidsjaur. The lightest traffic is at the border crossing between Norway and Sweden.

It is important for commuting between Arvidsjaur and Arjeplog and between Boliden and Skelleftå. There is an international bus service between Bodø and Skelleftå that operates every day of the week. The capacity of the road is generally sufficient, but the geometrical standard varies considerably.

5.13.4 KEY CHALLENGES

- To obtain a satisfactory geometrical standard
- Measures to reduce the effect of drifting snow in bad winter weather conditions

5.13.5 PLANNED DEVELOPMENT

It is planned to develop National Road 95 the road between Skelleftå and Skellefthamn.

National Road 77: The Norwegian Transport Plan suggests construction a tunnel through Tjernfjellet in 2018 - 2023. The total cost is estimated at EUR 60 million. This will greatly improve the geometrical standard. The length of the road will be reduced by 0.8 km.

E6: The Norwegian Transport Plan suggests to improve the E6 section down the northern slope of Saltfjellet between Sørrelva and Borkamo in 2018-2023. The cost is estimated at EUR 50 million.

National Road 80:

The Norwegian Transport Plan ³² provides for the funds to the amount EUR 250 million to improve National Road 80 in 2014-2017. These funds will be mainly aimed at restructuring the road section at the entrance to Bodø into four lanes and building a tunnel. There are also many other smaller infrastructure projects around Bodø planned for forthcoming years.

5.13.6 FUTURE POTENTIAL

³² Including the "Bypakke Bodø" project with a several sources of financing.

There is little cross-border traffic today, but there is a potential for an increase, especially for freight services, if a tunnel through Tjernfjellet is built. This applies especially to transport of fish from Norway to Sweden and Europe.

It should be mentioned that the road has an important role as a supplementary connection between Southern and Northern Norway. There is a risk of emergency closures of the E6 between Fauske and Narvik for several reasons. The biggest risks are considered to be rock falls, avalanches or breakdown of bridges/tunnels.

When such emergencies occur, the Silver Road acts as the link between Southern and Northern Norway. It is a long, but still the best diversion north-south in Norway if the E6 closes in this region.

5.14. ROUTE: MURMANSK – RAJA-JOOSPEPI – IVALO

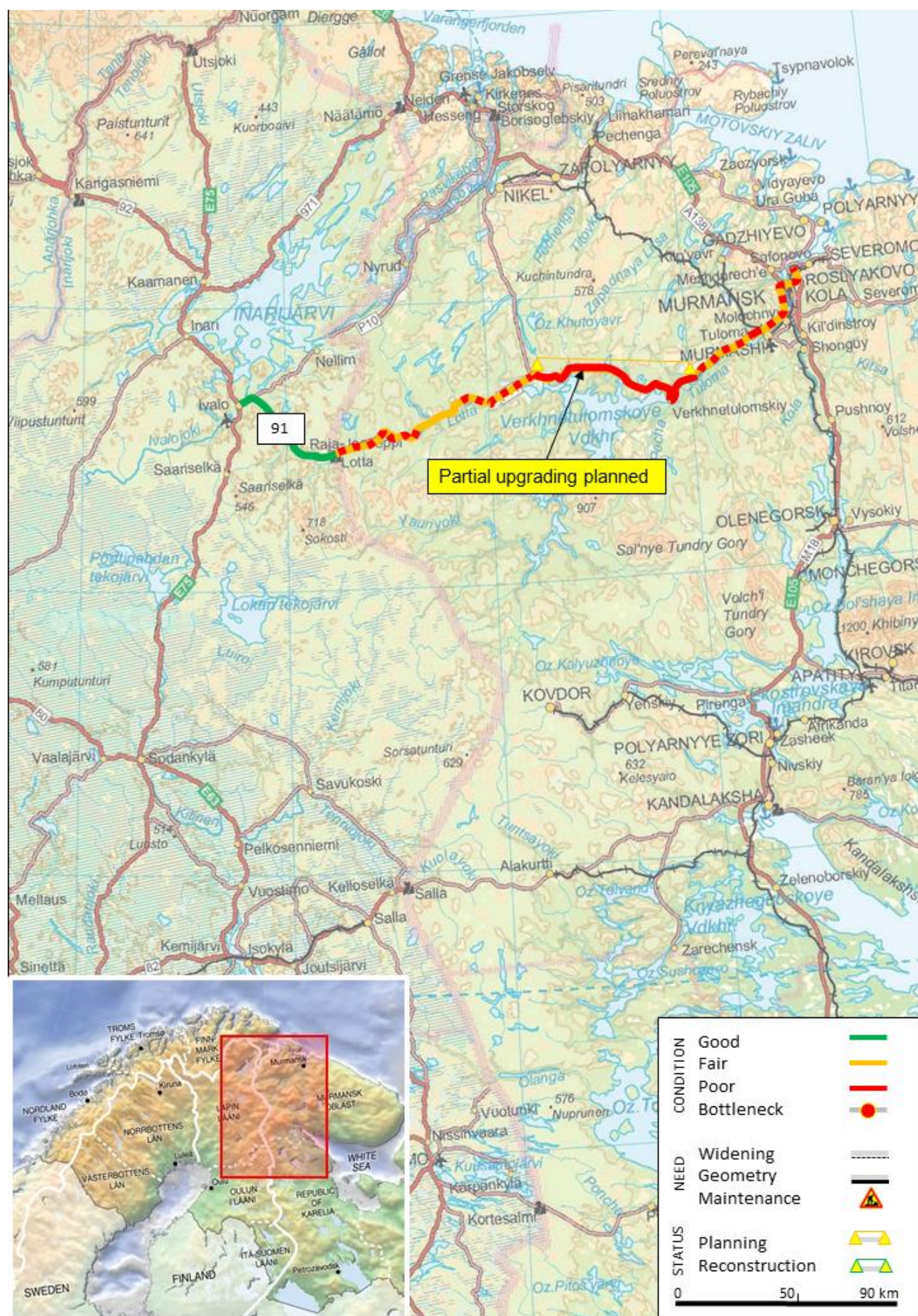


Figure 23. Murmansk – Ivalo

Consists of:

Roads:

Russia:

Regional Road “Kola” - Verkhnetulomsky -Lotta border crossing point

Finland:

National Road 91

Brief facts: Roads

Total length: 300 km (4h 45 min)

Length: 53 km in Finland and 247 km in Russia

Width (max-min): 7 m in Finland, 11–12 m in Russia

Percentage of the road with a width of 8 m or more:

Speed limit (max-min): 100–50 km/h in urban area of Ivalo and 60–110 km/h (Russia)

Number of vehicles crossing the border per day: 124 (2014)

Average number of vehicles per day where traffic is at its peak (evidently close to the main city):

Ivalo 2,600

Murmansk 6,100

Ports

See Chapter 5.4

Airports

Number of passengers per year at main airports:

Ivalo 150,000

Murmansk 751 258 (2015)

General information

Population of the cities

Ivalo 7 000

Murmansk 307 000

5.14.1 GENERAL DESCRIPTION

This road route consists of National Road 91 starting from the E75 in Ivalo and ending at the international border-crossing point of Raja-Jooseppi on the Russian border and then continuing to Murmansk.

5.14.2 INFRASTRUCTURE AND STANDARD

The road on the Finnish side is 53 km long and on the Russian side 232 km long. The pavement is 7 m wide on the Finnish side and 11 m on the Russian side. On the Russian side there are some dangerous curves.

Separate road sections on the Russian side were reconstructed in 2013. Currently, no defects have been found on the road sections reconstructed in 2013.

In 2014 some road sections were reconstructed and the full length of the road surface was paved.

5.14.3 TRAFFIC

The average daily number of border-crossing vehicles in 2012 was 153 cars and 7 trucks or buses. The number of border crossings has been growing over the last few years. The Finnish section of the road is used solely to reach the border.

The average number of vehicles per day on the Russian side is 530, 25% of which are heavy vehicles.

5.14.4 KEY CHALLENGES

The road standard in the Russian part of the Route, especially the surface of the pavement, is inadequate in many places.

5.14.5 PLANNED DEVELOPMENT

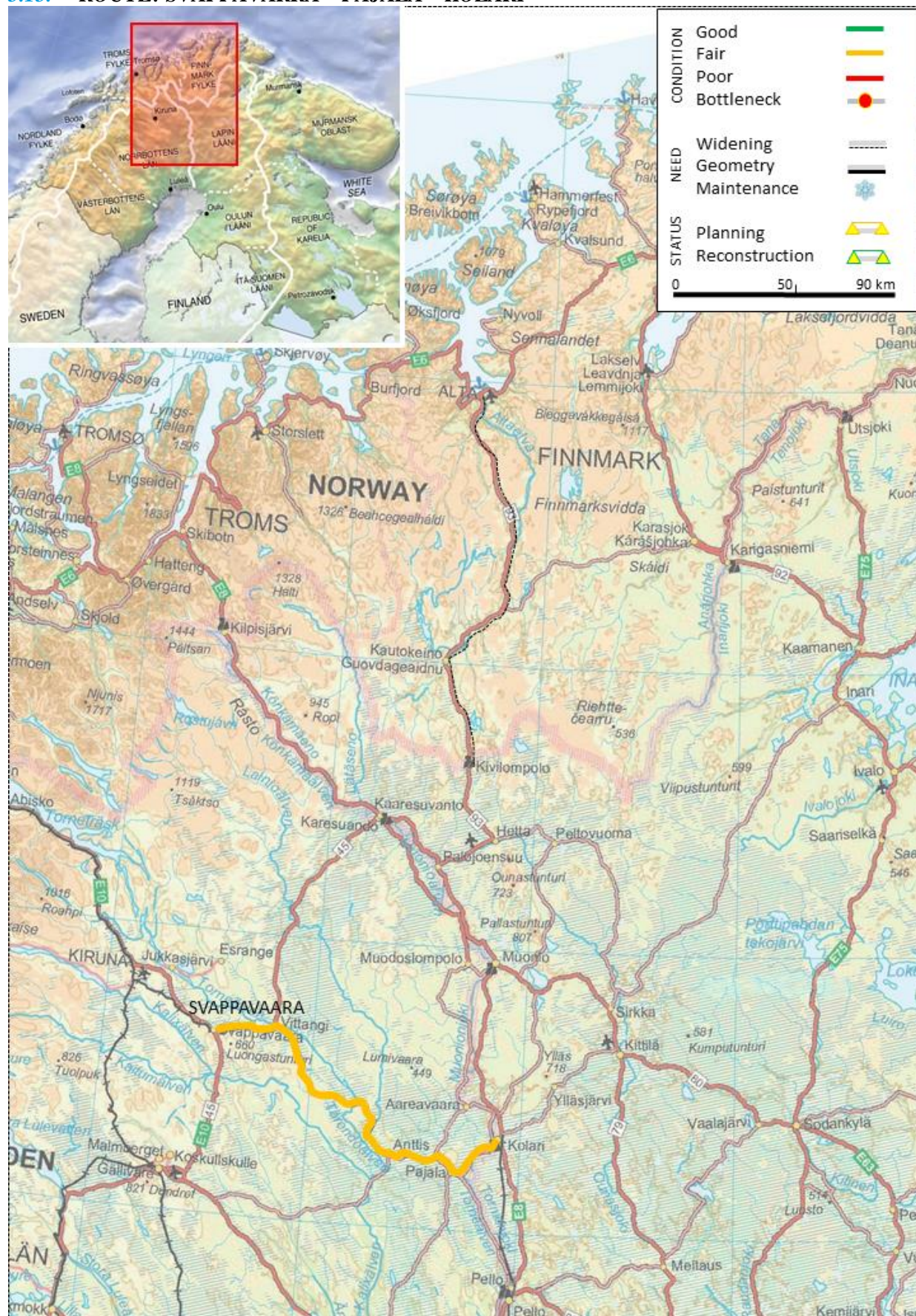
There are no plans for road investments in Finland. The border-crossing facilities at Raja-Jooseppi are planned to be upgraded within the next few years.

5.14.6 FUTURE POTENTIAL

Three other roads connecting the Murmansk Region with the neighbouring countries - one from Norway (E105) and two from Finland through the Salla and Lotta border crossing points.

The regional population seem to appreciate the advantage of having several border-crossing opportunities and this connection will stay important in the future.

5.15. ROUTE: SVAPPAVARRA – PAJALA – KOLARI



24. Svappavara – Pajala – Kolari

Figure

Consists of:

Roads: E10, E45, 395, 99

Rail: No railway exists today, but is an option in the future

Brief facts:

RoadsTotal length: 160 km

It is planned that in 2014 the volume of transportation of ore from the Pajala district (Kaunisvaara) to Svappavaara will reach 5 million tonnes. Transportation will be carried out by public roads in 90-tonne trucks at a distance of about 160 km. In Svappavaara the ore will be reloaded into cars for further transportation by the Ore Line (Malmbanan)/Ufuten line to Narvik.

In 2012-2017, the road (s) between Kaunisvaara and Svappavaara will be reconstructed in order to meet the mining industry's needs for a reliable infrastructure.

Construction of the new railway will allow to transport the ore not by road, but by rail, and thus to pave the way for the expansion of mining in the Region.

Alternatively, in the future, the new railway could link the Svappavaara-Pajala area in Sweden and Kolari in Finland to go further to the north of Finland, where several mining companies are located. It can also be connected to the Tornio-Kolari line. The length of the first section in Sweden will be 110 km.

Svappavaara is the terminus of one of the branches of the Swedish Ore line (Malmbanan).

The need to build such a railway line will depend on several factors, including the expansion of future mining operations in the Pajala/Kolari - Sodankylä - Savukoski belt, and the choice of the place of shipment of ore and minerals from the region. A recent Finnish study ³³ made an assessment of this idea, but no clear recommendations were given.

Another study³⁴carried out in Sweden, analyzed the need for infrastructure development in the Pajala area. A decision was taken in Sweden to transport the ore by road to Svappavaara, and from there by train to Narvik. Due to the development of a national plan of international transports for 2014-2025, a report was prepared in spring 2013 in Sweden, which set forth the necessary conditions for construction of the railway between Svappavaara and Kaunisvaara (a border crossing point at the Sweden/Finland border). The report shows a return on investment in railway, which will bring great benefit to industry and society. The calculations are quite rough. Sweden will continue research to determine the geographic location of the railway, analyze the costs and identify sources of funding. The current research also indicates considerable mineral resource potential of the territory between Svappavaara and Kaunisvaara and further to the north of Finland.

The Iron Ore line/The Ofoten lines have capacity problems. Currently, plans are being elaborated for development of these railways in the short and long term (see Chapter 5.2). But it would be natural to analyze the implications of this new latitudinal line as part of the long-term development plan.

The project should take into account the need for the capacity increase and hence the need for the expansion of the port in connection with the traffic increase as a result of the creation of a new railway line.

Another important aspect that requires attention in connection with the creation of a new railway line, is the choice of gauge for different railway sections, as well as the choice of location for a transshipment hub.

³³ Source: "Traffic requirements for the mining industry" (2012-2013)

³⁴ Source: Raw material and communications in the Barents Region (2012)

5.16. ROUTE: KAJAANI – PETROZAVODSK

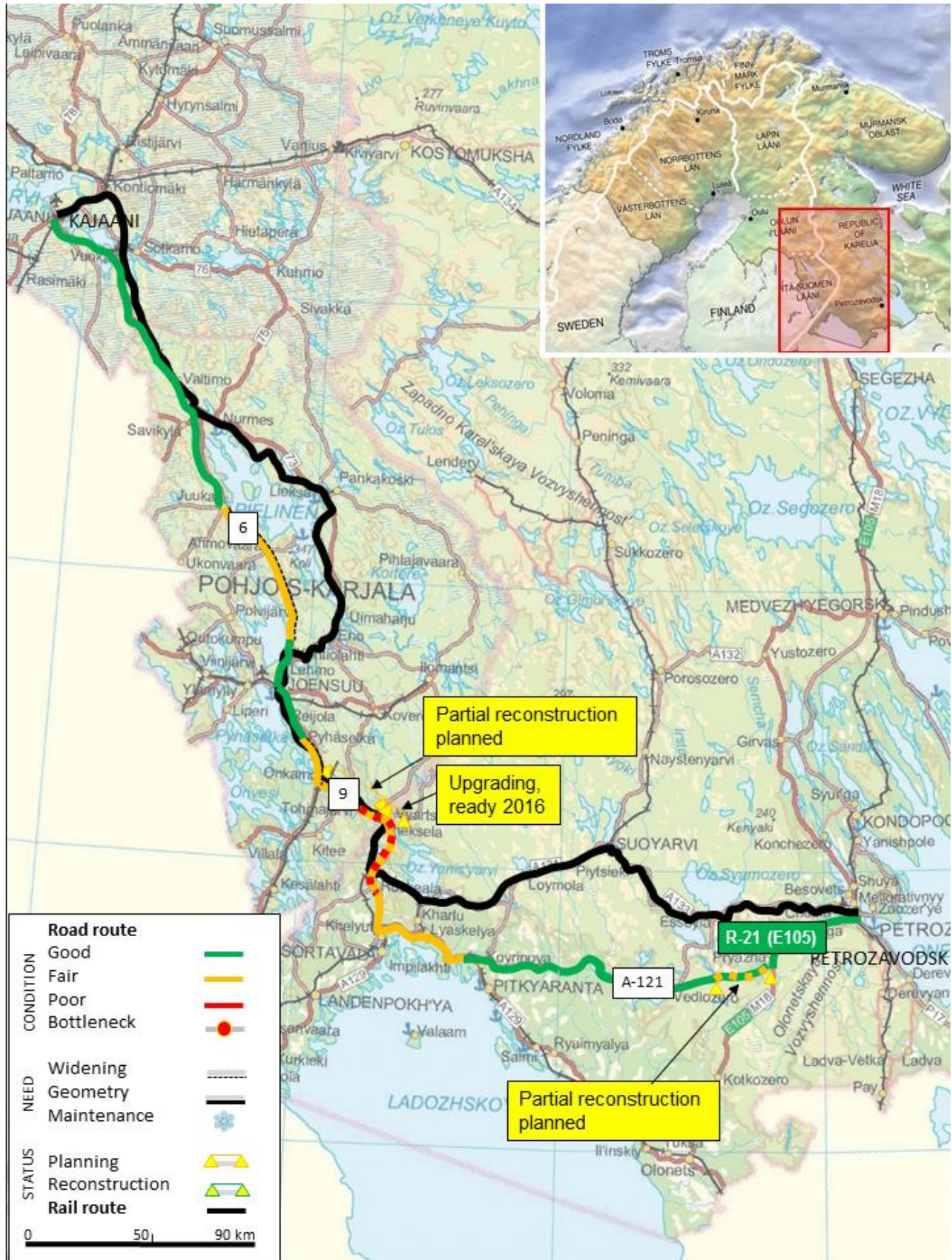


Figure 25. Kajaani - Petrozavodsk:

The province of North Karelia (Finland) is not officially part of the Barents Region, but the province of the Republic of Karelia, bordering on it, has a developed transport infrastructure, which has been taken as the basis for consideration of this route as the current transport artery by BEAC.

The Kajaani - Petrozavodsk Route is included into the Joint Barents Transport Plan on the initiative of the Finnish party on the basis of the proposal of the document “Cross-Border Traffic Corridors”, discussed at the High-Level BEATA Meeting held in Rovaniemi in 2015.

Consists of:

Roads:

Russia: National Road A-121 “Sortavala” Saint-Petersburg - Sortavala - road R-21 “Kola”, a section of National Road R-21 “Kola”, a section of the Regional Road Olonets-Värtsilä

Finland:

Rail:

The Russian section of the railway from Petrozavodsk to Värtsilä is part of the Oktyabrskaya Railway (October Railway) infrastructure - a branch of the Russian Railways, JSC.

Brief facts: Roads

Total length: 559 km

Length: 272 in Finland and 287 km in Russia

Width (max-min): .. m in Finland, 6-15 m in Russia

Speed limit (max-min): 40 km/h-90 km/h (in Russia)

Number of vehicles crossing the border per day: 2580

Average number of vehicles per day where traffic is at its peak: 20,000 Joensuu and 2600 at the border, 10,240 on the approach road to Petrozavodsk

Railway

Petrozavodsk - Värtsilä line

Passes the stations: Tomitsy, Suojärvi Yanisjarvi, Matkaselkä.

Length: 283 km

Single track

Not electrified

Mainly freight traffic.

5.16.1 GENERAL DESCRIPTION

In Russia, the Route passes through the territory of the Republic of Karelia down public National Road A-121 “Sortavala” Saint-Petersburg - Sortavala -road R-21 “Kola”, National Road R-21 “Kola” and the section of the Regional Road Olonets-Värtsilä, which is adjacent to National Road A-121 “Sortavala” and provides access to the International automobile border-crossing Point “Värtsilä”.

From Joensuu, the Route goes northwest to Kajaani and further to Oulu. At the same time, the Route goes to the west of Joensuu, Kuopio and is part of the “Blue Highway” tourist route, which continues to road E12.

5.16.2 INFRASTRUCTURE AND STANDARD

The road on the side of Finland in most places is a little too narrow, but in other aspects it is acceptable for the road traffic.

In Russia, reconstruction of road A-121 “Sortavala” from the border with Leningrad Region is under way, repair works, including major repair, are being carried out.

5.16.3 TRAFFIC

5.16.4 KEY CHALLENGES

Poor status, especially of the asphalt pavement, of the section in the Russian part of the route from National Road A-121 “Sortavala” to International Automobile Border-Crossing Point “Värtsilä” is unsatisfactory on many sections.

5.16.5 PLANNED DEVELOPMENT

Currently, Russia has prepared design documentation for continuation of the reconstruction of A-121 Sortavala road sections and construction of two sections in the direction of R-21 “Kola”. The projects envisage bringing the road parameters to technical category III with 2 lanes of traffic with a width of 3.5 m and arrangement of roadsides with a width of 2.5 m.

Also, design documentation for major repair of the road section, directly adjacent to the International automobile border-crossing Point “Värtsilä”, has been developed.

5.16.6 FUTURE POTENTIAL

In the future, Russia will consider the possibility to develop the Kajaani-Petrozavodsk Route by adding branches to Olonets and deepening the Route in the territory of Russia to Vologda.

Also in future, Russia will consider the possibility of the route Kajaani - Petrozavodsk by adding a branch from the Syväoro - Parikkala border crossing point to the Regional Road Olonets-Värtsilä after having taken a positive decision on the reconstruction of the Syväoro simplified border crossing point and having given it a status of an international automobile border-crossing point.

5.17. ROUTES IN THE AIR: EAST-WEST FLIGHT SERVICES IN BARENTS

5.17.1 INTRODUCTION



Figure 26. Air transport network

The distances between the cities in the Barents Region are long. Therefore air transport has an important role to play in passenger transport within the Region. However, due to economic reasons, the air traffic system has a strong north-south structure in all countries. As the map below shows (Figure 26), air passengers between the northern parts of Norway, Sweden, Finland and Russia normally have to take a route through two capitals in the south to reach their destinations in the north. This means two-stop connection flights and long travel times.

Better east-west flight connections in the Barents Region could substantially improve the communications for passengers between the main agglomerations in the Region. This could contribute to a positive development for trade and industry, and support tourism and cultural exchange in the whole Region. There have been attempts to improve the east-west flight connections, but these attempts and previous studies³⁵ on air transport in the Barents Region have shown that there are a number of challenges connected with air transport in the Region. Low population density and low demand for cross-border flights have resulted in low air-traffic flows. This has caused both financial and operational challenges for the airline companies which have been forced to reduce their air services. On the other hand, the lack of choice of air services has a negative influence on the number of passengers, thus creating a negative spiral.

There are other barriers hampering the development of Barents cross-border aviation³⁶. A kind of Public Service Obligation (PSO) may be necessary to incentivize new flight services which are not initially profitable. The use of such PSOs is governed by EU-regulation 1008/2008³⁷. This regulation needs to be further analysed regarding possibilities for cross-border flights both between the EU/EEA countries and between them and Russia.

³⁵ STBR (Sustainable Transport in the Barents Region) 2003-2007 aviation project, Inregia AB and WSP Civils (Sweden), TØI (Norway), LT Consultants (Finland), and RDIRDT (Russia)

³⁶ Source: STBR publications 10/2005: Barents Regional Aviation

³⁷ Source: Regulation (EC) No 1008/2008 of the European Parliament and of the Council

Russia and the Nordic countries do not always have the same approach to international technical standards for safety, security, environmental performance etc. An example of this is the problem of de-icing procedures for the former Kirkenes - Murmansk route. Finally, international flights to and from Russia are regulated by bilateral agreements. If new agreements are needed, the negotiation could take time. However, the existing bilateral agreements, signed in 1956, are currently under re-negotiation between Norway and Russia, and Sweden and Russia.

In 2013 Avinor AS, the Norwegian National Airport Company, initiated a re-evaluation of cross-border flights within the Barents Region³⁸. The study shows that overall the socio-economic development in the Barents Region has been positive, but there are still large disparities between the Nordic countries and Russia, especially in terms of disposable income. The positive socio-economic development indicates that there can be an increased demand for cross-border flights. Interviews with major players in the Region may shed more light on potential demand and factors influencing the demand. On a general basis, the most important factors determining demand for air transport are ticket price, frequency of departures, total travel time and connections to/from the airport.

Based on the previous studies and on recent developments, the studies were focused on both cross-border air routes between the Nordic countries and Russia, and routes to connect the Atlantic Coast with the Northern Gulf of Bothnia.

5.17.2 AIR SERVICES CONNECTING RUSSIA WITH THE NORDIC COUNTRIES

The following routes have been looked into:

- Arkhangelsk – Murmansk – Tromsø
- Murmansk – Kirkenes
- Murmansk/Arkhangelsk – the Northern Gulf of Bothnia

Arkhangelsk – Murmansk – Tromsø

One of the most promising of airlines is Tromsø - Murmansk - Arkhangelsk. Starting from 2014, the designated carrier is the Pskovavia airline.

This route was operated from 1996, but from October 2014 the flights were cancelled due to their poor profitability and low passenger traffic. From 2012 to 2014, more than 11 thousand people were transported along the route Tromsø - Murmansk and back.

The Russian Federation is considering the possibility to subsidize a part of the route.

The flight frequency before 2009 was three times a week, but since 2009 there have only been two flights a week. The reduction in frequency has reduced the load factor to slightly above 50%. The study concludes that frequency should be at least three times a week to improve performance of the route. Utilization of modern aircraft could further improve performance. Another conclusion is that connections between Murmansk/Arkhangelsk and the cities of Bodø, Alta, Harstad and Narvik via Tromsø can be improved through combinability of air fares between existing flights. The possibility for interline agreements and transfer fares depends on the policies of the airlines involved. If the demand for connection flights to/from Bodø proves sufficient, the next step may be to consider a direct flight from Bodø.

Murmansk – Kirkenes

This route was operated by Widerøe for about a year in 2007/2008. Few passengers and problems with different EU and Russian standards for de-icing procedures forced Widerøe to close the service. Airlines believe that a possible restart of the route depends on the Shtokman project development which will increase the demand for full-fare tickets as the market today is mainly formed by price-sensitive leisure passengers. Another factor is that the road connection has improved considerably since 2007, thus making road transport a more attractive choice. The driving distance is 230 kilometres. The Avinor study points to the possibility of making this route part of a routing continuing to the Northern Gulf of Bothnia.

Murmansk/Arkhangelsk – the Northern Gulf of Bothnia

³⁸ Source: Frank Neumann, Aviation Consultant, Re-Evaluation of Cross-Border Flights within the Barents-Euro-Arctic Transport Area (BEATA), April 2013

The Luleå – Rovaniemi – Murmansk – Arkhangelsk route was operated by Nordavia between 1996 and 2005. The route closed due to low demand and financial losses. The Avinor study concludes that there should be a possibility for a flight service between the large agglomerations both in Murmansk/Arkhangelsk and Luleå/Oulu/Rovaniemi. Oulu is the biggest Nordic city in the Barents Region with almost 200,000 residents. However, a multi-leg flight service including Luleå, Oulu and Rovaniemi is not viable operationally. Therefore the study analyzes the possibility of using Kemi-Tornio airport as a geographical focal point for Luleå, Oulu and Rovaniemi. 500,000 people within 2-hour travel from Kemi Airport. With such a solution the total travel time between Oulu and Murmansk will be 3 hours 45 minutes, compared with more than 11-hour flight today via Helsinki and Moscow or 10 hours by car. The total travel time between Luleå and Murmansk will be 5 hours, compared with more than 17-hour flight today via Stockholm and Moscow or 10.5 hours by car.

Scenarios created in the Avinor study show that it is possible to operate the Kemi – Murmansk line without subsidies, but subsidies are probably necessary initially to launch a new flight service. Another interesting scenario is to extend this route to Kirkenes and operate it using aircraft based in Kirkenes.

There are also some other obstacles to overcome before these solutions can be a reality. Kemi must be accepted in Luleå, Oulu and Rovaniemi as the hub airport, and there must be an efficient and cheap surface transport to the airport. There is also a need for negotiation with Russia over traffic rights.

5.17.3 AIR SERVICES CONNECTING THE ATLANTIC COAST WITH THE NORTHERN GULF OF BOTHNIA

Tromsø – Luleå – Oulu

In January, 2015 flights on the route Tromsø – Luleå – Oulu were launched.

The Avinor study concludes that it could be an option to operate this route with a larger capacity than was used between Tromsø and Luleå. More aggressive pricing could stimulate demand.

A flight schedule providing connectivity and combinability in Tromsø to flights to Bodø, Harstad, Narvik and Alta could attract additional passengers. There could also be a connection in Luleå to existing flights to Kiruna and Gällivare.

The study also considered the following routes:

Tromsø – Kiruna – Luleå

This route was operated three times a week by Barents AirLink in 2004-2008 and received EU subsidies for about two years. Due to low demand the route never made a profit. The Avinor study concludes that it appears difficult to establish a profitable operation for this route.

Tromsø – Murmansk – Kemi

A flight between Murmansk and Kemi would offer a one-stop connection to the Northern Gulf of Bothnia Region, but due to longer surface travel time from Kemi there would be almost no travel gain compared to a two-stop flight connection via Oslo and Stockholm. For this reason the study does not recommend this flight service.

Tromsø – Kemi

A flight between Tromsø and Kemi would offer a nonstop connection to the Northern Gulf of Bothnia Region. Due to the longer time of surface travel for passengers from Oulu, Rovaniemi and Luleå, the overall gain in time compared with the flight with two changes through Oslo and Stockholm will be less significant in comparison to the potential gain on the Kemi-Murmansk section (gain in time for a flight to Tromsø is 3 hours, and flight to Murmansk - at least 7 hours). For that reason the acceptance of Kemi as a point of departure and destination for this routing is expected to be lower and would require further evaluation.

5.17.4 EAST-WEST FLIGHT CONNECTIONS CONCLUSIONS AND RECOMMENDATIONS

The experts make the following conclusions and recommendations regarding flight connections in the Barents Region:

- Improving East-West air traffic in the Barents Region can considerably facilitate transportation of passengers between the main agglomerations in the Region. It can promote the development of trade, industry, tourism and cultural exchange in the entire Region.
- Responsibility for the offer of the air transport services rests with the market economy and airlines. However, public authorities should promote the establishment of new air routes:
 - Within the EU/EEA the market is free for carriers to establish new connections on economic grounds that they find feasible. International flights to and from Russia are regulated by bilateral agreements. In case of initiatives for new flight routes are dependent on new bilateral agreements, the public authorities should undertake the necessary negotiations.
 - Governmental subsidies may be necessary to incentivize new air connections at the outset. The European Community has guidelines on financing of airports and start-up aid to airlines³⁹. The European Commission has recently published a draft of new EU guidelines on state aid to airports and airlines. Therefore, there is a need to further analyze the possibilities of providing start-up aid and if that aid is not sufficient, the possibility of providing continual aid.

Therefore further analyses of the possible public service obligations for international flights should be carried out.

- If resumed, the Tromsø – Murmansk – Arkhangelsk route has a potential for more frequent traffic especially if the fare combinability can be improved to provide good connections with Bodø, Harstad/Narvik and Alta. Therefore relevant stakeholders should try to influence the airline companies concerned to change their policy and pave the way for fare combinability.
- The Avinor study concludes that there are advantages in establishing Kemi as a joint airport for flight connections between Russia and Luleå, Oulu and Rovaniemi. In this context, the authorities and other stakeholders in Sweden and Finland should conduct a further analysis in order to create a basis for open discussion of possible solutions.

At the same time, Kemi Airport is not included in the Table of Routes of International Flights between the Russian Federation and the Republic of Finland and the Russian Ministry of Transport has not received any applications from airlines for the use of this hub airport so far.

It is essential that the relevant authorities in Norway, Sweden, Finland and Russia maintain a continuous dialogue with relevant airline companies about the development of flight connections in the Barents Region. Implementation of new initiatives is impossible without close cooperation between state and local public authorities and the airlines.

³⁹ Application of Articles 92 and 93 of the EC Treaty and Article 61 of the EEA Agreement to State aids in the aviation sector. OJ C 350, 10. 12. 1994, p. 5 and Community guidelines on financing of airports and start-up aid to airlines departing from regional airports.

6. INTERRELATION BETWEEN TRANSPORT AND TOURISM IN BARENTS REGION

The modern tourism is one of the most important spheres of human activities support. For a number of Arctic countries and regions, tourism is an important part of economy and its development is an effective way to diversify the economy of depressed areas.

The whole Barents Region has rich and untapped resources for the tourism development. Northern Lights, the midnight sun in summer, the Arctic climate and wildlife are just some of the spectacular beauties of the Barents Region, which attract tourists. Cultural, educational, environmental, marine, cruise and expeditionary types of tourism are listed among the priority areas.

Tourists and tour operators are interested in new directions. The North arouses interest because it is different from everything else, full of exotica. Tourists are attracted by the snow and ice, wilderness, and special arctic nature with all its phenomena and leisure activities. Popular products in the Nordic countries are ice hotels, islands, wildlife, undeveloped areas, indigenous peoples, the Arctic Coast and coastal culture, skiing, ski resorts, kayaks, sea, river and lake fishing, Arctic expeditions, snowmobiling, hiking, etc. Winter tourism is gaining popularity in the Barents Region.

The number of tourists wishing to visit the Arctic Region is growing annually in the world market. According to research conducted by the World Wildlife Fund (WWF), over 90% of tourist traffic in the Arctic come from Northern Europe. The analysis of the objective prerequisites and trends in the world tourism development allows us to forecast: Arctic tourism has every chance to become a large sector of the economy of the Russian North regions, comparable in scale with the industry and transport. In this regard, it must be emphasized that the development of tourism in the Northern territories should be sustainable and ensure preservation of the unique nature and the interests of the peoples living in this territory.

Obvious as its potential may be, the Arctic Region is insufficiently used by tourists. The main deterrents are as follows: limited access to transportation, special climatic conditions, seasonality of tourist offers, the low level of tourist infrastructure.

The Barents Region has a significant potential for the development of the northern areas and extending humanitarian and cultural ties between residents of the Region in the field of tourism.

The Russian Federation was the Chairman of the BEAC Working Group on Tourism for several years. The Working Group on Tourism helps to attract the world's attention to the Barents/Euro-Arctic Region, promote economic activity in the Region by increasing the tourist flow, provide assistance in business development, grow employment in the tourism sector, develop cross-border tourist routes; it helps to unite the information and tourist space under the common brand and develop joint tourist routes.

The main tourist sites in the Barents Region are:

Norway

As a positive example of the tourism development in the high-latitude Arctic region, **the Archipelago of Svalbard** can be mentioned. The Norwegian archipelago hotels register about 100,000 of guests. The annual growth of this indicator is about 10%. 75% from the total number of tourists visiting Svalbard are Norwegians.

Fairly well-known are fjords of Northern Norway, the Lofoten Islands. Finnmark (Norway) is very popular in the summer due to the North Cape and cruises on the "Hurtigruten"

Russian Federation

The Northern Russian territory has a unique cultural and tourist sites to visit: the objects of cultural heritage, historical monuments, architecture, nature, archeology, museums, theaters, concert halls, theaters, objects for active, extreme and eco-tourism.

Only the Arkhangelsk Region counts more than 4,350 tourist sites.



Figure 27. Route map of tourist sites in the Arkhangelsk Region

One of the unique objects is the **National Conservation Park “Yugyd Va”**, located on the territory of the Republic of Komi. It is special due to the fact, that it is the largest natural area of protection of Russia. Several recreational centres are located on the territory of the Park. One can get to this area by rail to the town of Inta, where it is necessary to order a transfer before boarding an all-terrain vehicle or a helicopter.

The **National Park “Russian Arctic”** is one of the youngest and the second largest Arctic area of special protection in Russia. One of the main ways to get to the Park are Arctic liner cruises departing from the city of Murmansk and the Archipelago of Svalbard and calling at the Franz Josef Land.

In 2015, a marine checkpoint across the border of the Russian Federation was opened in a test mode on a remote section of the port of Arkhangelsk (the water area of Severnaya Bay at the Alexandra Land of the Franz Josef Land archipelago), which created an opportunity for the implementation of direct routes Svalbard (Longyearbyen) - Franz Joseph Land. Great interest was shown by foreign shipping companies. In 2016, the National Park “Russian Arctic” has received 5 applications for cruises, including a direct voyage between Norway and Russia. Of these, 3 are connected with the voyage along the Northern Sea Route (approximate route - Anchorage - Anadyr - Chukotka - Wrangel Island - New Siberian Islands - Severnaya Zemlya - Novaya Zemlya - Franz Josef Land- Longyearbyen (Norway)). According to the Ministry of Culture of the Arkhangelsk Region, the demand for the National Park “Russian Arctic” is growing, despite the relatively high cost of trip tickets (about EUR 1,200-1,500).

The Solovetsky archipelago (Solovki), located in the Onega Bay of the White Sea, 164 kilometers from the Polar Circle line, is of exceptional interest both for the Russians and foreigners. The only possible way to get to Solovki in winter is by air from Arkhangelsk. In summer, one can use a steamer, going through the towns of Kem and Belomorsk. In future, the Norway - Murmansk - Kem (Belomorsk) - Solovki route can be opened.

“The Murmansk Region is the northernmost region of the European part of Russia, whose whole area is included in the Arctic Zone of the Russian Federation. The Kola Peninsula, most of which is located above the Arctic Circle, is one of the few corners of the Earth that have preserved its original beauty: it is the territory of harsh and cold coastal cliffs, the vast tundra and the Europe’s northernmost pristine forests.

The Port of Murmansk is the northernmost ice-free port of Russia. The number of calls at the port of Murmansk is growing, so in 2015, during the summer navigation period, 13 cruise ships with 10 thousands passengers on board called at the port.

A **sea cruise** to the **North Pole** on an atomic icebreaker is possible only from Murmansk. Every year, the most powerful atomic icebreaker in the world “50 Let Pobedy” (50th Anniversary of Victory) performs at least four flights to the North Pole from the Port of Murmansk.

10 ski resorts of varying complexity are functioning in the Murmansk Region. Today, the main **centre for ski tourism is the city of Kirovsk**. It is visited annually by 40,000 tourists. In 2014, a new modern gondola-chair lift was launched on the eve of the new ski season.

Thanks to this project, already on the New Year holidays 2014-2015, the increase of the tourists flow in the resort was 30 -50% up compared with the previous year. Khibiny Airport (Apatity) is 20 km from Kirovsk; its passenger traffic in 2015 amounted to 38,870 passengers (in 2012 - 8,316 people) (currently it does not have the status of an international airport).

“Blue Highway” (Fin. Sininen tie, Swed. Blå vägen, Norw. Blå vegen) is an international tourist route with a length of more than 2,000 kilometers, linking Norway, Sweden, Finland and Russia.

The route runs along the banks of the rivers and lakes of historic waterways and starts from the Atlantic coast of Norway (Mo i Rana), passes through the territory of Sweden, Finland, Russia and ends in Pudozh (Karelia, Russia).

In Russia, the route runs through the territory of the Republic of Karelia from west to east, in the latitudinal direction - from the Finnish border (Border Crossing Point Värtsilä) to the border with the Arkhangelsk Region (Pudozh Municipal District). This is the territory of Sortavala, Pitkäranta, Suojärvi, Olonets National, Pryazha National, Prionezhye, Kondopoga, Medvezhiegorsk and Pudozh Municipal Districts.

The project helped to develop a tourist route from Scandinavia through Karelia to the Arkhangelsk Region, aimed at cultural and historical sights of Karelia.

The **“Silver Necklace of Russia”** is the inter-regional tourist project, consisting of a set of routes that combine historical cities, regional centres, large settlements of North-West Russia, which preserved the unique historical and cultural monuments and natural sites, including those from the UNESCO World Heritage list. The “Silver Necklace of Russia” covers 11 constituent entities of the North-West Federal District of the Russian Federation, including 5 constituent entities, entering the Barents Region. In drawing up the scheme of routes different modes of transport (air, car, rail, water, etc.) are used.



Figure 28. Map of the “Silver Necklace of Russia” inter-regional tourist project

Name of the direction and objects of the “Silver Necklace of Russia” project in the Barents Region

“The Great Russian Northern Way”

Syktvykar - Inta - Vorkuta - Pym-Ba-Shor; Arkhangelsk - Murmansk - Zaonezhye - Medvezhyegorsk - Medvezhyegorsk - Shunga - Tolvuya (the homeland of Zosima Solovetsky), Velikaya Guba - Kizhi - Povenets - Chelmuzy (the Church of the Epiphany, a place of exile of nun Martha (Duchess Romanova - the mother of the future tsar Michael) - Pyalma.

“The Cities of Peter the Great”

Petrozavodsk - Arkhangelsk

“Journey to Ancient Rus”

Olonets - Syktvykar - Pustozersk

“Outposts of Russia”:

Olonets - Pogrankondushi - Kolatselga - Kinerma - Kem - Murmansk - Arkhangelsk - Pustozersk

“Journey to holy places”:

The Republic of Karelia (Murom Monastery, Iliinskaya Volozerskaya Pustyn) - Arkhangelsk Region (Solovki Islands).

General scheme of the direction



Vologda - Veliky Ustyug - Syktvykar
Syktvykar - Inta - Vorkuta - Pym-Ba Shor
Arkhangelsk - Murmansk - Zaonezhye - Pudozh - Vologda



St. Petersburg - Shlisselburg - Novaya Ladoga -
Lodeynoye Pole - St. Petersburg - Petrozavodsk -
Arkhangelsk - Vologda - Totma



Veliky Novgorod - Izborsk - Staraya Ladoga -
St. Petersburg - Olonets - Belozersk - Kirillov



Kaliningrad - St. Petersburg - Vyborg - Priozersk - Shlisselburg - Staraya Ladoga -
Saint-Petersburg - Olonets - Kem - Murmansk - Arkhangelsk - Vologda -
Pskov - Veliky Novgorod
Izborsk - Pskov - Ivangorod - Koporye - Saint-Petersburg - Vyborg - Priozersk -
the Republic of Karelia (along the Russian border)



St. Petersburg - Pskov - Veliky Novgorod - Tikhvin - Vologda -
Pudozh (The Murom Monastery) - Valaam -
the Solovki Islands (Arkhangelsk Region)
St. Petersburg - Novaya Ladoga - Staraya Ladoga - Tikhvin - Belozersk -
Kirillov - Vologda - Totma - Veliky Ustyug

“Living water of the North-West of Russia”:

Petrozavodsk - Kizhi - Kem - Solovki islands; Arkhangelsk - Onega - Sumposad - Virma - Belomorsk - Kem - Gridino - Umba - Varzuga (Pomor villages of the White Sea; the Pomors is local term, which became universal for industrialists of Arkhangelsk, Mezen, Onega, Kem and Kola counties of the Arkhangelsk province, engaged in fishery (mainly cod), halibut, partly shark hunting in Murman Bay); Yarensk - Syktyvkar - Vorkuta - Pym-Ba-Shor (radon hot springs)

“The northern ports of Russia”:

Belomorsk - Kem - Kandalaksha - Murmansk - Arkhangelsk - Naryan-Mar (Pechora port) - Amderma

“Wooden architecture”

The Republic of Karelia (Museum-Reserve Kizhi), Arkhangelsk Region (Museum of Wooden Architecture “Small Karelians”) - Murmansk (Varzuga, Terek District)

“Indigenous peoples of the Silver Necklace of Russia”:

The Republic of Karelia (Prionezhye Region, Sheltozero (ancient Vepsian settlements); Pryazha District; Lahdenpohja District) - Murmansk Region (the Pomors, Terek District, Sami, Lovozero District), the Nenets Autonomous District (village Krasnoe, agricultural production cooperative SPK “KHARP”)

“Ghost Towns of the North”:

Korzunovo (Murmansk Region) - Halmer-Yu (Republic of Komi) - Amderma (Nenets Autonomous District). The programme includes the vanished cities (towns etc.) of the Russian North.

Table 5. Inter-regional directions within the historical, cultural and tourist project “Silver Necklace Russia” in the Barents Region

Finland:

Finnish Lapland specializes in winter tourism.

Positive changes since 2009 in the number of border crossings to/from the Russian territory in the Barents Region⁴⁰ are accounted for by the increase in the number of tourists in addition to the increase in passenger and freight traffic. This assumption is supported by data from studies such as studies on the influence of the tourist flow from Russia to Finland. This study shows that about 350,000 Russian tourists spend in Finnish Lapland about EUR 600-700 million annually. The influence of Russian tourism on Northern Norway and Northern Sweden seems to be more moderate, but is growing rapidly.



⁴⁰ Martti Hahl, Economic Cooperation in the Barents Region 2003-2012

Sweden:

It is advisable to organize international transports taking into account, in particular, cross-border routes specified in Chapter 5 of this document.

Improved accessibility and efficient transportation infrastructure are two key preconditions for the development of tourism in the Barents Region. Although the state of transport infrastructure has achieved a certain level, there is still a lot of room for improvement.

A recently published report, the “Barents Tourism Action Plan”, emphasized some main issues to improve. Among the most important challenges and development needs is the lack of high-quality air connections in an east-west direction. The Barents Joint Working Group on Tourism has raised the issue of developing the east-west flight connections as the most important development challenge. Better east-west connections would improve tourism in the whole region by enabling better cooperation and building joint tourism products. With good air connections, the Barents Region would become an even more attractive destination for international tourists. Combining together the tourism products from several countries through east-west flight connections would attract new customer segments, especially from Asia.

The transport costs in the Barents Region are high and road conditions vary considerably within the Barents area. Infrastructure needs improvement, especially in the Russian municipalities. There is a lack of rest areas, petrol stations and other roadside facilities along many of the roads, and very few are considered as meeting the needs of travellers with physical limitations and disabilities.

To boost the development of tourism between Russian and the Nordic countries, the visa regime between Russia and the Schengen area of the Barents Regions should be simplified.

There are common interests in developing the tourism industry in the Barents Region. In this context it is important to maintain and intensify bilateral and multilateral frameworks for business cooperation at the regional level.

The competent authorities of the Barents countries will seek to develop the transport routes to increase the accessibility of tourist sites.

The development of tourism will ensure the accessibility of the regions, development of humanitarian and cultural ties between the inhabitants of the Barents Region and an increase in the flow of tourists to the Barents Region.

7. IDENTIFYING POSSIBLE MEASURES

This chapter presents possible measures discussed by the experts. The next chapter will present the actual proposals of the experts.

7.1. MEASURES IN ACCORDANCE WITH MAIN OBJECTIVE

In Chapter 2 a joint strategic objective of the Joint Barents Transport Plan is formulated, based on the national objectives in each country:

Finland, Norway, Russia and Sweden have the ambition to develop an efficient transport system in the Barents Region with good internal connectivity between the Barents countries and with good external links to world markets. The transport system should facilitate the Barents regional development and create new opportunities for the key industries. The development of the transport system should take into account protection of the environment and improving safety and accessibility for all.

This objective can to be achieved by different measures. The next chapter is dedicated to the analysis of these measures in accordance with the four-stage principle.

Step 1: Measures which affect the demand for transport and the choice of modes of transport.

Step 2: Measures that provide more efficient utilization of the existing transport network.

Step 3: Improvement of infrastructure.

Step 4: New investment and major rebuilding measures.

7.2. ANALYSIS OF ADVISORY MEASURES IN ACCORDANCE WITH THE FOUR-STAGE PRINCIPLE

The mandate of the Expert Group, which worked during the Norwegian chairmanship in BEAC, requires advisory measures in the Barents Region to be analyzed in accordance with the four-stage principle. This principle is in use in Finland, Sweden and Norway and should be seen as a general approach to the analysis of advisory measures related to the transport system. The principle has been in active use for 10-15 years. It was initially mainly a tool to stimulate increased use of information technology in transport and to focus on the fact that infrastructure is occupying an increasing share of unspoilt nature. The principle has over time developed into a planning principle for general management of resources and reducing the negative effects of the transport system.

The principle is designed to handle all modes of transport, but has so far primarily been used when dealing with deficiencies and problems within the road transport system. The basic idea is that advisory measures, not providing for the building of a new infrastructure, can be sufficient to handle present or future transport demands.

The four steps involve analysis of measures in the following order⁴¹:

Step 1: Measures which affect the demand for transport and the choice of modes of transport

This step covers planning, control, regulation in the transport sphere taking into account social needs in general and development of safer and more environmentally friendly means of conveyance.

Step 2: Measures that provide more efficient utilization of the existing transport network

This step covers planning, control, regulation measures in the transport sphere, directed towards various components of the transport system, in order to use the existing infrastructure more efficiently, more safely and in a more environmentally friendly way.

Step 3: Improvement of infrastructure

This step covers improvement measures and rebuilding of existing segments, for example traffic safety measures or load-bearing capacity measures.

⁴¹ Source: Publication 2002:72 of the Swedish National Road Administration

Step 4: New investment and major rebuilding measures

The step covers rebuilding and new building measures, which often demand new land, for example new segments of road.

The four-stage principle means first considering whether one can fully or partly attain one or more of the objectives with the help of the measures in step one. After that, measures in step two are considered, etc. When all the steps for relevant transport modes have been analyzed, the measures are weighed up and prioritized with various timelines, taking into account cost-effectiveness and long-term sustainability.

Even if a measure is found which partly fulfils the objectives, there may be measures at a later stage that address all the issues or which are more cost-effective, and therefore are more preferable in terms of all the factors. Due to budget restrictions and other priorities, they may still not be possible to implement in the short term. All steps should consequently be analyzed if it is not obvious that the goals are attained in a cost-efficient manner that is sustainable in the long term. Measures in the various steps should not be seen as alternatives, but they can complement one another. The result may therefore be a combination of measures from the different steps.

7.3. ADVISORY MEASURES IN ACCORDANCE WITH THE FOUR-STAGE PRINCIPLE IN BEAC

The experts have discussed the following examples of measures or categories of measures as a basis for their proposals presented in Chapter 8:

7.3.1. Step 1: Measures which affect the demand for transport and the choice of modes of transport

Measures in this category are typically spatial planning measures, measures related to improving efficiency of logistical systems (for instance systems that improve cargo balance and the filling rate of cargo on trucks), measures to increase the intermodality of different transport modes, measures to reduce the need for travel (such as easy access to information technology for video meetings etc.), measures related to taxes (road taxes, port taxes). The above measures are primarily those which are possible to implement on a national level. No measures are identified in this category for the Barents Region by the experts. (One might think that prioritizing development of sea and rail transport over development of road and air transport is a step 1 measure because this can effect the choice of measures. However, since such development is either improvement, major rebuilding or new investments, they are not step 1 actions in the opinion of the experts.)

The coming Sulphur Emission Control Area (SECA) regulations will be a measure that can affect the choice of modes of transport, but this is initiated by the International Maritime Organization (IMO), not by the BEATA experts.

7.3.2. Step 2: Measures that provide more efficient utilization of the existing transport network

This step also considers air transport. Therefore the following measures are advised in step 2:

Rail transport

- Increased capacity on railways and synchronized and harmonized plans for railway development in designated corridors.
- Common technical standards for rail transport including a solution to the challenge of different gauge in Finland and Sweden. Several solutions have already been tried and rejected, ⁴²but the work continues in order to find an efficient way to solve this technical problem.
- A harmonized and common operational and maintenance standard on railways
- Implementation of ERTMS/ETCS⁴³ in the railway system

Sea transport

- Measures to increase safety at sea

⁴² The Swedish Transport Agency is investigating into the issue

⁴³ European Rail Traffic Management System/European Train Control System are standardized systems for signalling, control and train protection to enhance cross-border interoperability. ETCS is actually a component of ERTMS.

- More efficient administrative routines and customs clearance at ports
- Measures that facilitate new passenger and cargo services by sea between Russia and Norway in the Barents Region, e.g. efficient procedures in ports and modern facilities for passengers (terminals), waste handling etc.

Road transport (see more details in next subchapter on possible road measures)

- Prolongation of bilateral agreements on traffic safety
- Making information on road conditions and road weather in the Barents Region more easily accessible to tourists and cargo carriers by taking such measures as the increased sharing of such information between the countries, increasing mobile phone coverage along the roads and for instance producing a mobile application which allows to obtain updated information on Barents roads. The development of Intelligent Transport Systems (ITS) and Accident Emergency Response Systems is important and efforts should be made to take advantage of this technology in the Barents Region. Increasing the use of GPS/GLONASS opportunities.
- Increasing the number of rest areas along the roads for both heavy goods vehicles and tourists.

Aviation

- Improvement of flight connections in the Barents Region

All modes of transport

- Measures to increase accessibility for the disabled, children and the elderly
- More efficient administrative routines, visa procedures and customs clearance at borders
- Environmental measures

7.3.3. Step 3: Improvement measures

The experts have proposed to consider the following measures in step 3:

- Increased bearing capacity of the road network
- Synchronized and harmonized border roads development plans
- Traffic safety measures
- Measures at prioritized airports to increase the possibilities for air cargo and to meet demands for international passenger transport
- Development of prioritized ports with modern facilities and investments in increasing the fairway depth for larger vessels

7.3.4. Step 4: New investments and major rebuilding measures

This step consists mainly of large railway investments. The experts have discussed a few large railway projects. If such projects were to be realized they would be step 4 measures.

7.4. MORE DETAILED ANALYSIS OF POSSIBLE MEASURES FOR ROAD TRANSPORT

This subchapter gives an overview of facts about different standards for road transport in different countries.

7.4.1. FACTS ON THRESHOLD VALUES FOR VEHICLES

The following maximum threshold values apply to vehicles in different countries:

	Total weight
Russia	40 tonnes
Finland	76 tonnes (in some routes up to 100 tonnes)
Sweden	60 tonnes (in some routes 90 tonnes)
Norway	50 tonnes (in some routes 60 tonnes)

	Total length
Russia	12.00 m (in some routes 20.00 m)
Finland	25.25 m (in some routes more)
Sweden	25.25 m (in one route 30m is admitted for timber transports)
Norway	19.50 m (in some routes 25.25 m)
	Maximum possible vehicle height on existing roads
Russia	4.0 m
Finland	4.4 m
Sweden	4.5 m (on some roads or road sections reduced)
Norway	4.5 m (on some older roads or road sections reduced to 4.0 or 4.2 m)

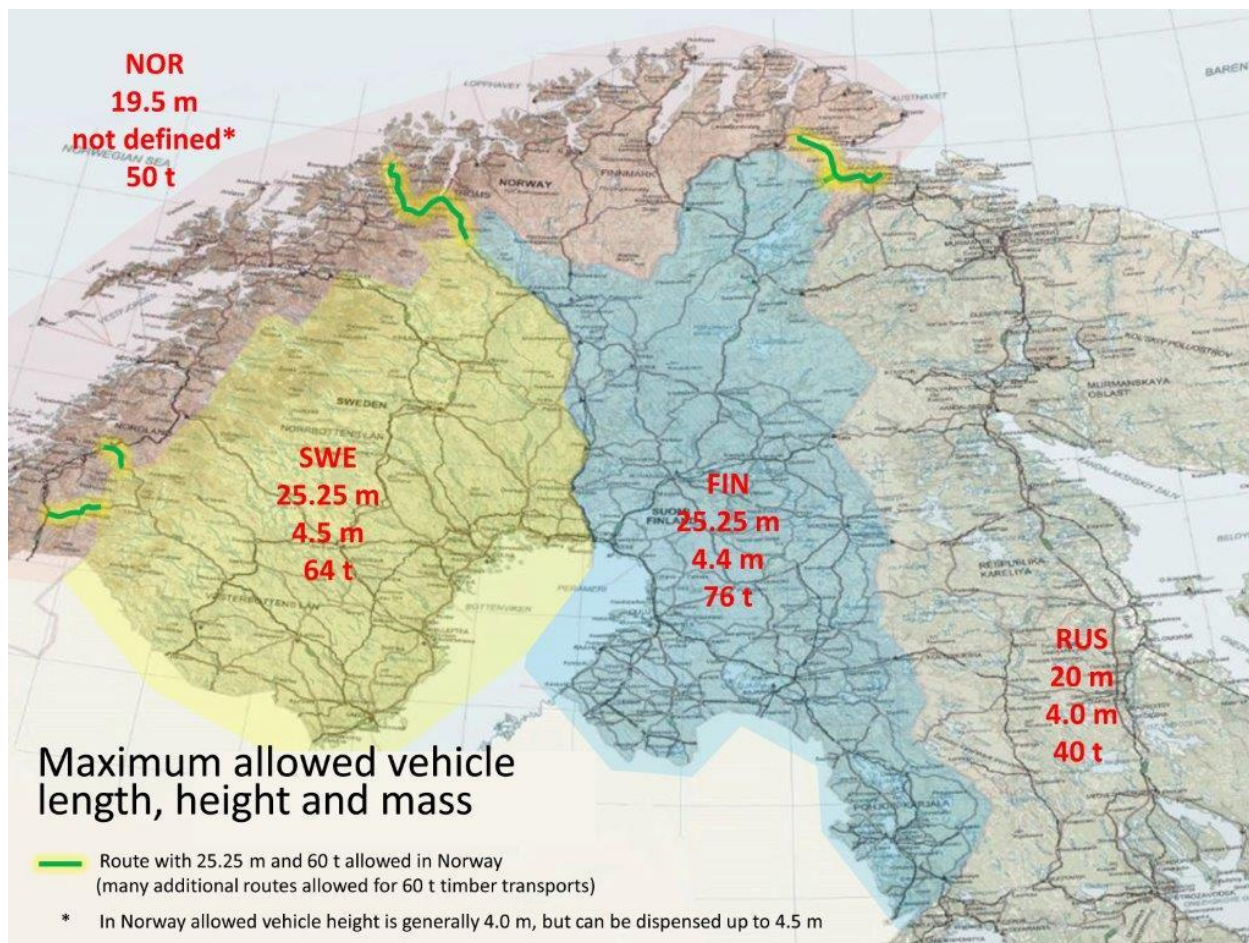


Figure 29. Threshold values for vehicles

Finland increased the maximum total vehicle weight from 60 to 76 tonnes from 1 October 2013. In addition, even heavier vehicles up to 100 tonnes will be tested on several routes.

Sweden has increased the maximum total vehicle weight from 60 to 90 tonnes on selected sections of roads where a large volume of iron ore and timber is transported.

Norway has increased the maximum total vehicle weight from 50 to 60 tonnes on several of the roads in the routes.

Roads with a total permitted weight of 90 tonnes in Sweden are currently associated with domestic freight, but in

the future it might be desirable for this freight transport to use both the Norwegian and Finnish road networks.

7.4.2. DEFINITION OF BOTTLENECKS ON ROADS

The experts suggest the following definition of bottlenecks as the basis:

Road width

- Sections with an asphalted road width of less than 6 metres.
- Sections with an asphalted road width of less than 7 metres in combination with other conditions that impair the traffic flow quality.
- Horizontal geometry
- Sections with a horizontal radius of less than 50 metres.
- Sections with a horizontal radius of less than 150 metres in combination with other conditions that impair the traffic flow quality.
- Vertical geometry
- Sections with a gradient of more than 6% over a length of more than 500 metres. Free height
- Sections the height restriction causes problems for the cargo traffic in the border-crossing routes
- Speed limit
- 60 km/ hour or less for a distance of more than 4 km (this is seen in areas with so-called “ribbon development” where houses are built in a continuous row along a main road)

7.4.3. REGULARITY

High regularity on the road network is particularly important for industrial freight haulage. It is expected that freight should be delivered in accordance with the calculated driving time and the agreements entered into.

The Barents Region faces the greatest challenges in winter due to snow and ice conditions. The problems can be classified as follows:

- Problematic mountain passes with drifting snow; road closure or convoy traffic.
- Avalanche or falling ice; road closure due to avalanche or risk of avalanche.
- Slippery road surface; reduced speed, or traffic flow on the road stops due to problems with other vehicles.
- Irregularities (traffic limitations); the weakening of the bearing capacity of the roads caused by the spring thaw

In recent years, greater problems of traffic regularity on the roads have been recorded due to the increased precipitation and flooding.

A general problem with the road network in the Barents Region is that the roads are far apart from each other and there are few alternative routes in the vicinity. Road closure consequently entails long detours.

In this regard, it is necessary to consider the possibility of including alternative routes as branches of the main routes into the BEAC Joint Barents Transport Plan.

Avalanche and falling ice is a challenge that is particularly associated with the Norwegian road network. Improvement of sections with avalanche problems is a high priority.

Slippery road surfaces lead to traffic flow problems. The experts have identified the following measures:

- The maintenance standard of winter roads must be improved,
- Even if the maintenance standard of winter roads is improved, it will be still necessary to install and remove tyre chains. New and better areas should be provided where these operations can be safely carried out.

7.4.4. ROAD TRAFFIC SAFETY

Improvement of bottlenecks will have a positive effect on traffic safety. Run-off-road collisions represent a significant proportion of the accidents on the lightly trafficked road network in the Barents Region. Relevant measures to reduce the extent of injury caused by run-off-road collisions will be soft design of ditches and verges or erection of barriers.

Well-rested drivers are important for traffic safety. Provisions for driving and rest periods stipulate that drivers of heavy goods vehicles should regularly take short or longer breaks. There is a need for continuous control over observance of the driving and rest regulations. Cooperation can be considered to exercise control along border roads.

Wildlife collisions are a challenge shared by all countries. Exchange of best practices on how to avoid such accidents would be useful.

A common programme is in place aimed at training and exchanging expertise on rescue operations on roads (accidents in tunnels, avalanches, etc) within the “Barents Rescue” exercise that is undertaken every second year. The main focus of the international exercise is sea transport, but all modes are included.

8. ADVISORY MEASURES PROPOSED BY THE BEATA EXPERTS

8.1. LONG-TERM MEASURES (12-15 YEARS)

This chapter presents the advisory measures proposed by the experts. They are divided into measures for mid-term implementation and long-term implementation. The Joint Barents Transport Plan is seen as the start of the process, and it would be reasonable to prepare more detailed and clearer recommendations later on.

Even though the mandate asks for measures on a mid-term and long-term basis, many of the proposals should be accomplished as soon as possible. In the descriptions of each route in Chapter 5, the experts have pointed out key challenges, planned development and further potential. Planned improvements should be implemented without delay, and where possible, the implementation of bilateral contacts should be started as soon as possible for further discussions about joint planning and future strategies.

Each project has its own characteristics, and planning of works in border areas should be carried out with extra awareness about plans and standards on the other side of the border. A possibility of joint planning should always be considered. A first step to a possible joint planning for development of a particular route could be a bilateral agreement on a joint development strategy.

Besides, the proposed feasibility studies should be done in the immediate future.

8.1.1. MEDIUM-TERM MEASURES FOR ROAD TRANSPORT

As described in the previous chapter, there are different standards on maximum total vehicle weight and length, road width and road vertical geometry. This causes problems on a daily basis for international cargo transports in the Barents Region. Since the standards are national, the experts suggest considering these issues at the national level in each country.

The experts propose that the countries should jointly carry out an assessment of the possibilities to increase harmonization in this area.

Reliable information on driving conditions on the different road sections is important for drivers to be able to plan their journeys.

The experts propose that a common system should be established for real-time information on driving conditions on the international roads in the Barents Region.

The experts propose that neighboring countries should consider the possibility of concluding bilateral agreements on the harmonization of requirements to the Accident Emergency Response Systems being created with the use of GLONASS/GPS technologies, so as to realize the road users' rights for safety and timely aid in road traffic accidents and other emergency situations on roads.

Consideration should be given to the harmonization of standards related to the use of GLONASS/GPS technologies in intelligent transportation systems, and systems of monitoring transportation on the roads of the Barents Region.

The availability of rest areas for lorry drivers (both for shorter breaks and overnight breaks) increases road safety and also promotes efficiency of the transport system.

The experts propose that rest areas in the prioritized routes described in Chapter 5 should be seen as a relevant measure both to increase safety and to improve the efficiency of the transport system.

8.1.2. MEDIUM-TERM MEASURES (12-15 YEARS) FOR RAIL TRANSPORT

The Iron Ore line/the Ofoten line

There are significant challenges with regard to capacity on the section of railway between Kiruna and Narvik. In addition to the possibility to run more trains on the line, the current situation also affects train punctuality and the possibility of carrying out maintenance work on the line.

Swedish and Norwegian authorities have jointly carried out an assessment to evaluate necessary measures in the short, medium and long term. The experts support the recommendations made in the assessment.

The experts propose that the following measures must be implemented as rapidly as possible:

- Technical measures with regard to maintenance and renewal of the track bed.
- Increasing the capacity by extending the existing crossing sections and constructing new crossing sections.

The experts are looking forward to the results of the ongoing strategic study of measures, aimed to improve the capacity along the line.

Rail connection between Finland and Sweden in Haparanda/Tornio

There is a difference in gauge between railways in Sweden/Norway and railways in Finland/Russia. This causes bottlenecks both in passenger and freight transport.

The experts propose that further efforts should be made to find solutions for efficient transshipment of freight between railways with gauge difference to improve connectivity between the Barents countries.

8.1.3. MEDIUM-TERM MEASURES (12-15 YEARS) FOR SEA TRANSPORT

Ports and services

As described in Chapter 5, several ports in the Barents Region play an important role in international sea transportation today, or they have such potential in the future.

The experts propose that development of key ports should be seen as a relevant measure to create new opportunities for industries in the Barents Region. The experts propose that particular attention should be paid to developing the ports of Murmansk, Kirkenes and Narvik.

There are a number of other measures that can have a positive effect on the efficiency of sea transportation in the Barents Region. These include measures, related to customs and visas.

The experts propose that relevant bodies continue to develop more efficient administrative routines, visa procedures and customs clearance routines.

Safety at sea

Increased mining in the Barents Region, increased petroleum activity in the Barents Sea require better safety measures. Several measures are described in Chapter 5:

- The need to develop a functioning system of communication (broadband satellite communications) in polar waters
- The need for more hydrographical surveys and development of complete charts, improvement of infrastructure for navigation and improved forecasts related to weather, waves and ice conditions.
- The need for a joint traffic monitoring system. The establishment of a joint Barents VTMISS (Vessel Traffic Monitoring and Information System), including seamless sharing of traffic data from AIS, Satellite AIS and other relevant sources.
- Harmonization of national rules, regulations and procedures in the area, to achieve greater predictability and lessen the administrative burden on mariners.
- Extension of the newly established Barents Ship Reporting System (Barents SRS) to cover the entire Barents Sea Region
- The need for an improved system for search and rescue to ensure:
 - Early warning
 - Efficient detection equipment
 - Efficient mobilization and availability of rescue resources
 - Efficient coordination and execution of rescue operations
 - Efficient personal rescue equipment
 - Efficient use of non-governmental (non-SAR) ships being in the area of any emergency situation

To solve the problems encountered in those waters, the experts propose to introduce maritime safety system designed specifically for the Barents Region.

8.1.4. MEDIUM-TERM MEASURES FOR AIR TRAFFIC DEVELOPMENT (12- 15 years)

International air transports in the Barents Region are carried out in a very limited scope. Improving East-West air traffic in the Barents Region can considerably facilitate transportation of passengers between the main agglomerations in the Region. It can promote the development of trade, industry, tourism and cultural exchange in the entire Region. Responsibility for the offer of the air transport services rests with the market economy and airlines. However, public authorities should promote the establishment of new routes:

The experts pointed out a number of relevant measures, that are given in Section 5:

- If need be, the bilateral agreements on international flights between the countries of the Barents Region are to be updated.
- Encouraging airlines to cooperate and implement the combined tariffs in order to increase the attractiveness of existing and possible new East-West routes.
- The authorities and other stakeholders in Sweden and Finland should conduct a further analysis in order to create a basis for open discussion of possible solutions with regard to the choice of hub airport.
- Support for new international routes, if it is necessary to achieve the objective in creating new opportunities for important industries in the Barents Region.
- Public authorities and stakeholders in Norway, Sweden, Finland and Russia must maintain a constant dialogue with appropriate airlines regarding the progress of communication in the direction of “East-West” in the Barents Region. Implementation of new initiatives is impossible without close cooperation between state and local public authorities and the airlines.

The experts propose to foster establishing links in the Barents region in the direction of “East-West”, both at the national and regional levels of different countries.

8.2. LONG-TERM MEASURES (15-30 YEARS)

The long-term measures proposed by the experts mainly deal with the rail transport. Nevertheless, the further work on harmonization of all transport modes in all four countries should continue on a long term basis.

For example, there are the traffic flows between the Norwegian counties of Nordland and Finnmark, going transit through the territory of Sweden and Finland. The experts propose to examine the improvement of road infrastructure of those motorways in the long term basis.

Even today, some ports of the Barents Region play an important role in international maritime transport, or have such potential for the future. The Barents Region extremely needs to develop reliable and efficient maritime routes and the development of ports in Murmansk, Kirkenes and Narvik is important yet in the long term.

Bothnia railway route: improving reliability and traffic capacity of the northern sector

In Sweden, the northern part of the Bothnia railway route plays an important role in ensuring reliable communications in the direction of “North-South”, mainly for the industry, but also for passenger traffic. The existing link is susceptible to traffic disturbances, and studies performed have outlined measures to increase reliability and traffic capacity. In the event of a serious failure on the main line that goes along the northern part of Nurlanna, north of Vennesla, alternative by-pass options will be needed. Presently, marine transport and inland line are used as alternative routes. Several studies have been conducted in recent years with respect to construction of a new railway along the coast between Umeå and Luleå 270 km long (the North Bothnia line). That railway will increase traffic capacity, improve reliability and enhance quality of passenger services, complementing the existing single-track railway that runs along the inland areas. The North Bothnia line is characterized by low socio-economic profitability, and therefore it was not included in the draft of a new long-term plan developed by the national Swedish Transport Administration.

The experts suggest that the need to improve reliability and increase capacity is to be taken into account when developing long-term plans for development of transport infrastructure in Sweden.

Svappavaara - Pajala - Kolari; the possibility of construction of a new railroad branch to the Iron Ore Line

On behalf of the Swedish Government the national Transport Administration investigates the possibility to construct a new railway Kaunisvaara – Svappavaara, due to the growing demand for transportation in the Pajala area where mining operations are carried out. In this regard, the possibility of construction of the railway of 110 km long to transport iron ore, which is currently being transported by road, is being discussed. The new railway will come into service not earlier than 2022. The possibility of co-financing the construction on the part of the industry

and the state should be considered, as it will bring great economic benefits. The recent analysis showed the profitability of the project, but the Swedish Transport Administration has proposed that a deeper complementary analysis of the project should be made to eliminate the uncertainty in terms of the scope of necessary expenditure and the expected benefits. It is important that Sweden and Finland cooperate in assessing the feasibility of the further extension of the branch for about 100 km over the territory of Finland. The total length of the new railway line will amount to approximately 200 km.

The experts propose to consider the inclusion of the construction of the branch from to the Iron Ore line up to the mining operations areas across the border to Finland in the long-term plans for development of the transport infrastructure, if the evaluations made prove economic feasibility of such investments.

Rovaniemi - Sodankylä - Kirkenes, construction of the a new railway

The main argument in favor of building a new railway is to provide access for the Finnish mining industry to the Barents Sea ice-free port. Finland has recently assessed⁴⁴ the possibility of construction of a new railway Rovaniemi - Sodankylä - Kirkenes for transportation of ores and minerals from Pajala/Kolari - Sodankylä - Savukoski belt via the port of Kirkenes. Creating such a railway section would mean the construction of approximately 460 - 470 km of new railroads. Norway expressed an interest in that Finland's initiative, but no joint research or planning have been made.

The major part of the cargo transportation to be carried out by that railway will fall within the ores and minerals, which transportation has been envisaged by the potential construction of a new section of the Iron Ore line. Therefore, the possibility of implementing only one of these options will be considered. Whereas construction of the railway will have an impact on the port of Kirkenes development.

Experts suggest further research to identify the prospects of a new railway between Rovaniemi and Kirkenes through Sodankylä.

Iron Ore line /Ofutbanen: the construction of the second track

That railway is proposed to be included in the TEN-T core network. The experts have proposed a number of measures to be implemented over the medium term. However, those measures will only allow to increase the traffic capacity to 40 trains per day. In the long term, that capacity may be insufficient. Therefore, the transport authorities in Norway and Sweden are considering construction of a second track along the entire length of that railway line as one of the possible measures. Development of that railway is closely linked with the development of Narvik and Luleå ports. The growth of the railroad traffic capacity will require the growth of the ports' capacities. Port of Luleå received funding from the TEN-T core network to carry out necessary research and elaboration of plans of such development.

The experts suggest that Norway and Sweden should continue close cooperation within the framework of development of that railway line and explore the possibility of construction of a second track along its entire length.

⁴⁴The study "The traffic flow requirements for the mining industry" (2012/2013)

9. INTERNATIONAL FUNDING OF THE PROPOSED MEASURES

Along with the national and regional budgets the following sources of funding can be used:

- Internal and external loans
- Freight charges
- Public-private partnership (PPP)
- Funding from industrial enterprises
- International funding
 - Loans from a consortium of banks
 - International capital markets (stocks, bonds, etc.)
 - Loans, grants and guarantees of international institutions (the European Investment Bank, the European Bank for Reconstruction and Development, the Nordic Investment Bank, the World Bank, etc.)
 - EU grants
 - Assistance and support from the EU and other international organizations (including the Support Fund of the Northern Dimension Partnership on transport and logistics)

Use of national and foreign loans is a common practice in all the countries of the Barents Region. Freight charges are mainly used in Norway, while PPP are used in Finland, Norway (three projects) and Russia.

International financing is more common in Russia and in two EU countries (Finland and Sweden) rather than in Norway. However, international funding can play an important role in ensuring development and growth dynamics.

Construction of infrastructure using funds of industrial enterprises is not very common, but requires further study. In Finland there exists a system of loans extended by industrial enterprises. Each investment project is considered separately, but in many cases mining companies provided funds for construction of access railway branches to mines, and received, a few years later, reimbursement from the budget after the mines were put in operation. This allows to speed up construction of the necessary infrastructure.

The EU member states may receive **EU grants**, while the European Union finances a number of projects and programs. For example, the EU has allocated grants totaling EUR 8 billion for the development of the Trans-European Transport Networks (TEN-T/TEN-T) for the period 2007-2013. Those grants may be used for co-financing of studies related to projects (not exceeding 50%) and for the direct execution of works (not more than 20%, 30% for cross-border sections). There are other forms of support, for example in the form of preferential interest rates, and venture financing. Finland and Sweden have received small grants under the TEN-T for their respective countries.

European Structural Funds and the EU Cohesion Fund also play an important role in the financing of TEN-T. The Cohesion Fund finances strategic investments in the transport field of the member states, which gross national income per capita is less than 90 per cent of the EU average. The European Regional Development Fund (ERDF) is one of the structural funds that provides funding for development of regional transport infrastructure to ensure access to the TEN-T network, communication between the center and the rest of the country, as well as for development of regional public transport. ERDF has definitely supported small projects in Finland and Sweden.

The European Investment Bank (EIB) is a financial institution of the European Union. The EIB plays a crucial role in the development of the TEN-T, offering a variety of instruments such as loans, venture capital, guarantees and incentive tools. In November 2012, the EIB and the European Commission signed a cooperation agreement for the official launch of the pilot phase of the Project Bond Initiative. Using participation interests in the capital from the EU budget in order to reduce its risks, the EIB offers a credit quality enhancement product, called a project bond instrument (PBI), aimed at achieving rating's grade A, thereby facilitating issue of long-term bonds as an alternative to bank loans.

The Nordic Investment Bank (NIB) finances projects aimed at strengthening the competitiveness and improving the environment. The NIB offers long-term loans and guarantees on an arm's length basis both for private and public clients.

The founders of the NIB are Denmark, Estonia, Finland, Iceland, Latvia, Lithuania, Norway and Sweden.

Northern Dimension Partnership on Transport and Logistics (NDPTL) is a platform for cooperation in the field of transportation and logistics for 11 member states and the EU. The main objective is to improve major transport links and logistics in the region of the Northern Dimension for promotion of sustainable economic growth

at the local/regional and global levels by focusing on a limited number of priority areas, taking into account the balance of state and regional interests. The NDPTL has recently founded the NDPTL support fund that can allocate funds to perform research necessary for preparation of the project implementation, including preliminary, feasibility, evaluation studies and validity analysis as well as other technical measures of support, such as examining plots of land in question and preparation of a package of financial documents. The NDPTL can also support projects of organizational and informational nature, aimed at eliminating/reducing the impact of the limiting factors not related to the infrastructure, such as traffic congestion at the national borders and inefficient operation of logistics hubs. The NDPTL support fund provides up to 50% of the project cost for the member countries. Finland, Norway, Russia and Sweden are all members of the NDPTL and therefore can apply for grants of the NDPTL support fund.

In **Russia**, funding of transport infrastructure is mainly carried out at the expense of the budgets of different levels (federal, regional and municipal), intended for the development of transport infrastructure. In 2011, the Russian Direct Investment Fund (RDIF) was established to invest funds in the most promising sectors of the economy. There are also two other main sources of funds for large-scale infrastructure projects in Russia: Bank for Development and Foreign Economic Affairs - VEB (Vnesheconombank) and the financial holding of VTB group (Vneshtorgbank). Both banks are owned by the government. Nowadays, only a limited number of private companies invest in the transport infrastructure. Investment companies in Russia are mainly owned by the government or controlled by the state monopolies. European Union funds have not yet been widely used in Russia. However, some large-scale projects for development of transport infrastructure, are expected to be partly financed by the European Regional Development Fund (ERDF). There are other financial institutions operating in Russia, such as the World Bank, the Eurasian Development Bank and the Nordic Investment Bank.

Ore line Malmbanan/Ofofbanen can become an example of innovative approach to financing large investments in cross-border infrastructure. If the next National Transport Plan defines the project to create a second track as a priority, the Norwegian authorities will be open to joint investments and co-financing with Sweden. The agreement, defining distribution of costs and obligations between the parties, will form the basis of such joint development. Cooperation is likely to also include the coordination of maintenance, selection of technical solutions and common regulatory standards on either sides of the border. Norwegian public authorities are also open to innovative approach to finance construction of railways by private investors, which is used in construction of motorways, ports and airports. Toll roads are very common in Norway, while the railways were traditionally built with 100% state budget funding. Three sidings at Ofofbanen are already in the development stage, with financial participation of the major non-governmental users of that railway. Prolongation of sidings length that is currently taking place, was due to the demand of the non-state industrial enterprises to use trains over 750 m long.

In 2014-2015 on Russia's initiative within the framework of the BEAC, studies were held on feasibility of establishing own mechanism of project financing in the Barents Region. Such mechanism could be a good solution for financing the creation or upgrading of infrastructure in the Barents Region. The appropriate BEAC target group held nine meetings. Given the lack of consensus on that issue, the final report of the Group suggested to optimize the use of the existing sources of funding in the region, as well as improve awareness of the participants of the Barents cooperation about availability of such mechanisms and procedures to apply for project grants".

All cross-border projects or projects in the vicinity of the border require further exploration of possibilities for co-financing. Each project has specific objective, so they must be considered individually.

10. RECOMMENDATIONS FOR FURTHER WORK

This edition of the Joint Barents Transport Plan identifies important cross-border road, rail, air and sea routes, give their description and suggests development strategies.

Significant industrial potential of the region requires new approaches to planning and creation of infrastructure. All export-oriented industries require an efficient transport system, and all the neighboring countries can help create a strong and sustainable transport network both within the region and with access to international markets. A change in approaches to planning, financing and cooperation is required. Cross-border thinking will bear fruit and can open up new opportunities, lead to new ideas, show new solutions for the next generation to the stakeholders.

To succeed, the Barents cooperation require joint work of the transport control authorities of various countries in terms of knowledge sharing and development of joint strategies.

Implementation by the countries of the existing plans will improve the efficiency of the transport system, while the countries have broad opportunities for further cooperation in the region.

The above-noted work includes further research and planning on some of the routes. The experts propose to consider the possibility to conduct some of those further studies within the framework of joint cooperation projects between technical universities of Arkhangelsk, Murmansk, Oulu, Luleå and Narvik by order of the Barents/Euro-Arctic Transport Area.

Each state should become aware of its involvement in the Joint Barents Transport Plan. After the approval of the Plan in 2016 at BEAC Transport Ministerial Meeting in Arkhangelsk, the BEATA Steering Committee may initiate further work on updating the Plan as an advisory supplement to national transport documents of the four countries. Updating of the joint Barents plan should be carried out by agreement of the BEATA member states within mutually agreed terms.

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