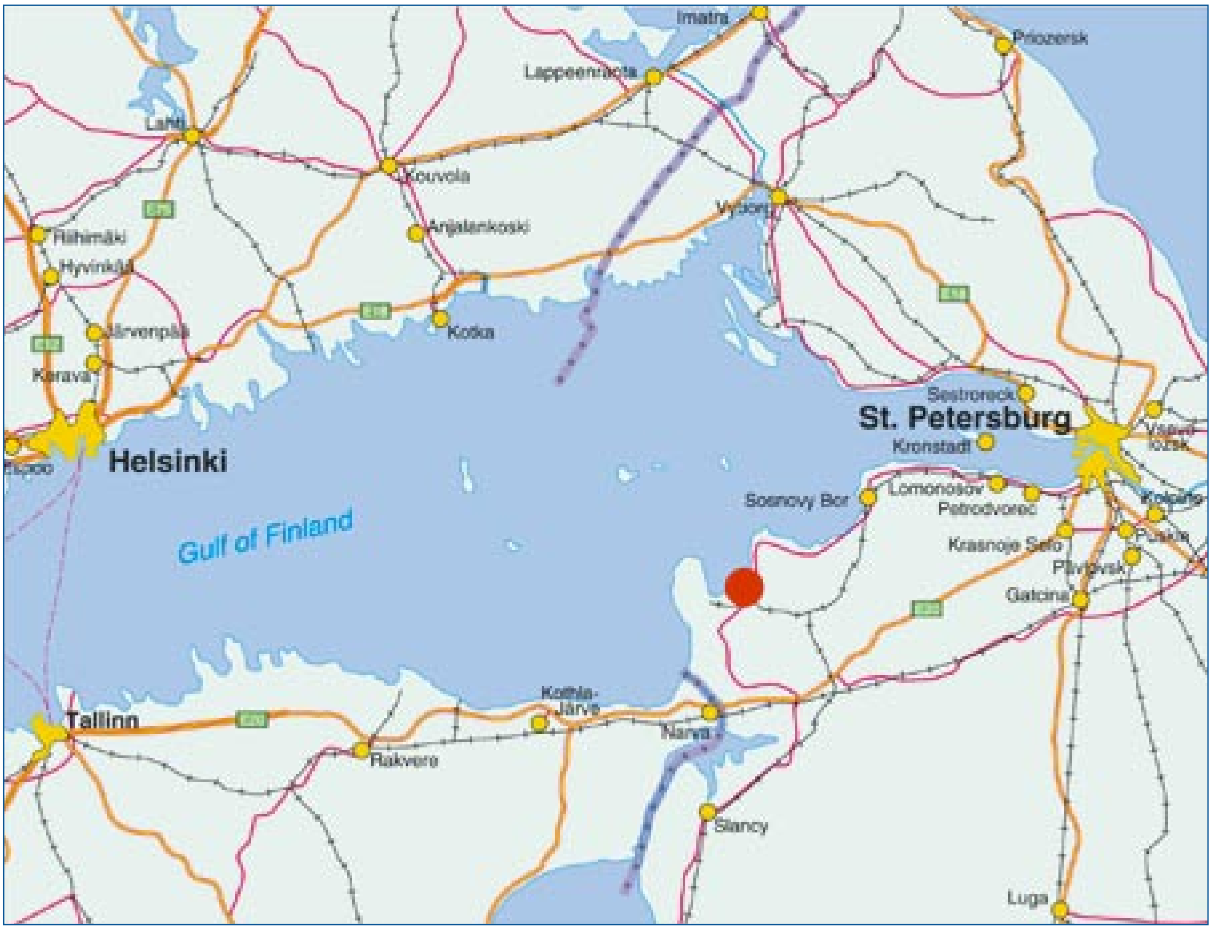
SCANDIACONSULT INTERNATIONAL

Ministry of Transport
Russian Federation

Ust-Luga Port Development Project
Multi-purpose Terminal
Environmental Impact Assessment



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June 2003

Preface

The European Bank of Reconstruction and Development (EBRD) has been requested by the Ministry of Transport of the Russian Federation (MoT) to participate in the funding of the construction of a Multi-purpose port terminal in Ust-Luga, Leningrads Oblast, the Russian Federation. The Federal State Unitary Enterprise “Rosmorport” will be acting as a Project implementation unit. The port will be composed of a RoRo facility, a container facility and a ferry facility.

Prior to making a funding decision the EBRD has to be satisfied that

1. the elements of the investment program conform with national and European Community legislation and international conventions in the environmental field,
2. the project would not result in significant adverse environmental impacts, and
3. the project would include all necessary mitigation measures to minimise any adverse change in the environmental conditions in the Gulf of Finland.

EBRD has classified the project as A/0, requiring an Environmental Impact Assessment (EIA) including a public consultation.

Scandiaconsult International AB has, on assignment by EBRD, made the EIA for the Multi-purpose Terminal. The assignment was commenced in April 2003 and a draft EIA is made available to the public on 30 June 2003.

An assessment of environmental impacts for the planned terminals according to the Russian legislation was performed by GT Morstroj and ZAO “Ecotrans – Dorservis” during 2002. A translation of their document has been the basis for the description of the existing environment in the present EIA.

Information for this EIA was also gathered during Scandiaconsult’s visit to St. Petersburg and Ust-Luga at the beginning of May 2003. During the visit meetings were held with representatives from Ministry of Transport, GT Morstroy, Ecotrans Dorservis, Lenmoorniiprojekt, Baltiski Parom, Ministry of Natural Resources (Baltic Sea Inspection), Green World, Marine Administration of Sea Port, Sea Port Administration of Vyborg and Visotsk, Department of Administration of Municipal formation Sosnovy Bor, Leningrad Oblast, International Association of Ecological Safety, Institute of Man-Caused Safety, and OOO Audit Company “KONTO”.

SCANDIACONSULT INTERNATIONAL AB
Göteborg, Sweden, June 2003

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Table of Contents

Annexes:

Summary

Construction of a Multi-purpose Terminal at Ust-Luga is part of the development of a port complex STP Ust-Luga in the Gulf of Finland decided in a presidential decree in 1993. The Multi-purpose Terminal is localised to the southern part of the Luga Bay, see map below.

Map of the area – Gulf of Finland

The Multi-purpose Terminal consists of a RoRo/Ferry Terminal and a Container Terminal. A Coal Terminal is already constructed adjacent to the planned Multi-purpose Terminal.

The Baltic Sea has some of the busiest shipping routes in the world. The traffic on the Baltic Sea is estimated to increase by 10–15% with the new capacity at STP Ust-Luga. The impact of increased traffic on the Baltic Sea will be higher risks due to vessel collisions, vessels running aground and other accidents leading to oil spillage.

The air emissions will increase due to increased transports on roads, railway and vessels. This leads to negative impact on the environment for example eutrophication, acidification, global warming and smog. These impacts are due to increased trade and commerce. In comparison with road transports vessels generate low emissions per transported tonne.

The water of the Luga Bay is eutrophicated due to a fairly high load of nutrients from the rivers discharging to the bay. The level of contamination in soil, sediment and water investigated so far, indicate that no special precautions are required during construction. However the expected turbidity increase during construction needs monitoring and precautions.

The landscape is varied and contains many different habitats. The most sensitive habitats are the coastal wetlands containing a great variety of species of plants and birds, many of them being rare or protected. Two nature reserve areas are situated in the vicinity of the port complex: The Ramsar wetland site on the Kurgalsky peninsula and the Kotelsky zakaznik. Two protected species of seals have their primary habitat north of the Kurgalsky peninsula. Luga Bay is an important area for spawning and nursery ground for fish. The area is important for reproduction of basic food fish in the Gulf of Finland.

The environmental impacts have been assessed for three alternatives: the proposed localisation, north of the proposed localisation and the do-nothing alternative. The most important impacts for the alternatives are summarised below:

Alternative	Comments
Proposed localisation	The most important impacts during construction are extensive destruction of ecosystems in the water area. Turbidity effects from land formation and dredging are also important impacts. Impacts of importance during operation of the port will be as a regional source of air emissions. Important indirect impacts from vessels to and from the port will be the risk of accidental water pollution as well as discharges of ballast water and anti-fouling leakage.
North of proposed localisation	Important impacts during construction are destruction of ecosystems in the water area. Impacts of importance during operation of the port will be as a regional source of air emissions. Important indirect impacts from vessels to and from the port will be the risk of accidental water pollution as well as discharges of ballast water and anti-fouling leakage.
Do-nothing	The environment in Luga Bay will not be further effected. The conditions and the impact of an expansion of existing ports are however not known. The descriptions are made from the basic conditions, in the first place, localisation.

The conclusion can be drawn that the two alternatives in Luga Bay are preferred to expansion of existing Russian ports. Of the two alternatives in Luga Bay, the alternative north of the proposed localisation might be preferred due to lesser infringement on valuable natural environment and lesser dredging.

Mitigation measures in order to protect the environment must be taken for dredging operations, waste management (both vessel and port generated), oil spillage, waste and storm water, hazardous goods management etc.

A monitoring plan, considering the suggested mitigation measures, will be produced.

Public consultation has been performed in March 2003. Comments period is between June 30 and 120 days forward. The final public consultation will be performed in August/September 2003.

1 Operational Context

1.1 Purpose and Need

Total Russian foreign trade and transit traffic amount to some 600 million tons annually of which 255 million tons were handled through the country's ports in 2002. A total of 68 million tons or 27% of the total was handled through Russia's north western ports of which 37 million tons transited through St. Petersburg. While port traffic at St. Petersburg increased at 15% per year from 1991–1998, growth has accelerated at some 20% per year from 1998 to 2001. This reflects the rapid growth of the Russian economy, expansion of exports of raw materials and semi-processed goods and a concomitant growth in imports, mainly in the form of containerised cargoes and perishable food stuffs. During the same period, there has been an increasing focus on using Russian ports and this has also contributed to rapid increases in throughput at St. Petersburg port. Container cargoes in St. Petersburg are now close to 600,000 TEU annually and are projected to double by 2006 at which time traffic would be forced to divert to other ports.

Figure 1 Map of the Area

There is considerable strain on existing port infrastructure at St. Petersburg with an accompanying detrimental effect on the urban environment as the port is enclosed by the urban area. In addition, there is a lack of good rail access to the port which hinders the development of container traffic by rail. It is also not permissible for vessels to navigate the St. Petersburg channel in both directions simultaneously, which increases ship waiting and service times, adding to logistics costs. The purpose of building Ust-Luga port is to overcome potential shortages of port capacity at St. Petersburg and to remove from the urban area cargoes causing pollution and traffic congestion problems.

1.2 Legal and Institutional Framework

1.2.1 International Conventions

The following international conventions are of relevance within this project.

EIA

– *Convention on Environmental Impact Assessment in a Transboundary Context, 1991 (Espoo)*

  The aim of the convention is to enhance the international co-operation regarding EIA's especially when it comes to transboundary impacts from specific listed activities, e.g. trading ports and inland waterways and ports for inland waterway traffic which permit the passage of vessels of over 1 350 tonnes (*Appendix I*). Another aim of the convention is to ensure environmentally sound and sustainable development.

  Article 2 states for instance the obligation to undertake an EIA prior to a decision to authorise or undertake a proposed activity that is likely to cause a significant adverse transboundary impact and to provide an opportunity to the public to participate in relevant EIA procedures.

  Article 3 states the procedures concerning notification to those nearby countries that may be affected by the transboundary impact as early as possible and no later than when informing its own public about the proposed activity. The purpose of the notification is to ensure adequate and effective consultations, see *Article 5* below.

  Article 4 concerns the preparation of the EIA documentation. The content of the EIA document as a minimum is listed in Appendix II of the convention.

  Article 5 concerns the obligations of consultation with those nearby countries that may be affected by the transboundary impact on the basis of the completed EIA documentation measures to reduce or eliminate the impact.

  According to *Article 6* due account will be taken, in the final decision on the proposed activity, of the outcome of the EIA, including the EIA documentation and the EIA procedures.

Marine Environment

– *Convention on the Protection of the Marine Environment of the Baltic Sea Area, 1992 (Helsinki)*

  Helsinki Commission, or HELCOM, is the governing body of the Helsinki convention. HELCOM works to protect the marine environment of the Baltic Sea through intergovernmental co-operation between Denmark, Estonia, the European Community, Finland, Germany, Latvia, Lithuania, Poland, Russian Federation and Sweden. HELCOM's main goal is to protect the marine environment of the Baltic Sea from all sources of pollution, and to restore and safeguard its ecological balance.

  The fundamental principles and obligations of the convention are stated in *Article 3*. The contracting parties shall individually or jointly take all appropriate legislative, administrative or other relevant measures to prevent and eliminate pollution in order to promote the ecological restoration of the Baltic Sea Area including estuaries and the preservation of its ecological balance. The contracting parties shall

  - apply to the precautionary principle,
  - apply to the polluter-pays-principle and
  - promote the use of Best Environmental Practice (BEP) and Best Available Technology (BAT).

  The convention applies to the protection of the marine environment of the Baltic Sea Area, which comprises the water-body and the seabed including their living resources and other forms of marine life. Each contracting party shall implement the provisions of the convention within its territorial sea and its internal waters through its national authorities. (*Article 4*)

  The convention covers all sorts of pollution of the Baltic Sea Area, e.g. harmful substances (*Article 5* and *Annex 1*), pollution from land-based sources (*Article 6*), pollution from ships and reception facilities for ship-generated waste (*Article 8*), airborne/atmospheric deposition, dumping of waste (*Article 11*), exploration and exploitation of the seabed and its subsoil (*Article 12*) and nature conservation and bio-diversity, and sustainable use of natural resources *(Article 15)*.

  Whenever an environmental impact assessment of a proposed activity that is likely to cause a significant impact on the marine environment is required by international law or supra-national regulations, the contracting party shall notify HELCOM and any contracting party which may be affected by a transboundary impact. Where two or more contracting parties share transboundary waters these parties shall co-operate to ensure that potential impacts on the marine environment of the Baltic Sea Area are fully investigated within the environmental impact assessment. (*Article 7*) There is also an obligation to ensure that information is made available to the public on the condition of the Baltic Sea and measures taken or planned to be taken to prevent or eliminate pollution (*Article 17*).

– *Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (London). 1996 Protocol to the Convention*

  1972 Convention permits dumping to be carried out provided certain conditions are met. The severity of these conditions varies according to the danger to the environment presented by the materials themselves and there are some materials, which may not be dumped at all. The criteria governing the issuing of these permits deal with the nature of the waste material, the characteristics of the dumping site and method of disposal. The provision of the Convention shall not apply when it is necessary to secure the safety of human life or of vessels in cases of force majeure.

  1996 Protocol to the convention is intended to replace the 1972 Convention. It represents a major change of approach to the question of how to regulate the use of the sea as a depository for waste materials. One of the most important innovations is to introduce the precautionary principle and polluter pays principle. The 1996 Protocol is more restrictive than the convention since it prohibits the dumping of all kinds of wastes, with some exception e.g. dredged material. The protocol has not yet entered into force and Russian Federation has not ratified the protocol.

– *International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualties, 1969*

  The Convention affirms the right of a coastal State to take such measures on the high seas as may be necessary to prevent, mitigate or eliminate danger to its coastline or related interests from pollution by oil or the threat thereof, following upon a maritime casualty. The 1973 Protocol extended the Convention to cover substances other than oil.

– *International Convention for Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78)*

  The MARPOL Convention includes regulations aimed at preventing and minimising pollution of the marine environment by ships from accidental pollution and that from routine operations. It currently includes six annexes that cover pollution by oil, chemicals, goods in packaged form, sewage, garbage and air pollution. The annexes are all in force, except annex IV about sewage, which will enter into force 27 September 2003 and annex VI about air pollution. Russian Federation has not ratified Annex VI.

  There are some international conventions concerning the marine environment that Russian Federation has not ratified e.g. International Convention on Oil Pollution Preparedness, Response and Co-operation, 1990 (OPRC, IMO), Protocol on Preparedness, Response and Co-operation to pollution Incidents by Hazardous and Noxious Substances, 2000 (HNS-protocol, IMO) and International Convention on the Control of Harmful Anti-fouling Systems on Ships, 2001 (London, IMO). The HNS Protocol and the convention concerning anti-fouling have not yet entered into force. The OPRC and HNS Protocol stipulate requirements to establish measures for dealing with pollution incidents, either nationally or in co-operation with other countries. Ships are required to carry a shipboard pollution emergency plan to deal specifically with incidents involving oil and hazardous and noxious substances.

Air

– *The Air Convention (Long-Range Transboundary Airborne Pollutants, LRTAP), 1979 (Geneva)*

The Convention recognises both the environmental and health problems caused by the flow of air pollutants across borders. It establishes a broad framework for co-operative action on air pollution and sets up a process for negotiating concrete measures to control specific pollutants through legally binding protocols. Four protocols are currently in force under the Convention. One establishes the long-term financing of the European Monitoring and Evaluation Programme (EMEP). Three others regulate emissions of sulphur, nitrogen oxides, and volatile organic compounds respectively. A second sulphur protocol has been adopted and will enter into force this year. New protocols on POPs and heavy metals are being adopted and signed in June 1998. Finally, a protocol on nitrogen oxides and related substances is being negotiated, targeting acidification, eutrophication, and the effects of ground-level ozone (smog) on crops, forests, and human health.

Nature

– *Convention on Wetlands of International Importance especially as Waterfowl Habitat, 1971 (Ramsar Convention)*

According to the convention each contracting party shall designate suitable wetlands within its territory in a List of Wetlands of International Importance. By establishing nature reserves on the wetlands it will promote the conservation and the wise use of wetlands and waterfowl. Number of sites designated for the list in the Russian Federation is 35 sites. The Russian Federation has also ratified the Paris protocol to the Convention (1982) and the “Regina Amendments” to the Convention (1987).

– *Convention on Biological Diversity, 1992 (Rio de Janeiro)*

The objectives of the Convention are the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilisation of genetic resources between developing countries and industrial countries.

1.2.2 European Community Legislation

The EC regulations and directives that are of relevance for the project are listed below.

EIA

– *Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment (the EIA-directive, amended by Council Directive 97/11/EC)*

  The purpose of the Directive is to harmonise the laws in various Member States regarding assessments of environmental effects of certain listed projects in order to prevent unfavourable competitive conditions. Trading ports, which can take vessels of over 1,350 tonnes are subject to an assessment in accordance with article 5 (the contents of the assessment), article 6 (public consultation and consultation with authorities), article 7 (notification and consultation with authorities in another Member State when a project is likely to have significant effects on the environment in another Member State), article 8 (considerations in the consent procedure), article 9 (information to the public regarding the authorities decision to grant or refuse a permit) and article 10 (consideration of commercial and industrial confidentiality). A Member State may exempt a project from these provisions, except for article 7.

Safety at Sea and Marine Environment

European Maritime Safety Agency (EMSA) has been established according to the regulation no 1406/2002 of 27 June 2002. This new agency is set to ensure a high, uniform and effective level of maritime safety and pollution prevention from ships in Community waters, in order to reduce the risk of maritime accidents, maritime pollution from ships and to prevent the loss of human life at sea. The organisation of the agency is still under construction.

Committee on Safe Seas and the Prevention of Pollution from Ships (COSS) will be established according to the regulation no 2099/2002 of 5 November 2002. COSS will replace the different committees that were set up under Community maritime legislation, see the list of regulations and directives below. The purpose of this centralisation is to improve the implementation of this legislation by a conformity checking procedure initiated by the Commission, which may act at the request of a Member State.

– *Directive 2002/59/EC of the European Parliament and of the Council of 27 June 2002 establishing a Community vessel traffic monitoring and information system and repealing Council Directive 93/75/EEC concerning minimum requirements for vessels bound for or leaving Community ports and carrying dangerous or polluting goods.*

  The purpose of the directive is to establish a monitoring and information system in order to enhance the safety and efficiency of maritime traffic, improve the response of authorities to incidents and accidents etc. including search and rescue operations, and contribute to a better prevention and detection of pollution by ships.

- *Council Directive 94/57/EC of 22 November 1994 on common rules and standards for ship inspection and survey organisations and for the relevant activities of maritime administration (last amendment Dir 2001/105/EC)*

  The directive establishes measures to be followed by the organisations concerned with the inspection, survey and certification of ships for compliance with the international conventions on safety at sea and prevention of marine pollution. The Member States shall ensure that their competent administrations can assure an appropriate enforcement of the provisions of the international conventions.

- *Council Directive 95/21/EC of 19 June 1995 concerning the enforcement, in respect of shipping using Community ports and sailing in the waters under the jurisdiction of the Member States, of international standards for ship safety, pollution prevention and shipboard living and working conditions (port State control)*

  The directive aims to drastically reduce substandard shipping in the waters under the jurisdiction of member states by increasing compliance with international and community legislation, establishing common criteria for control of ships by the port State and harmonising procedures on inspection and detention.

- *Council Directive 96/98/EC of 20 December 1996 on marine equipment.*

  The Directive aims to enhance safety at sea and the prevention of marine pollution through the uniform application of the relevant international instruments to be placed on board ships for which safety certificates are issued by or on behalf of Member States pursuant to international conventions.

- *Council Directive 1999/35/EC of 29 April 1999 on a system of mandatory surveys for the safe operation of regular ro-ro ferry and high-speed passenger craft services*

  The purpose of the Directive is to lay down a system of mandatory surveys, which will provide a greater assurance of safe operation of regular ro-ro ferries and high-speed passenger craft services to or from ports in the Member States of the Community. The directive also aims to provide for the right of Member States to conduct, participate in or co-operate with any investigation of maritime casualties or incidents on these services.

- *Directive 2000/59/EC of the European Parliament and of the Council of 27 November 2000 on port reception facilities for ship-generated waste and cargo residues.*

  The directive aims to reduce the discharges of ship-generated waste and cargo residues into the sea thereby enhancing the protection of the marine environment. All ports of the member states shall have reception facilities adequate to meet the needs of the ships normally using the port without causing undue delay to ships. Treatment, recovery and disposal of ship-generated waste and cargo residues shall be carried out in accordance with the waste framework directive 75/442/EEC, that is without endangering human health and without using processes or methods which could harm the environment.

– *Regulation (EC) No 782/2003 of the European Parliament and of the Council of 14 April 2003 on the prohibition of organotin compounds on ships*

The Regulation requests the Member States to ratify the Convention on the control of harmful anti-fouling systems on ships (2001, London) at the earliest opportunity. The regulation prohibit the application of organotin compounds, which act as biocides in anti-fouling systems as from 1 July 2003. As from 1 January 2008 the bearing of organotin compounds will be prohibited unless there is a coating that forms a barrier to such compounds leaching from the underlying non-compliant anti-fouling system.

The regulation applies to

a) ships flying the flag of a Member State,

b) ships not flying the flag of a Member State but operating under the authority of a Member State, and

c) ships that enter a port or offshore terminal of a Member State but do not fall within points (a) or (b).

Water

– *Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy*

The purpose of the directive is to create a framework for the protection of inland waters, transition waters, coastal waters and ground-water in order to e.g. prevent further deterioration and protect and enhance the status of aquatic ecosystems, terrestrial ecosystems and wetlands directly depending on the aquatic ecosystems. Strategies to prevent or eliminate pollution of the marine environment will follow the strategies laid down in relevant Community law and international conventions. Water framework directive will be implemented in the national legislation of the Member States at the latest 22 December 2003.

Air

– *Council Directive 96/62/EC of 27 September 1996 on ambient air quality assessment and management and Council Directive 1999/30/EC relating to limit values for sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air*

Directive 96/62/EC is a framework of a common strategy for ambient air quality. Directive 1999/30/EC establishes limit values and alert thresholds for concentrations of sulphur dioxide, nitrogen dioxide and oxides of nitrogen, particulate matter and lead in ambient air intended to avoid, prevent or reduce harmful effects on human health and the environment. The objectives are also to obtain adequate information on concentrations and ensure that it is available to the public, and to maintain ambient air quality where it is good and improve it in other cases.

Nature

– *Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the habitat directive) and Council Directive 79/409/EEC on the conservation of wild birds*

  The aim of the directives is to ensure bio-diversity through the conservation of natural habitats, wild flora and fauna and wild birds in the European territory in the Member States. Ecological network, Natura 2000, enables the natural habitat types and the species habitats concerned to be maintain or restored at a favourable conservation status in their natural range.

Waste

– *Council Directive 75/442/EEC on waste (amended by Council directive 91/156) and Council Directive 91/689/EEC on hazardous waste*

  The objectives of the directives is the protection of human health and the environment against harmful effects caused by the collection, transport, treatment, storage and disposal of waste and hazardous waste. Member States shall also take the necessary measures to prohibit the abandonment, dumping or uncontrolled disposal of waste.

1.2.3 Russian Legislation concerning Environment, Health and Safety

There is an extensive list of Russian legislations in the Russian OVOS, applicable to the project.

1.3 History of Operation including Considered Alternatives

According to the newly carried out OVOS, six alternative sites where originally investigated. In discussions with Lernmorniiprojekt, the consultant for Ust-Luga Company, however only three alternatives were mentioned, Primorsk, Batareynaya Bay and Ust-Luga.

Primorsk has since then been developed to an oil port. The site is sheltered behind islands, but the navigation channel is narrow and thus ice can be a problem during winter. Batareynaya Bay is located just north of Sosnovy Bor. There is no port facility in this area today. The site seems shallow and less protected than Ust-Luga. This port site would primarily be aimed for export of oil products.

Other alternatives are mentioned below.

1.3.1 Ust-Luga

In 1993 a presidential decree defined the terms for a port development in the Gulf of Finland able to handle 35 million tons. The same year it was decided to make the development at Ust-Luga. Ust-Luga Company was given the task to find investors and to plan and implement the overall infrastructure. A layout of the different terminals was presented and approved. One terminal has been implemented, a coal terminal with a present capacity of 30,000 tons and a final capacity of 8 million tons.

The railway from Kingisepp has been updated and a new single line track has been constructed between Kotly and Ust-Luga, a length of approximately 20 km. Next terminal to be implemented is the Multi-purpose Terminal. The preliminary design and OVOS for the Multi-purpose Terminal are complete and the tender documents have been planned to be prepared during the coming autumn. The preliminary design of the Container Terminal will just commence. It has been moved from a position north of a planned Oil Terminal to the site just west of the Ferry Terminal. The reason mentioned was that time could be saved by profiting from the completed dredging for the Multi-purpose Terminal and by a joint railway system.

Other terminals planned at Ust-Luga, except for the coal, ferry and container terminals, are an ore terminal, an oil and liquid chemical cargoes terminal, a fertiliser terminal, a terminal for metal and general cargoes, a timber terminal, a terminal for perishable and wet food cargoes.

1.3.2 Other Port Alternatives

The location of the ports mentioned below can be found on map in Figure 1.

Vyborg and Vysotsk are located close to the Finnish border. Both ports have access to railway. The fairway is however long and narrow to Vyborg and limited to 6.5 m draft. Vysotsk is closer to the bay and allows a draft of close to 9 m. This port could be an alternative to ferry and container terminals at Ust-Luga. The fairway to Ust-Luga is however wider and safer. A location west of St. Petersburg might mean a restriction for goods to/from locations east and south of St. Petersburg.

Primorsk is located south of Vyborg and Vysotsk. The port has recently been developed to an oil terminal connected to a pipeline.

St. Petersburg already has ferry and container terminals but the possibility for expansion is limited. All traffic has to pass through the city. The port will most likely continue to expand for passenger and cruise ships while the increasing cargo volumes will have to find alternatives.

Kronstadt, Lomonosov and Bronka are located close to each other. Kronstadt is an old military base and placed on a small island. It is connected to the mainland by the recently completed north arm of the barrier to protect St. Petersburg from flooding. When the south arm is also completed, a ring road is planned on the barrier. At that time a ferry terminal at Kronstadt could become competitive. A study for this ring road will be carried out in the near future. It will probably be equipped with a high bridge over the channel to St. Petersburg, since a bridge to be opened for large ships would be a restriction both for St. Petersburg and for a port at Kronstadt.

Lomonosov is also a former military base. It is a small harbour with a turnover of less than 1 million tons of goods. Main products are timber, metals and food products. The port has an access channel with a depth of 7 m but allows a maximum draft of only 5 m. It is thus not a realistic alternative as a new ferry terminal, without dredging and reconstruction of berths.

Bronka is another small port discussed for future development. Investments might have been carried out for export of small volumes oil products.

Alternatives outside Russia could be Vuosaari (the new port east of Helsinki), Kotka and Hamina in Finland and Muuga in Estonia.

2 Description of the Multi-purpose Terminal and its Operation

2.1 General

The proposed multipurpose terminal at Ust-Luga will comprise Ro-Ro and container handling facilities. It will form part of a much larger port development whose construction has already begun. The coal terminal at Ust-Luga is now operational, and the approach channel to the port has been dredged. Other terminals are planned for containers, grain, timber, perishable foodstuffs, ore, fertilisers and oil. The capacity of the port when all of these terminals are in place will be around 35 million tons per annum.

The Multi-purpose Terminal will be located at the southern end of the Ust-Luga port development. The territory for the Ro-Ro Terminal is 300 metres wide covering an area of 38 Ha and the container terminal covers an area of 44 Ha with a width of 400 metres. The Ro-Ro Terminal has been planned to handle approximately 50,000 road vehicle units per annum, with space to expand to over 150,000 units per annum by 2020. The layout has been designed to accommodate a rail ferry berth and rail tracks for unloading and loading rail ferries if there is demand for this at a later stage. The Container Terminal is planned to handle 500,000 TEU per annum.

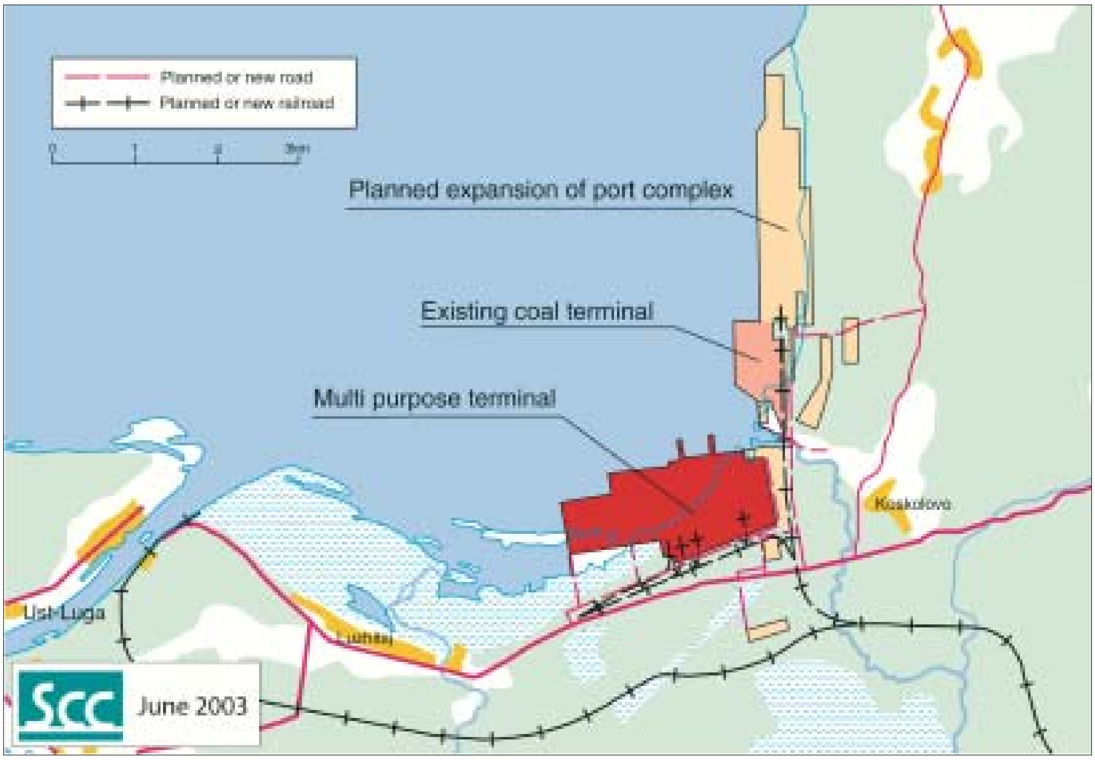

Figure 2 Map of Terminals

2.2 Technical Design

The Multi-purpose Terminal, as proposed by the company GT Morstroy, will be constructed in a rather shallow area in the southeast part of the bay. First sea weed, peat and soft material will be removed. Then a dyke will be created along the south, east and west sides to contain the fill. It will be protected against erosion by stone blocks imported from Karelia. The territory will be filled by sand from borrow pits only a few kilometres from the site and by sand from the dredging operation. The dredged material will contain much water. Settling ponds must be arranged to prevent suspended material to reach the sea. More than 2 million m^3 of fill will be required.

The sea front of the area will consist of steel sheet piles. The pier for the ferries will have a reinforced concrete deck founded on steel tube piles. One side of the pier will be equipped with a ramp for RoRo ships and he other side with a ramp for railway wagons. In the first stage only the RoRo ramp will be constructed.

The water depth at the pier will be 9.5 m.

As mentioned above only the ferry terminal can be described in detail. It will have three areas capable of storing trucks and trailers for two full ships. The three different areas will be one for outgoing traffic before customs, one for outgoing traffic after customs and one area for incoming traffic. A large portion of the area will be for railway traffic. It is equipped with a marshalling yard with each track having the length of the ship. Shunting can be done on both sides of the yard.

The ferry terminal will be more or less self-sufficient having an auxiliary power generating plant, water supply, heating plant, sewage treatment plant, filling station for vehicles, canteen for personnel, fire station etc. There will be several buildings for administration, operators, customs, watchmen etc. In total approximately 500 persons will work at the site when fully constructed. There will be a main terminal building to which all passengers will be admitted and then transported to the ship by bus.

The Multi-purpose Terminal will cover an area of more than 70 ha, of which half will represent the Ferry Terminal. In chapter 41, an alternative Ferry Terminal has been described requiring an area of 10 ha only.

2.3 Goods

As mentioned above the main cargo volume will be containers and RoRo, that is goods carried on trucks and trailers. The goods can be anything suitable for containers, flats and trailers but also products which can roll on their own, such as cars. Flats can carry heavyweight equipment. In general unitised goods is of high value which require good logistic planning and low transport time.

The railway goods will be of a type that can easily be moved to railway wagons with European gauge at Germany, if not the wheel boogies can be switched. There is a system common at Russian borders in which the wheels are moved along its axis to be fixed in a position suitable for the actual gauge. The change of gauge can be done at Ust-Luga and Baltijsk or in Germany.

As mentioned above, hazardous goods have not been foreseen. It will not be possible to avoid such goods, wherefore an area should be reserved for storage of such goods. A procedure should also be developed in which conditions such goods will be allowed on the ship. It can mean no passengers, only storage on an open deck etc.

There are very few alternative ports for container and ferry transports to Europe and therefore it is difficult to foresee the origin or destination of the goods in Russia. The hinterland will be very large.

Railways in Europe have difficulties in competing with trucks. This means that railway ferries often carry more trucks than railway wagons. The situation might be different in Russia due to large transport distances and a tradition in large railway volumes. Railways are however more suitable for low value goods. The railway berth should thus be planned to also allow trucks.

Passenger traffic will be very limited, perhaps only drivers. There are no large urban centres in the vicinity and people in the St. Petersburg area will prefer the ferries in St. Petersburg.

2.4 Land Infrastructure

The main road and railway access will be from Kingisepp. There are several alternative routes but no-one in better condition than the one via Kingisepp. Some kilometres of the road closest to the terminal are newly constructed and in good condition. The other portion needs improvement. The railway is single line and recently refurbished. The last kilometres to the site consist of a completely new line. It is already in use for the coal terminal. In the future the railway will be extended to double tracks and electrified.

Electricity will be supplied from Sosnovy Bor. Pylons for high-tension supply and parts of a transformer station are in place. Thus the generating plant at the terminal will be for emergency only.

Potable water will produced by desalination of ground-water. Water for fire fighting will be pumped straight from the sea.

Sewage water will be taken care of in a local treatment plant within the terminal. The treated water will be deposited straight to the sea. There are plans to connect the treated water to a municipal system, which however will not be in place when the terminal starts its operation.

Fuel oil can be supplied either by road or by railway.

2.5 Sea Transports

First only the RoRo berth will be constructed. There is a large amount of existing vessels from many countries in Europe. In principle all ferries and RoRo ships with a straight stern or bow ramp can be used.

There are about 62,000 trips by vessels each year in the Baltic Sea. The traffic generated at Ust-Luga for a fully developed port with 35 million tons of goods per year will be approximately 7,000 vessels. Thus, the 4 million tons planned for the Multi-purpose Terminal correspond to 700 vessels.

The main fairways in the Baltic Sea are shown in Figure 3.

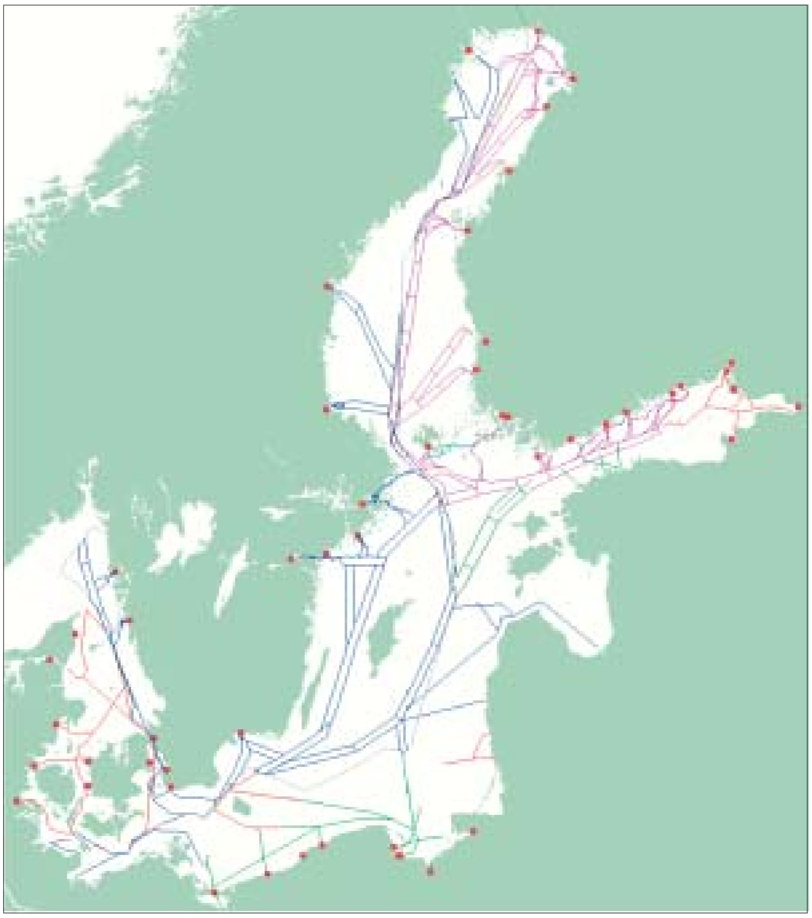

Figure 3 Fairways in the Baltic Sea.

To illustrate Ust-Luga's part of the shipping trade in the Gulf of Finland and Kaliningrad data from the largest ports in the area was studied. The total amount of goods being handled in the large Russian ports in the Gulf of Finland in 2001 was approximately 55 million tons. At the fully developed port complex at Ust-Luga 35 million tons of goods will be traded, which is comparable to the amount of goods traded at the Port of St. Petersburg in 2001. In Figure 4 the increase in goods volumes at the Port of St. Petersburg is shown.

Figure 4 Goods at the Port of St. Petersburg.

2.6 Fairways

There are two possibilities to enter the port area at Ust-Luga, along the west side of the bay or along the east side. There is a shallow area in the middle of the bay.

The channel along the eastern side of the bay will be the main channel. This is the safest route. The channel is wide and deep all the way until the south part of the bay. From there a 5 km long channel will be dredged to a depth of 13.6 m. The width of the channel will be 130 m, corresponding to approximately 5 times the width of the vessels. This should be sufficient for a straight double lane channel in open waters in good weather. The channel is already marked with leading lights and markers on high towers. The channel will probably silt up with about 10 cm per year meaning that it has to be sounded after some years to check that it is still deep enough.

The last portion, after the turning basin, will be 10 m deep. The depth at the container and ferry terminal will be 9.5 m. The present depth at the rim of the planned terminals is only 3 m.

In total 2.5 million m^3 will be dredged. 1 million m^3 will be used as fill at the terminal and 1.5 million m^3 will be dumped on a shoal in the middle of the bay.

Another much shorter channel will be dredged at the north end of the whole port complex.

Floating boys mark the passage through the bay. Russia is currently installing radar installation on three islands from the Estonian border to St. Petersburg.

There is no special procedure for ships moving in the area for the moment. The middle of the Gulf of Finland is international water.

2.7 Safety Systems

Safety systems at sea are traffic control, salvage operations, tug assistance, ice breaking and oil spill prevention. A short description of the systems is given below.

After July 1, 2004 all vessels entering the Gulf of Finland will have to report to a vessel traffic system (VTS). The first contact will be with the Estonian administration. There will be a common database in Estonia, Finland and Russia.

Through initiative by the Sea Administration of St. Petersburg a radar surveillance system is under installation in Russian waters.

Salvage operation follow international conventions, meaning that any ship from any country can assist a ship in distress regardless of national borders.

Tugs and icebreakers assist ships to/from their port of calls. This means that Russian ships can be assisted by Russian icebreakers and tugs all the way to open waters west of Finland. When leaving Russian territory they will ply on international water. Finland and Estonia have an agreement that Finland keeps the routes between Paldiski and Hanko and between Tallinn and Helsinki open.

Finland has a special plane for surveillance to detect oil spill. It flies over the Gulf of Finland 3–4 times per week. No such surveillance is carried out in Russia, but the bay is so small that oil spill on Russian waters will also be detected by the Finnish.

Example of safety systems on land are a generating plant for electricity, fire station with vehicles and a pump and pipe system for fire fighting water from the sea. Moreover the terminal is fenced, which will prevent unauthorised persons to enter the area. No movements of personnel not belonging to the staff of the terminal will be allowed to move around inside the fence. Passengers will be transported by bus from the terminal building to the ferry.

A power generating plant at the terminal will deliver electricity to vital functions, should a power failure occur in the main supply.

3 Description of the Existing Environment

The description of the existing environment at Ust-Luga is primarily based on the English translation of “Assessment of Environmental Impact of the Multi-purpose Terminal in Ust-Luga”, issued by ZAO “Ecotrans – Dorservis” in December 2002. Information in chapter 3.2 originates from HELCOM.

3.1 Location

The proposed Multi-purpose Terminal is located in the southern part of the Luga Bay on the south coast of the Gulf of Finland about 110 km west of St. Petersburg. The water is brackish and covers an area of about 200 km^2 with an average water depth of 11,4 m. The bay is limited by the Kurgalsky peninsula in the west and the Soikinsky peninsula at the east coast. The width of the water area is in its middle part 13 km. In the west the Luga Bay borders the Gulf of Narva and in the east the Koporski Bay. The length of the coast line is 59 km.

Figure 5 General view.

The industrial towns of Kingisepp and Slantsy are situated 30 respectively 60 km south of Luga Bay. The nuclear-power plant of Sosnowy Bor is situated approximately 40 km northeast of the planned port complex.

In the central part of the bay in north-south direction there is a 22 km long ridge of stony holes with depths of 0.9–4.0 m. It divides the bay into two parts: eastern part is 4–5 km wide and the western is 8–9 km wide. The southern part of the Luga Bay where the port is to be constructed is situated between the mouths of the River Luga and the smaller River Khabolovka.

Figure 6 Reed at the construction site of the Multi-purpose Terminal (the fence of the lighthouse is on the right).

Figure 7 View from the east shore over the south part of Luga Bay.

The western and eastern shorelines are high and consist of ledges covered with forest. The height of the top terrace of the eastern coast reaches 135 m. In the southeastern part of the bay the coast declines to 0.5–1.0 m.

The coast on the site location is low and partly swampy. The coastal part is shallow, partly covered with macrophytes, whereas the higher part has coastal vegetation.

3.2 Gulf of Finland and the Baltic Sea

The Baltic marine area, or Baltic Sea for short, is one of the world's most extraordinary seas. The beauty and great variety of the sea and its surrounding landscapes are unique. Its natural history since the last Ice Age has also been unusual, since these waters have at different times been a wide strait, a large bay, a lake and now form an inland sea connected to the open ocean only by narrow straits. Due to the slow exchange of water with the open ocean, and low salinity levels, Baltic marine ecosystems are particularly vulnerable to pollution.

The Baltic Sea has been exploited by people living and trading in the area for thousands of years, both as a source of seals and fish, mainly cod and herring, and for the transport of goods. Nowadays the Baltic Sea also has to cope with new pressures related to recreation and tourism.

The marine ecosystem of the Baltic Sea is very sensitive due to natural conditions. The fragile ecological balance is threatened by pressure related to the activities of the 85 million people who live and work in the Baltic drainage basin. Over the past few decades, marine pollution has become increasingly serious.

The existing most serious threats are:

- eutrophication, caused by the presence of excess nutrients in the sea water – particularly nitrogen and phosphorus.
- hazardous substances, including pesticides like DDT and HCB; heavy metals, including cadmium, mercury and lead; industrial substances like PCBs, short-chained chlorinated paraffins and nonylphenolethoxylates and unintended by-products like dioxins.
- other significant threats include habitat destruction, the use of certain harmful fishing equipment, and the presence of alien species.
- dramatic images of oil spills and oil-smeared birds and mammals have become an all too frequent sight.

Figure 8   Ship Accidents in the Baltic Sea.

Oil is the biggest cause of environmental damage from shipping in the Baltic Sea. This may originate from accidental spillage or illegal discharge of sludge. Maps from HELCOM gives an overview of accidents and observed oil spillage in the Baltic Sea during 2000–01 (Figures 8 and 9).

The total number of accidents during 2000 and 2001 was 119, of which 9 resulted in oil spillage, see Figure 8. Most of the accidents occurred near port areas and in straits especially the entrance of the Baltic Sea and the Gulf of Finland.

Some of the oil discharges from vessels are observed by means of air surveillance, see Figure 9. During 2002, observations of 344 oil spillage were made. The large number of occurrences of spillages <1 m^3, are assumed to be discharges of oily water from machinery or cargo holds. The absence of observed oil spills in the eastern and southeastern part of the Gulf of Finland (Russian water) are probably because of lack of reports or absence of Russian flight surveillance activity.

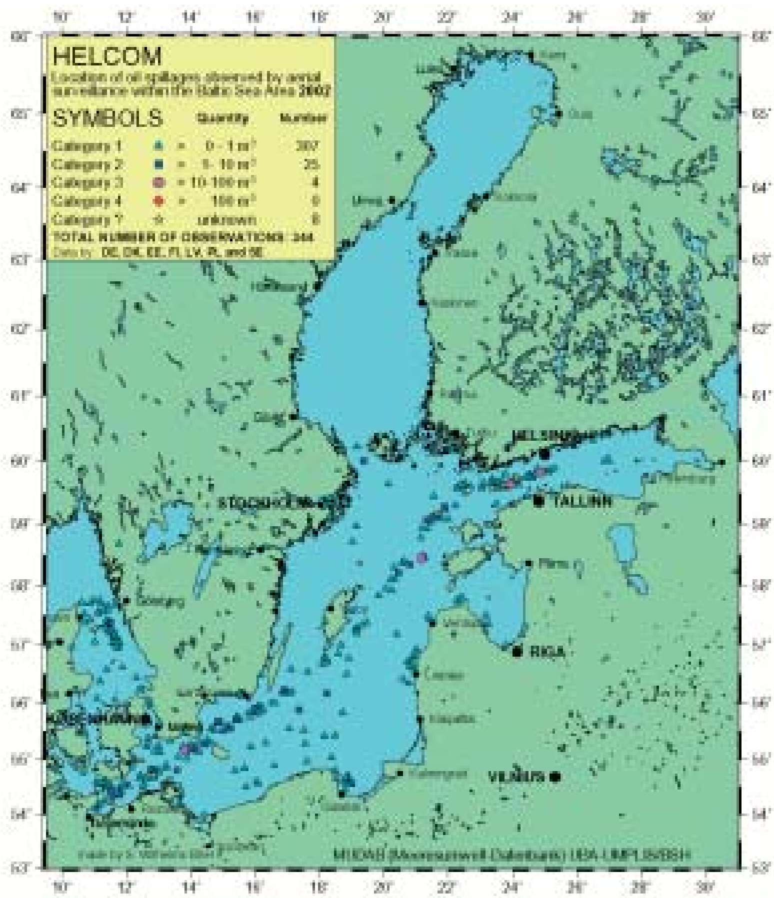

Figure 9 Location of oil spillages observed by aerial surveillance within the Baltic Sea Area 2002.

3.3 Climatic Conditions

The **climate** of the Ust-Luga region has the features of a marine climate of high latitudes, being transitional from marine to continental. Winters are unstable and mild characterised by sharp fluctuations in air temperature down to thaws, prevalence of cloudy weather, atmospheric precipitation and frequent fogs. Spring is cool and long and cold periods with snow cover often returns. Fog is frequent. Summer is not so hot and has a significant amount of atmospheric precipitation. In autumn the air temperature decreases and periods of cloud and fogs increase. Windspeed and the number of storms also increase.

Air temperature. Average annual air temperature according to the Ust-Luga meteorological station data is + 4.2°C. The warmest month is July with an average monthly air temperature of 16.9°C; the coldest month is February (–7.7°C). The absolute maximum temperature observed is +32°C (June–July) and the absolute minimum is –42°C (January). In Figure 10 average monthly and annual air temperatures are given according to the Ust-Luga meteorological station data.

On average, the first autumn frost occurs on 28 September and the last spring frost on 19 May. The average duration of a frost-free period is 131 days. The estimated temperature of the coldest five-day week is –23°C.

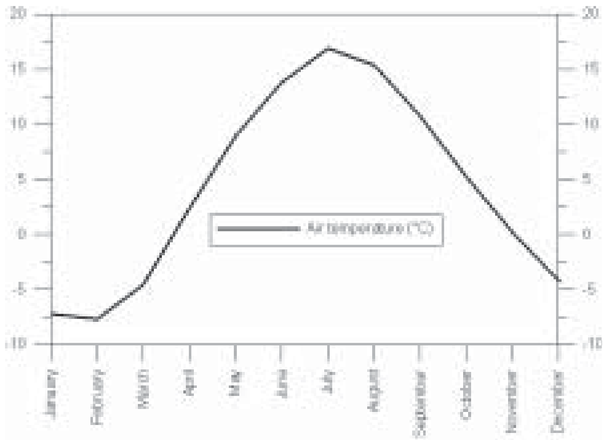

Figure 10 Average monthly temperature (°C).

Air humidity. The average annual relative air humidity in the region is 80%. Average monthly relative air humidity (%) is given in Figure 11.

Precipitation. The region relates to a zone of high humidity. The annual precipitation is on the average 700–760 mm. In Figure 11 the monthly average amount of precipitation is shown.

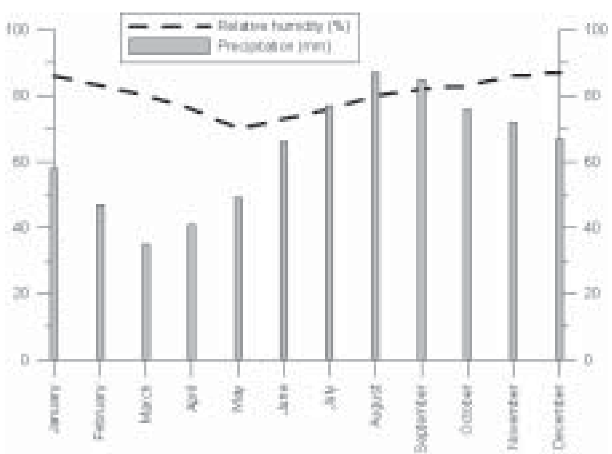

Figure 11 Precipitation (mm) and relative air humidty (%).

Cover of snow. On average, the first snow cover is usually on 4 November, formation of the stable cover of snow on 11 December and completion of melting of the snow is on 6 April. Average number of days with snow cover is 132 days. Maximum depth of the snow cover is 32 cm.

Snowstorms, fogs, thunderstorms. The average number of days with snowstorms is 20–23 days. Fogs occur on average on 28 days per year at Ust-Luga. On average thunder occurs on 19 days per year during the warm period (May–August).

Wind. Winds from south, southwest and west directions prevail during the year. The frequency of the winds in these directions is 50% but higher during the cold period of the year. During the summer months northerly winds are more prevalent.

The average annual wind velocity is 4.7 m/s. The highest average monthly wind velocity (November–December) is 5.4 m/s, whereas the lowest wind velocity (July, August) were 4.1 m/s and 3.9 m/s, respectively.

Winds of 4–8 m/s (45.3%) are noticed frequently. The recurrence of gale winds, with velocity of 14–20 m/s, is 1.3%. Recurrence of calm weather in the course of the year is 6.7 %. In a year, on the average, 18 days with gale wind (15 m/s and more) occur.

The maximum speed of wind in different directions for the monitoring periods of 1922–1935 and 1947–1958 were:

North	North-east	East	South-east	South	South-west	West	North-west
20 m/s	12 m/s	12 m/s	20 m/s	20 m/s	24 m/s	20 m/s	24 m/s

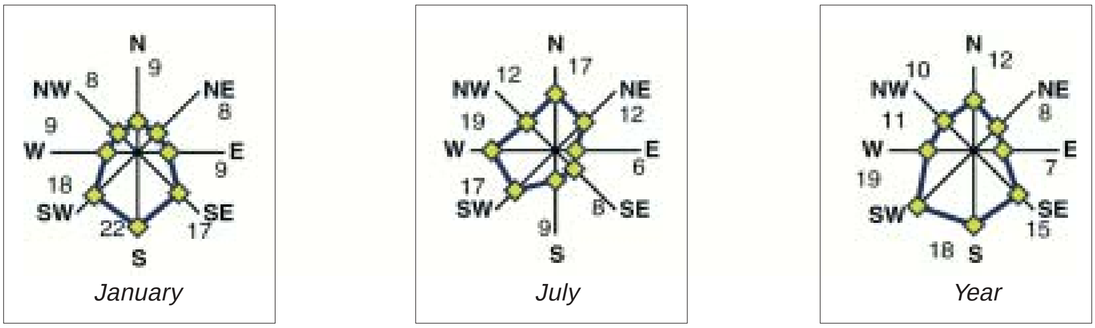

Figure 12 Wind-roses in Ust-Luga based on data of long-term monitoring.

Water levels. The Gulf of Finland is non-tidal but wind can cause level fluctuation of 5–10 cm on average, normal maximums of 20–30 cm and 1 m in extreme conditions. The water level fluctuation in the Luga Bay at the hydrological station of Ust-Luga is presented in Figure 13.

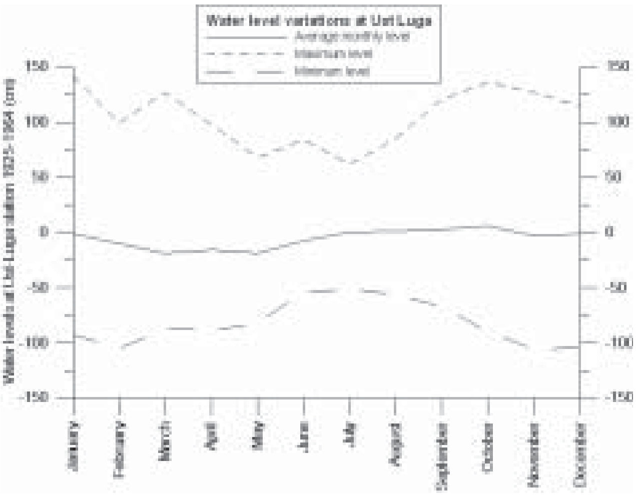

Figure 13 Average monthly and extreme water levels at the Ust-Luga station for 1925–1964 (cm).

The estimated water levels in the water area of Luga Bay (Baltic system):

Maximal (1 time in 100 years)	176 cm
Minimal (1 time in 100 years)	–130 cm
Average long term	–6 cm

Waves. Observations of water movements in the southeast part of the Luga Bay were carried out in 1994 by the expedition of Lenmorniiproject (LMHIIP). For the summer–autumn period maximum heights of waves (up to 1.6 m) were observed for NNW winds 7–9 m/s and for NNE winds, 8–10 m/s. Based on the data collected during the survey it was forecast 2 m waves can be expected during storm.

Water circulation. The currents in the Luga Bay are primarily caused by three factors:

- The water discharge by the River Luga
- Wind
- Influence of perennial currents of the Gulf of Finland.

Water movements are also affected by the sea bed contours in the bay. The combination of these factors causes varying character of the currents in the bay. It is known that in calm seas the surface current is north to south in the eastern part of the Luga Bay, and in the western part from south to north. The main reasons for these currents are the outflow of the River Luga in the southwestern part of the bay and the inflow of water from the Gulf of Finland to the bay through the eastern part. The current carries out substances from the southeastern part of the bay. The velocities of these currents are insignificant i.e. about 8–12 cm/s.

Under north and northeast winds in the eastern part of the bay, currents directed to south and southwest prevail. In the western part of bay the current is directed to the north and northwest. Under east and southeast winds in the eastern part of the bay, the current is directed to the south (current flows along the eastern coast in a strip of 2 km) and to the north. In the western part of the bay currents with northern and northwestern directions prevail. At southern and southwestern winds in east part of the bay, the current is directed, approximately, the same way as at southeast winds. At western and northwest winds in the east half of bay there is a uniform current direction to the south and southwest. In the western half of bay there are two directions: to the south and to the north. The north going current follows two branches: along the western coast and along Merilod. These two streams divide the current directed to the south. The observed maximal current velocity in the southeastern part of Luga Bay is 15–18 cm/s.

Ice conditions. Luga Bay ices over every year. The average number of days with ice is 146 days per year for the period of observations (1920 to 1964), with a minimum of 95 and a maximum of 186 days.

In shallow water around banks and shoals ice hummocks of height up to 5–6 m are common, whilst near the coast the ice is normally 1–2 m thick. In the upper part of the bay ice growth is on the average 10 cm at the end of November and 52 cm at the end of April, although ice 76 cm occurred in 1928.

At the beginning and end of winter there are occasions when high winds drive ice flocs into the bay which build up along the coast often damaging marine structure. In winter, when the prevailing wind is southwest, the ice drifting in the Gulf of Finland is partly stopped by the Kurgalskii reef and local ice in Luga Bay is moved towards the east. These conditions keep the western part of the bay open to shipping until January/February and two years in five the channel remains open throughout the winter.

3.4 Geomorphology and Geology

The Multi-purpose Terminal is sited on a terraced plain that rise gradually to 135 m ASL at Soikinskaya height. North of the mouth of River Khabolovka the terraces are separated by two vertical steps.

The first coastal terrace inclines slightly towards the sea. It is formed by sandy deposits and at some places swamps are present. There are clusters of boulders on the terrace. Stone ridges and ancient coastal shafts extend along the coastline. The bed thickness varies between 0.5 m and 5.6 m.

The second coastal terrace is wooded and inhabited to a great extent with residential settlements and roads. The thickness varies from 6 m to 7 m and rises to 40–60 m ASL.

According to the State 1:200 000 (1980) geological map of the USSR, pre-quaternary deposits on the east coast of the Luga Bay are represented by the Gdov and liaminarite horizons of the lower Cambrian period, deposited on an archaic crystal base. Gneisses, granite-gneisses and granites represent the crystal base. Quaternary deposits are found on top of the Cambrian and crystalline base.

3.4.1 Cambrian Deposits

The Gdov horizon is deposited on the rough diffuse surface of crystalline bedrock. Its appearance on a surface below quaternary sediments has local distribution and is linked to the ancient valleys in the region of the Lake Kopanskoye, Ust-Luga and the Lake Lipovskoye. The bed has no precise upper stratigraphic boundary and gradually passes into the overlaying liaminarite clays. The bed is up to 78 m thick. The sandstone and sands of the Gdov horizon consist of quartz, feldspar and mica.

Liaminarite horizon. The outcrops of liaminarite sediments are present everywhere in the port area. The bed is composed of layers of clays with thin layers of sandstone and sand. The clays are connected with the coastal band of the Gulf of Finland, where their thickness reaches 90 m, decreasing in the southwest direction to 55–60 m (region of Narva).

3.4.2 Quaternary Deposits

On the east coast of the Luga Bay there are quaternary sediments related to the upper and later periods of the Quaternary system. They include glacial, water-glacial, lacustrine, kettle lake, aeolian, alluvial, marine and bog deposits.

At the base of the quaternary deposit there are beds of ***lower-valdai recessional deposits***. The depth of the deposits is about 13 m. This stadial moraine consists of dark grey loamy sands, loams, with greenish tint and less often by boulder clays.

Lacustrine-alluvial deposits consisting mostly of thin dense ***middle-valdai interstadial*** loams and loamy sands between 10 and 16 m thick.

Sediments of Ostashkov and Luga (Luzhsky) sub-horizons represent ***the upper-valdai stadial horizon***. The structure of the moraine is various, from boulder loamy sands to boulder clays. The moraine has weak carbonate composition (3.5–7 %). The Luga sub-horizon mounts to a capacity of 4–7 m and consists of fluvial sands with gravel and rubble contents.

Varved and non-layered clays, loams and sand sediments of the Baltic glacial lake have an average thickness of 3–4 m. These clays frequently occur in the area.

The recent deposits of the region are marine and lacustrine sediments of the Baltic Sea in various stages of development. The sediments of the Littorina Sea are sands, loamy sands, loams and clays, and have a depth of 8–9 m. The sediments of the Baltic Sea limnial and mollusc stages are observed as a narrow band (50 m wide) at the coast of the Gulf of Finland. The sediments 5–6 m thick yellow-brown and grey sands, less often loams and clays, with large content (up to 30–40%) of rounded boulder-rubble material. The peat bog sediments have a rather small distribution. The depth of peat seldom exceeds 0.5–1.0 m.

3.4.3 Modern Sediments of the Luga Bay Water Area and Suspended Load

Middle and fine sand represent the beach sediments on accumulative sites of the coast. Sand-gravel and gravel-sand sediments with rubble and boulders at the eastern part of the Gulf of Finland are forming areas bordering the sites of the coast, islands, shoal banks and shoals. The low border of distribution of these deposits passes along the isobathic contour of 8–10 m.

The sandy sediments form areas in the upper part of the submarine coastal slope. In the southern part of the area the lower boundary of distribution of sand is on 18–20 m. In the central part of the area the sediments are fixed at the depths of 24–31 m, in the northern part at 35–41 m.

Aleuritic silts in the eastern part of the Gulf of Finland occupy the bottom area at depths between 18–20 and 36–38 m.

The suspended matter found in the eastern part of the Gulf of Finland is mainly of a terrestrial origin.

The average annual amount of suspended matter from the rivers running into the Gulf of Finland is (thousand tons):

River Neva	514.1
River Narva	159.6
River Luga	40.8
River Kumin-Ioki	50.0
Other rivers	51.3
Total	815.8

Suspended sediments in the eastern part of the Gulf of Finland promote distribution of coastal abrasion products into the central, mostly deep-water regions and there maintains a high concentration of suspension. With small waves the maximum suspended load is observed at depth of 4.5 m and during moderate waves at the depth of 10 m. At storm strength, the zone of the increased contents of suspended load sinks to even greater depths.

On the western and eastern coasts of the Luga Bay there is a north-south littoral draft.. Sedimentation occurs in the southern part of the bay. The movement of the suspended solids along the coast under influence of waves and currents occurs down to depths of 11–12 m.

3.5 Surface Water and Groundwater

3.5.1 Surface Water

The region of the Luga Bay is characterised by a well-developed hydrographic network. In the area of the port construction site the River Luga, and the smaller rivers River Khabolovka, River Luzhitsa and River Krakolka represent the drainage net.

The *River Luga* runs into the Luga Bay 5 km southwest of the construction site. The length of the river is 336 km with a catchments area of ~14 000 km^2. The width of the river at the mouth is 300–400 m. The Luga River is a plain type river with a predominance of snow runoff. The ratio of average long-term distribution of spring flood, rain and underground drainage in percentage of the average annual drainage is 53:19:28.

The River Rosson separates 24 km from the mouth of Riv er Luga and runs southwards to the mouth of the River Narva. The River Vyb separates from the River Luga 6 km from the mouth.

Four phases of water levels characterise River Luga: spring high water, summer–autumn period broken by rain high water, autumn–winter period with slight increase and winter period. The main inflow to the river during the summer drought period is from groundwater.

The *River Khabolovka* originates in the northern part of the Khabolovo lake system and flows into the southeast part of the Luga Bay just north of the Multi-purpose Terminal near Koskolovo village. The river is 10 km long with an average slope of 0.7%, and a catchment area of 330 km^2.

Figure 14 Map of hydrography.

Figure 15 The mouth of River Khabolovka at Luga Bay.

The *River Luzhitsa* originates from the Zavironskii Mokholigotrophic moor and flows in a northern direction into the southern part of the Luga Bay. The river is 13 km long with an average slope of 1.5%, and a catchment area of 50.2 km^2.

The *River Krakolka* originates 3 km south of Krakolye village and flows into the Luzhitsa river 2.2 km from its mouth, near Luzhitsa village. The river is 9 km long and has an average slope of 0.9%, and a catchment area of 18.3 km^2.

The spring high water of the small rivers begins at the turn of the month March/April. The duration of the high water is about 55–60 days with a peak at the third part of April. The summer–autumn low water is from June until October. Average increase in water level during autumnal high waters is 20–40 cm. The winter low level starts at the beginning of December and proceeds till the end of March.

	Average annual flows at river mouth(m^3/s)	Maximum water flows at river mouth(m^3/s)
River Luga	92	1,660
River Khabolovka	3.6	29
River Luzhitsa	0.4	14
River Krakolka	0.1	6

Table 1 Water discharges at river mouths.

Ice conditions. River Luga freezes at the beginning of December and remains frozen on average for 123 days with a variation between 52 and 164 days. The greatest thickness of ice is observed in March being on average 50 cm, and a maximum thickness of ice of 85 cm. Spring ice floes occurs in the middle of April for 4–5 days, less often for 15–16 days. With late ice thaws (end of April) the ice disappears in less than 1 day.

The small rivers freeze at the end of December – beginning of January. At the mouths of River Khabolovka and River Luzhitsa the average ice thickness is 40–50 cm, with a maximum of 60–70 cm in severe winters. Breaking ice in the watercourses occurs at the beginning of April. Spring ice floes do not occur in these rivers and they are frozen in 90–110 days.

Hydrochemical conditions. The River Luga has fairly high concentrations of inorganic nutrients as nitrogen and phosphorus, although concentrations vary during the year with e.g. the water flow and season. The content of organic matter (COD_{Cr} = 16–47 mg/l) and iron (1.00 mg/l) is moderate, giving some colour to the water, although the water has high transparency during the whole year. Water from the River Luga is potable the whole year round.

Hydrochemical conditions in small watercourses. In the Rivers Khabolovka, Luzhitsa and Krakolka the water has pH of 6.6–6.9, a high content of dissolved oxygen and the content of organic matter (measured as COD_{Cr}) in the three rivers varies between 9 and 25 mg/l. No information on the concentrations of nutrients is available.

Analyses of sediments in surface waters showed that the content of petroleum hydrocarbons varied in the interval of 2.3–275 mg/kg, thus at some sites exceeding the target value of 50 mg/kg. The concentration of polycyclic aromatic hydrocarbons (PAH) did not exceed 200 µg/kg in most samples, except at one site on the River Khabolovka where 596 µg/kg was detected. Other contaminants as chloroorganic substances including DDT and heavy metals do not exceed target values according to SP11-102-97. Thus, the results of analyses do not indicate the presence of contaminants in high concentrations in the sediments.

The water of the studied rivers is weakly aggressive to concrete.

3.5.2 Ground Water

In the region there are two ground water aquifers of different origins located in quaternary sediments: sandy gravel and pebble structures and sites where clay is absent. These aquifers are interconnected hydraulically. The groundwater recharge is from infiltration of atmospheric precipitation and melting snow. The groundwater flows generally from high ground, towards the Luga Bay with which there is a close hydraulic connection.

The first horizon usually has a sea and glacial lake origin. In places where dense sediments are deposited on top of the horizon, the groundwater is held under pressure. Hydraulically the groundwater is closely connected to the sea water in Luga Bay. Discharge of groundwater occurs in the hydrographic network.

The aquifer thickness varies with the ground relief. On lower boggy sites the ground water surface is close to ground level. Generally the aquifer is 0–3.2 m thick

The second aquifer is located at depths of 9.2–21.9 m. Piezometric surfaces are registered at absolute levels of minus 3.1–3.2 m, the confined ground water pressure is 6.7–17.3 m. Water of this aquifer is also aggressive. The results of the groundwater analysis are shown in Table 2.

Parameters	I aquifer	II aquifer
Chlorides	43.0–172.2	29.3
Sulphates	13.2–93.8	551
Nitrates	1.6–7.5	1.0
Calcium	12.0–61.0	18.0–26.0
Magnesium	7.3–26.1	2.4–12.2
Sodium + Potassium, calculated as K	34.5–124.9	18.2–29.7
Iron (total)	2.5–22.4	1.6–1.9
Dry residue	210–508	170.0
pH	6.28–7.54	6.40–6.42
Organic matter (humus)	7.8–45.8	4.1–6.2

Table 2 Chemical composition of ground water of aquifers I and II, mg/l.

The planned source of potable water supply for the port complex is the underground water of Gdov horizon of 100–120 m depth. Physical and chemical parameters of the Gdov horizon water in the Ust-Luga marine trade port vicinity are given in Table 3.

Parameter	Unit	Concentration
Hardness	mg-eqv./l	7.7–10.4
Chlorides	mg/l	883–1089
Hydrocarbonates	mg/l	159–176
Sulphates	mg/l	8.2
Sodium	mg/l	495–538
Magnesium	mg/l	40–55
Calcium	mg/l	81–116

Table 3 Chemical composition of Gdov horizon water in the region of the Ust-Luga port.

3.5.3 Water in Luga Bay

Several geophysical processes that vary in time and space have influenced the hydrochemical composition of the seawater in the eastern part of the Gulf of Finland. The water circulation, river discharge, surface runoff, atmospheric precipitation, biological activity and extent of human activities in the area are all factors that effect the seawater hydrochemistry.

The water in the Luga Bay is eutrophic due to a fairly high load of nutrients in the form of phosphorus and nitrogen from the rivers discharging into the bay. The oxygen content in the water is, however, relatively high giving good conditions for biological life. A few results from analyses of the water are presented below.

Water salinity in the Luga Bay. The highest salinity is observed in the northern deep-water part of the bay and along the eastern coast. In the northeastern part of the bay salinity at the surface water layer varies between 1.7 and 5 ‰ and in the benthonic layer it is between 3.2 and 7.7 ‰. In the more shallow southern part of the bay salinity is somewhat reduced due to the outflow of river water and varies from 1 up to 4.8 ‰ in the surface layer and from 2.2 up to 6.2 ‰ at the bottom.

Water salinity varies with river fluctuations but when the surface water salinity decreases the deeper salinity increases due to inflow of salty water.

Oxygen conditions. The oxygen conditions in Luga Bay varies due to the non-uniform distribution of river water, the vertical heterogeneity of the water mass, the presence of a halocline and the load of organic matter.

According to observations in 1997–2001 of surface water in the eastern part of the Gulf of Finland, the concentrations of dissolved oxygen varied between 5.5 and 10.8 mg/l, which is a fairly good. The content of dissolved oxygen in the Luga Bay varies in the surface layer during the year, with a lower content during the winter period.

Biological oxygen demand (BOD_5) in surface water of the Gulf of Finland varies between 0.35 and 1.63 mg/l. The maximum value of BOD_5 was registered in the Luga Bay, indicating that a larger load of organic matter has to be degraded in this part of the gulf.

Chemical oxygen demand (COD) – Values of 8–15 mg/l are characteristic for the Luga Bay.

Nitrate concentration in Luga Bay water is observed to have elevated levels of 1,200 μg/l and also high concentrations of nitrite (20 μg/l) have been observed. The high levels of nitrogen content were connected to the influence of enriched water from the River Luga.

Phosphate content in the water of the Luga Bay is essentially higher than in the open parts of the Gulf of Finland and varies between 5–10 and 40–60 μg/l which can be connected to the outflow of the River Luga. Elevated values are observed in the bottom layers in the more saline parts of the bay and less often in the desalinated parts.

3.6 Ecology and Biotic Resources

The vegetation in the area belongs to the subzone of southern boreal forest.

Vegetation types on which the port expansion will have a direct impact are in the shallow water where different species of bullrush are growing. In the marshland, closer to the shore, there is a marshland flora containing common reed, yellow loosestrife, marsh-bedstraw, tuffed hair-grass, meadow buttercup, meadow rue and sneezewort. Further up from the shore there are different kinds of pine forest.

On the site where the port complex is planned, there are 8–10 different rare or protected species of plants, e.g. early marsh-orchid, heath spotted-orchid and water-lilies. In the area for the whole port complex there are around 20 species of rare and protected plants. Location of sites for rare and protected plants is shown in Figure 16.

Level of pollutants in the vegetation cover has been carried out in the Ust-Luga seaport area in 2002. During the study the content of polycyclic aromatic hydrocarbons (PAH), chloroorganic compounds and heavy metals were analysed in samples of vegetation. The analysis shows that the levels of pollutants in the vegetation cover are low and does not differ from characteristic background levels of the northwest European territory of Russia.

Nesting and sites for rare birds and mammals are shown in Figure 16.

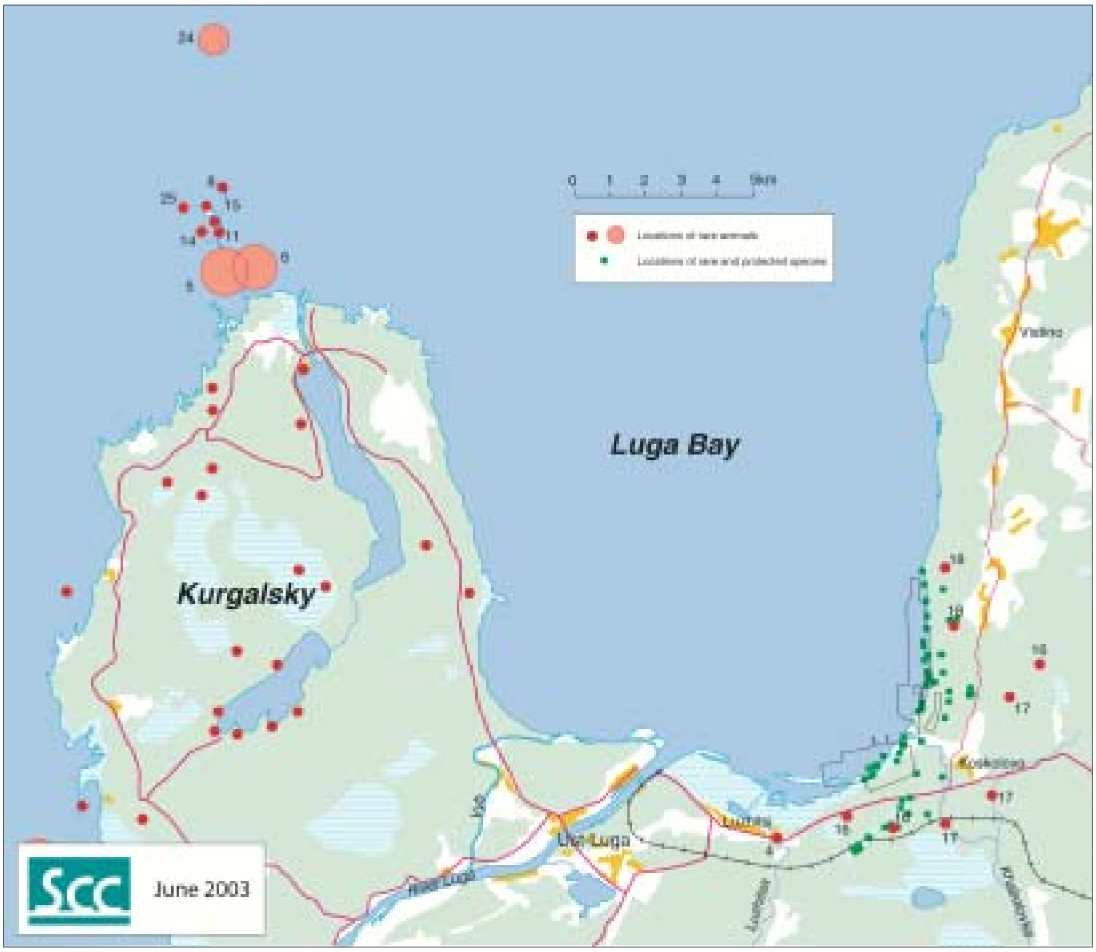

Figure 16 Nesting sites of rare birds, habitats of rare mammals and locations of rare and protected plants. Numbered dots: 4 - Stork, 5 - Mute Swan, 6 - Velvet Scoter, 8 - Greylag Goose, 11 - Lesser Black-backed Gull, 14 - Razorbill, 15 - Black Guillemot, 16 - Ural Owl, 17 - Bat, 18 - Hedgehog, 24 - Grey Seal, and 25 - Ringed Seal.

3.6.1 Fauna

The fauna of vertebrates around the Luga Bay is rich. The landscape is varied and contains many different kinds of habitats. Until now the area has not been involved in large human activities and the animal life has not been too much disturbed.

In the vicinity of the Luga Bay, there are 3 species of amphibians, 5species of reptiles, 118 species of birds and 30 species of mammals.

The birdlife is rich with both forest birds (various species of thrushes, warblers, etc.) and sea and wetland birds (crickets, snipes, sandpipers). In the sea just north of the port complex are rest places for Black Scoter during migration and moulting. On swamps grey cranes are observed.

In the woods there are hedgehogs, ordinary moles, bats, mouse-type rodents, hares, stoats, weasels, wild boars and, less often, elks. Among reptiles and mammals the most numerous are ordinary adder and hares, respectively.

Figure 17 shows the different kinds of fauna habitats in the vicinity of the port expansion. The habitats on which the port expansion will have a direct impact are the coastal wetland, the pine forest, mixed forest and the areas in between.

The most sensitive habitat is the coastal wetland. It contains birdspecies like seagull, herring gull, black-headed gull, common and arctic tern, great crested grebe, mallard, goldeneye, little ringed plover, common redshank, common sandpiper, great reed warbler, sedge warbler and reed bunting. There are also mink, raccoon dog and common frog in the area.

Protected Fauna

The area for the port expansion is close to the nature reserve of Kurgalsky peninsula. Many of the different species of birds that are harboured at the peninsula are also present at the shallow waters in the southeastern part of the bay. The area supports large numbers of migrating and breeding waterbirds.

The following species of birds, included in the Russian Red Data Book (RRDB), are present in the area:

- **Black stork** (*Ciconia nigra*).
- **Bewick's Swan** (*Cygnus bewickii*) – during spring migration, long stops for rest and feeding.
- **Lesser White-fronted Goose** (*Anser erythropus*).
- **Barnacle Goose** (*Branta Leucopsis*).
- **White-tailed Eagle** (*Haliaeetus albicilla*) – several pairs nesting at the Kurgalsky peninsula.
- **Osprey** (*Pandion haliaetus*) – nesting in the area and feeding in the bay.
- **Peregrine Falcon** (*Falco peregrinus*).

Other species in the area that are rare and protected in the Leningrad oblast includes black-and red-throated divers, whooper and mute swan, golden plover, Eurasian oystercatcher, ruff, curlew, whimbrel, bar-tailed and black tailed godwit.

Except for birds there are 2 species of amphibians, 4 species of reptiles and 8 species of mammals that are rare and are protected in the Leningrad Oblast.

Two species of seals are in the RRDB and vulnerable respectively near threatened according to IUCN Red List of Threatened Animals: **Ringed seal** and **Baltic grey seal**. Their primary habitat is in the archipelago north of the Kurgalsky peninsula.

Figure 17 Map of habitats.

3.6.2 Value of Habitats for Flora and Fauna in the Area for Port Complex

The coastline in the area of planned port complex has different value as a habitat for animals and plants. The coastal zone in the shallow part of the bay have the highest value and the value diminishes, as the water along the coast gets deeper, see Figure 18.

The shallow area is an important habitat for water birds and shore birds during nesting and migration periods and there are species of rare and protected plant.

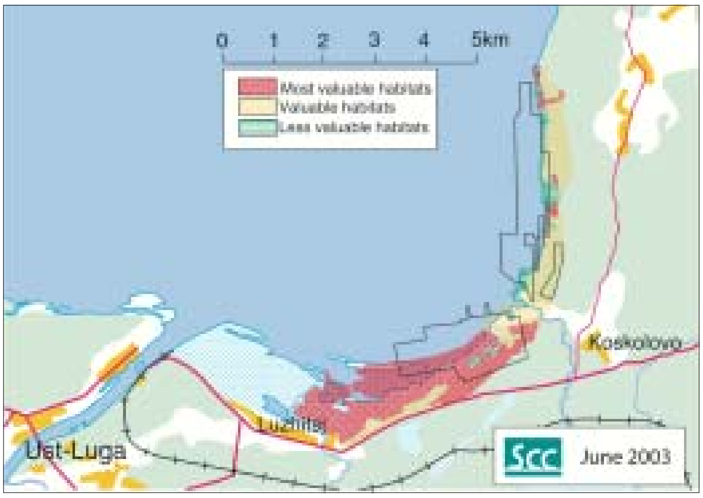

Figure 18 Map of the value of habitats for flora and fauna.

3.6.3 Marine Flora and Fauna

Phyto- and Zooplankton

The production of phytoplankton in the bay is characterised by two peaks – in the spring and in the autumn with a recession in the middle of the summer. This is usual for the Baltic Sea and the Gulf of Finland. The maximum biomass is occurring in spring and does sometime reach 15 mg/m^3. In shallow parts of the bay an intense algae blooming is likely in the summer due to eutrophication.

The production of zooplankton in the Luga Bay is one of the highest in the Gulf of Finland. A typical biomass-level during September is 0.5 g/m^3. There are more than 80 species of zooplankton. Two groups, crustaceans and copepods, dominate.

Bentic Animals (Zoobenthos)

The zoobenthos of the Luga Bay has a smaller variety than in the western part of the Gulf of Finland and the Narva Bay. The most varying communities are found in the western, southern and central part of the bay. In the southeast part of the bay the communities are less varied.

The distribution of *benthic animal* communities reflects the general ecological situation in the Luga Bay. It indicates contamination of the water and sediments of the southeastern corner of the bay and considerably better ecological conditions at the western, southern and central parts of the bay.

Among zoobenthos in the bay there is a small number of shells Baltic clam, Bay barnacle and Zebra mussel. Zoobenthos are dominated by aquatic worms and midges/ mosquito larvae.

Fish

The Luga Bay contains a wide variety of fish species and is a water area of the highest fishery category. The annual catch of fish is about 900 tonnes. The Luga Bay contains permanently more than 30 species of fish including sprat, salmon, gwyniad, vendace and trout of greatest importance. The spawning grounds in the River Luga explain the presence of salmon and gwyniad species in the bay.

A reduction of the valuable species in the bay has occurred because of overfishing, infringement on spawning grounds and eutrophication. The proportion of the valuable species in the total annual catch has decreased. For that reason, the fish caught of less valuable species (stickleback, carp and bass) have increased. The catch of stickleback has risen up to half of fish caught in the past years. The stickleback is used as raw material in fish flour factories.

Morphological features of a reservoir (shallow and deep areas), salinity variations and seasonal variations determine the distribution of fish in the water area of the bay. The deep part of a bay contains sprat, stickleback and the coastal shallow zone of stickleback, perch, bleak and small fry.

The numbers and the biomass of fish in the Luga Bay vary considerably in time and distribution. The coastal zone of the eastern coast is characterised by considerably larger fish abundance compared with the western one (on the average two times greater in numbers and four times greater in biomass) and has different seasonal variations. At the eastern coast there are two peaks – in June (maximal) and in September – and a significant depression in August. In the eastern part of the southern shallow zone (the site of the port construction) the maximum of the bay’s average seasonal biomass of fish, more than 200 kg/ha, was registered.

The majority of the fish species in Luga Bay are spawning in the area. The spawning of sprats is concentrated to the central and northern parts of the Luga Bay, on banks in the coastal part on depths from 3 to 15 m. Spawning of the stickleback is located in the littoral zone at small depths, mainly in areas in the southern part of a bay with lower salinity and in the river mouth. The densest spawning of the stickleback is along the eastern coast of the bay.

The Luga Bay is an important area for spawning and nursery ground for fish. The area is important for reproduction of basic food fish in the of Gulf of Finland.

3.6.4 Nature Reserves

There are two nature reserve areas in the vicinity of the port complex in Ust-Luga: The Ramsar wetland site and zakaznik **Kurgalsky peninsula** and zakaznik **Kotelsky**.

There is also a Baltic Sea Protected Area north of the bay – **Eastern Gulf of Finland**. The protected area includes islands and sea area in the gulf. Protected areas are shown in Figure 19.

Figure 19 Protected nature in the vicinity of the port complex in Ust-Luga.

Kurgalsky Peninsula

Kurgalsky peninsula is a wetland of international importance according to the Ramsar Convention. The area is also a regional state nature reserve, a zakaznik. A zakaznik is a temporary nature reserve.

The area of land is 20,724 ha and lakes and gulf is 39,390 ha, which make a total of 61,144 ha.

The purpose for creation of the zakaznik was

- Preservation of the standards of natural complexes of seaside landscapes of the coast of the Gulf of Finland;
- Protection of forests of middle-, southern-, and sub-boreal type;
- Maintaining of biological diversity, protection of rare species of flora and fauna;
- Protection of a shallow zone of the gulf that is a spawning ground for valuable species of fish;
- Protection of areas for nesting and migration stops for waterbirds and wading birds etc.;
- Protection of habitat for grey Baltic seal and ringed seal;

- Organisation of zones for regulated recreation.

In the annotated Ramsar list of wetlands the site of Kurgalsky peninsula has following description:

> **Kurgalsky Peninsula.** *13/09/94;* Leningrad Oblast; 65,000 ha; 59º41'N 028º09'E. Temporary Nature Reserve. The shallow waters of the Gulf of Finland, numerous islands, and the Kurgalsky Peninsula, which is covered with mires and pine forest. Habitats include patches of broad-leaved and mixed forests, coastal meadows and marshes with alder and oak, *Sphagnum* fens, floodplains, dry meadows, and reedbeds. The site exhibits a high species diversity of flora and fauna, supporting numerous species of regionally or globally threatened plants, mammals, birds, amphibians and reptiles. The wetland supports large migrating and breeding populations of numerous species of waterbirds. The local population is engaged in the fisheries or seafood industry. The site borders Estonia. Ramsar site no. 690.

The borders of the zakaznik and the Ramsar site are viewed in Figure 20. The distance from the Multi-purpose Terminal quay to the border of the Ramsar site is about 6 km.

Figure 20 Kurgalsky peninsula, Ramsar site of wetland, and Kotelsky reserve.

Kotelsky Reservation

Kotelsky is a regional state nature reserve, a zakaznik. The reserve contains a system of lakes and a forest with few clearcuts. The area is 7,690 ha and 3,000 ha of lakes.

The purpose for creation of the zakaznik was:

- Preservation of natural complexes of forests of southern boreal type and lake-river system with rare species of plants and animals of the western part of the Leningrad Oblast.

The reserve has a high diversity of vegetation with some species from the Russian Red Data Book. There is also a rich wildlife with many rare birds. The lakes contain some fish species: perch, pike, roach and crucian carp. Streams and canals connect four of the lakes – Sudachye, Khabolovo, Babinskoye and Globokoye. The lake system is connected to the Luga Bay by the River Khabolovka, which ends up in the middle of the planned port complex. There is no information on migrating fish in River Khabolovka. The reserve is shown in Figure 20.

Eastern Gulf of Finland

The Baltic Sea Protection Area, BSPA, named Eastern Gulf of Finland consists of islands with adjacent water areas in the Russian part of the gulf. The islands close to Luga Bay included in the protected area are Ostrov Seskar, Ostrov Malyy and Ostrov Moshchnyy. Vessels taking the eastern channel to Ust-Luga will pass Ostrov Seskar and vessels taking the western channel will pass Ostrov Malyy, Figure 21. The main channel into the eastern part of the Gulf of Finland passes other islands included in the protected area.

The BSPA:s are sensitive areas with large numbers of nesting and migration birds.

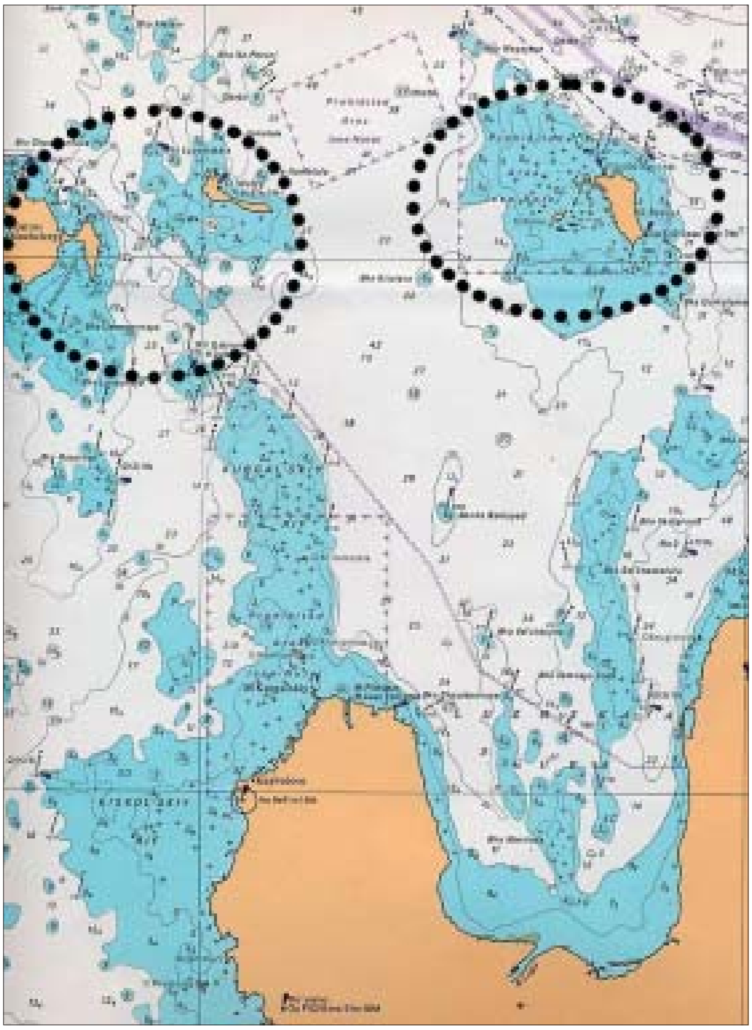

Figure 21 Islands included in the BSPA Eastern Gulf of Finland.

3.7 Air Quality

The background levels of air pollutants in the region of the port complex are formed by emissions from industrial centres (St. Petersburg, Kingisepp, Narva). There are also industries contributing to the background levels (Fertiliser industry and industries in the industrial town of Slantsy, 60 km away) and trans-boundary transport. The "Phosphorite" industry emits 2,700 tons of dust, 2,050 tons of sulphur-containing gases, 140 tons of sulphuric acid, 40 tons of fluorine compounds and 540 tons of ammonia to atmosphere annually.

Substance	Concentration (µg/m^3)
Particulate matter (PM)	< 150
Nitrogen dioxide (NO_2)	< 20
Sulphur dioxide (SO_2)	< 11
Carbon monoxide (CO)	< 750

Table 4 Background concentrations of air pollutants.

An investigation of the most important air pollutants was carried out in summer 2002. The background concentration of polluting substances in the atmosphere in the region of planned port complex was analysed and the result is shown in Table 4.

The concentrations of PM seem to be high. For other pollutants in Table 4 the background levels are more moderate.

Measures were also made for volatile organic compounds (VOC) and the concentration e.g. benzene was 10 mg/m^3 which is rather high.

There are no nearby large sources of air pollutants – no traffic, no industrial sites except for the fish industry in Ust-Luga. In the winter, wood burning for heating of houses will contribute to the levels of particulate matter and VOC in air. Thus, the level of air pollutants from the investigation seems to be too high for the port area.

3.8 Noise and Vibrations

No measures of noise levels or vibrations have been carried out in the vicinity of the planned port complex. The area around the port complex is a sparsely settled rural area with no industries. The noise levels are low in the nearby settlements due to a low traffic volume and absence of other noise sources. Possible vibration disturbance sources are road and railway traffic. The traffic on roads and railway are low, which means that vibration disturbance for people living in the area are unlikely.

3.9 Ground Conditions

3.9.1 Pollution of Sediments in Luga Bay

Contaminants in sediments in a bay reflect the degree of contamination by the surface water runoff as well as the surrounding sea area. Contaminants often bind to particles and they are deposited when the hydrographic conditions allow sedimentation.

The contamination level in the sediments in the Luga Bay that are described is generally low. However, no information is given on where the samples have been collected. The concentrations of heavy metals are close to the regional background, whereas hydrocarbons, PAH and chloroorganic compounds are detected, although not in very high concentrations.

In Table 5 the concentrations of some parameters are compared with quality standards for four Baltic Sea states.

Mineral oil. Concentration of hydrocarbons (mineral oil) in bottom deposits of the Luga Bay varied from 5–37 mg/kg dry weight. Areas with the higher concentration of mineral oil were fixed in the central part of the bay.

Polycyclic aromatic hydrocarbons. Out of 24 individual PAH levels of concentration, 16 were lower than limits of detection of the used method of the analysis. In Table 5 the intervals of concentration of identified PAH in sediments of the Luga Bay are shown.

	Mud	**Sand and muddy sand**	**Russian norm** SP11-102-97	**German-HABAK der WSV** standard values	**Estonian Target values in soil**	**Swedish Environmental Quality Criteria** for sediments
Metals (mg/kg d.w.)						(Background values)
Zinc	24–68	7–24	140	350	20	85
Copper	1–22	0.05–9	36	40	20	15
Nickel	1–12	0.05–10	35	50	100	30
Lead	5–83	0.5–29	85	100	200	25
Cadmium	0.1–1.2	0.05–0.66	1	2,5	50	0,2
Chromium	38–86	43–57	100	150	100	40
Mercury	0.05–0.25	0.05–0.08	0,3	1	1	0.04
Organic compounds (µg/kg d.w.)						(Minimum concentration in open sea)
PAH (24)	10–70	10–70			100	0–280
DDT (sum)	<2.1	<2.1	2.5	1	100	0–0.2
HCH (α,γ)	<0.25	<0.25			100	0–0.01
PCB (total?)	<2.2	<2.2	20	20	100	0–5

Table 5 Contamination levels in sediments in the Luga Bay.

Chloroorganic substances. In the bottom sediments of the Luga Bay the maximum concentration of the chlorinated organic substances (PCB and pesticides like DDT and HCH, hexachlorocyclohexane) was found in mud and muddy sands. The concentration of pesticides indicates a low level of contamination.

Heavy metals. In some of the samples the concentration of cadmium, chromium, lead and mercury exceeds the background values for sediments in the open sea, however the values are within the German-HABAK der WSV standard values.

3.9.2 Soil Pollution

Former activities might have contaminated the soil in the area. Contaminated soil has to be handled in a way that will minimize the risk for future contamination of air, ground, surface and ground water.

The basic criterion of the estimation of the degree of pollution of ground with chemical substance is their concentration compared with different quality standards applicable for soil. However, only a few results of analysis are available to make a close comparison. From the information given in the Russian EIA it can be concluded that the soil probably is not seriously polluted in the area of the port complex.

Several ecological and geochemical investigations of soils in the territory of port complex in Ust-Luga have been performed. The results commented below are taken from the EIA summary and not from the original reports from the investigations. In soil investigations from 2002 the following substances were determined: total content of petroleum hydrocarbons, non-polar aliphatic hydrocarbons, volatile aromatic hydrocarbons, polyaromatic hydrocarbons (PAH), phenols, chloro-organic pesticides, PCB and heavy metals. Some results are presented in Table 6. A comparison with guideline values indicate that the analysed sampled do not contain high concentrations of mineral oil and PAH.

Total contents of petroleum hydrocarbons (TPH). In 90 % of the analysed samples TPH did not exceed 50 mg/kg. The concentration of TPH varied within the range 7.8–77.1 mg/kg, the average being 26.8 mg/kg. The maximum values were found in turf sand in the northern part of the territory (4–4.5 km to north of the ferry complex).

mg/kg d.w.	**Investigation 2002**	**Swedish guide- (industrial areas)**	**Estonian guide-ance value (industrial areas)**
Total petroleum hydrocarbons (mineral oil)	7.8–77	200–500	–
Non-polar petroleum hydrocarbons	0.79–2.4	–	–
Volatile aromatic hydrocarbons	–	–	–
Polyaromatic hydrocarbons (sum of PAH)	Maximum 2.3	20	20
Chloro-organic substances – DDT	0.0006	–	–

Table 6 Results of organic analysis of soil samples.

Non-polar aliphatic hydrocarbons. Frequency of detection of substances of this group in soils of the surveyed territory was 20–90%. The total concentrations of non-polar hydrocarbons varied in the range 0.79–2.41 mg/kg. The maximum value was found in peat soils in the northern part of the territory.

Volatile aromatic hydrocarbons. In all the analysed samples the concentration of volatile compounds was lower than the detection limit, and consequently, below established target values.

Polyaromatic hydrocarbons (PAH). In the soil samples almost all of the 16 individual PAH generally analysed were detected. The total PAH concentration in this test was 2.3 mg/kg. In this sample the maximum concentration of most of identified PAH were observed.

Chloro-organic compounds. In the analysed soil samples DDT and polychlorinated biphenyl were regularly found. However, none of the samples exceeded the established maximum (Russian norm) for the soils. The maximum observed concentration of hexachlorbenzol (0,18 µg/kg and total DDT (0,59 µg/kg) was much lower than the maximum permitted levels for these substances.

Heavy metals. Concentrations of analysed metals (iron, manganese, zinc, copper, nickel, cobalt, lead, cadmium, chromium, tin, mercury, arsenic) in the soils were below levels of Russian target values. No values are available.

Radioecological Conditions

The radiation condition is one parameter evaluated for the environmental situation. The radiation is a combination of natural and anthropogenic factors.

Ecologic-radiometric inspections in particular the areas of the coal and mineral fertilizers terminals were performed in 1997, 2000 and 2001. Some conclusions from the investigations were:

- The natural component of radiating risk factors in the examined area is within the limits usual for Leningrad region. The results of field monitoring indicate a low probability of radiation danger. If ground-water (Gdov or into moraine water carrying horizons) is used, periodic radiating control of water communications is necessary.
- The area of raised cesium radiation is on the northern flank of the trace of the Chernobyl deposits. The average density of pollution Cs^{137} is below threshold level (1 Ci/km^2), however the levels might lead to excess activity in wild-growing raw material. Of the cesium content 74 % was concentrated in the top 5 cm of the soil.

According to the research of radioecological conditions in the Luga Bay, pollution of bottom sediments with Cs^{137} is observed. There is a distinct reduction with depth of the contents of radionucleids in bottom sediments. Pollution by isotopes of cesium is basically located on deep-water sites where most fine dispersed deposits are located, frequently with an increased content of organics, with a significant sorbing ability.

Depth of radionucleids penetration vertically in bottom sediments is 5–10 cm. The amount of pollution of bottom sediments does, on average, not reach the level of 1 Ci/km^2. The location of the bottom deepening works will not involve places of the maximum pollution Cs^{137}. Contents of Cs^{137} in fish in the Luga Bay is on an average level for the Gulf of Finland.

A concentration of Cs^{135} below threshold values in sediments indicates limited impacts on sediments from Cernobyl and from the nearby nuclear-power plant in Sosnowy Bor.

3.10 Socio-economic and Cultural Issues

The region of the planned port complex belongs administratively to the Kingisepp district of the Leningrad Oblast. In Kingisepp district there are 74,000 people living in 214 rural settlements. The administrative district centre is the town of Kingisepp with a population of 50,000. By national structure the overwhelming population are Russians. A small group of the population is of Finn-Ugor origin.

The district is an average populated region of the Leningrad Oblast. The density of rural population is about 8.3 persons/km^2. The places in the vicinity to railroads and larger roads are most populated. The population of the district is predicted to lose in numbers the nearest 10 to 15 years.

There are approximately 3 000 people living in the village of Ust-Luga. The houses in Ust-Luga and the nearby settlements are old and many of them in poor condition.

The health of the population in the Sojkinskaja volost does not differ from the population of the Kingisepp district or the Leningrad oblast.

3.10.1 Trade and Industry, Employment

Close to the city of Kingisepp district the industrial site KPO “Fosforit” amalgamation is situated. The industry occupies a territory on the western bank of the River Luga from Aleksandrovskaya gorka settlement up to Salla settlement. The industry structure includes two large phosphorites quarries and two grinding and concentrating plants.

Beside of the phosphorus industry, marine type of enterprises employs most of the population in the district. There is the Ust-Luga fish factory, the shipyard, “Lenkholodflot”-base, Ust-Luga quay and the “Baltic” fishery collective farm.

A timber terminal and a fish port are located at the mouth of the River Luga.

The agriculture sector is well developed in the area. There are livestock farming as well as agriculture in the district.

3.10.2 Infrastructure

The port complex in Ust-Luga is connected to the St. Petersburg–Tallinn railway. From Veymarn on the St. Petersburg–Tallinn connection there is a railway to Kotly with further connection to Ust-Luga. There is also a connection to the industrial town of Slantsy. The railway connection Veymarn–Kotly–Ust-Luga is not electrified.

There are two main roads leading to Ust-Luga. From Kingisepp in the south, there is a road along the River Luga. From the main road between St. Petersburg and Tallinn, E 20, there is a connection to Ust-Luga via Alekseevka–Kotel‘skiy and through the Kotelsy zakaznik. A small coast road is also leading to Ust-Luga.

The River Luga is navigable up to the Kingisepp kataracts, however, further upstream navigation is not possible.

Telephone and optic-fiber cable communications exist.

3.10.3 Culture

There are no known archaeological sites in the area for the port complex expansion. No cultural important buildings or sites are known in the vicinity of the planned port complex.

3.11 Land Use and Settlement Partners

Along the coast of the Luga Bay there are territories of rural councils – Krakolsky and Soikinsky. In 1992 the population of these councils was 4 587 people. The major part of the inhabitants lives in the village of Ust-Luga. There are two nearby settlements – Luzhitsy, approximately 3 km southwest and Koskolovo approximately 1 km east of the port complex, see Figure 22.

Figure 22 Settlement and land use.

The closest settlements with year around population are shown in Table 7.

Settlement	Population
Dubki	18
Semenkovo	5
Krasnaya Gorka	12
Ugantovo	55
Slobodka	36
Koskolovo	22
Luzhitsj	70

Table 7 Settlements around STP Ust-Luga.

Many of the houses in the settlements are used as summerhouses and the population will be 3 or 4 times as high during summer vacations.

The village of Ust-Luga is approximately 6 km away from the port complex.

Land use in the vicinity of the port complex is forestry and agriculture. Northwest of the complex there are minor areas of grazing land and grassland for hay. There are industrial areas in the Ust-Luga village.

There is no land allocated for recreation e.g. beaches and parks. Recreation activities occur in the area. Some of the houses in the settlements are used as hunting cabins and as datchas.

4 Description and Assessment of Significant Environmental Impacts at Local, Regional and Global Levels

The Baltic Sea has some of the busiest shipping routes in the world. Approximately 2,000 vessels are normally at sea at any time in the Baltic. Today there are 62,000 trips by vessels trough the Baltic Sea a year. STP Ust-Luga will, fully developed, generate 7,000 visiting vessels a year which means 14,000 vessels through the Baltic Sea. Some of the traffic is not new generated; it will only be transferred from other Russian ports, Baltic State ports and Finnish ports. The traffic on the Baltic Sea is nevertheless estimated to increase by 10–15% with the new capacity at STP Ust-Luga. The impact of increased traffic on the Baltic Sea will be higher risks due to vessel collisions, running aground and accidents leading to oil spillage.

The air emissions will increase due to increased transports on roads, railway and vessels. This leads to negative impact on the environment for example eutrophication, acidification, global warming and smog. These impacts are due to increased trade and commerce. In comparison with road transports vessels generates low emissions per transported tonne. The emission of coaldioxide for instance, is one fourth compared to transportation on roads.

The environmental impact assessment will be performed for three alternatives:

- The proposed localisation at Ust-Luga
- A localisation north of proposed localisation
- “Do-nothing”, i.e. no Multi-purpose Terminal is constructed.

The assessment is focused on major impacts during construction of the port and major direct and indirect impacts during operation. In this context direct impacts are for instance noise and exhaust gases from working machines within the port area. Indirect impacts are e.g. emissions from land and sea transports to and from the port. The issues will be discussed under separate headings (chapters 4.1–4.3) followed by a summary (chapter 4.6) including a comparison between the three alternatives.

Proposed Localisation

The localisation is described in chapter 2.

North of Proposed Localisation

It is difficult to place the Multi-purpose Terminal further north along the east shore of Luga Bay, due to the steep shore and thus problems to arrange a marshalling yard for the railway. However, an alternative localisation along the coast north of the proposed localisation is suggested and broadly described here. The description is a principle only. The real layout will depend on its exact location.

This site requires no dredging for channels and turning basins, which also would minimize maintenance dredging. It is more likely that material excavated on land is more suitable as fill than material to be dredged.

The west edge of the landfill could be placed close to the –9.5 depth line thus avoiding dredging, minor dredging at the berth might, however, save long slopes with extensive erosion protection. The most economical balance between filling and dredging should be found.

The proposed location is unprotected against winds from north. The berths should thus be oriented in a way to allow the ships to moor with the bow towards north. The berths could either be arranged along both sides of a pier or single-sided staggered berths. In the first case, the pier should be built in a small angle towards the coast in order to make the approach to the inner berth safer. Some dredging could be required for this berth. In the second case, single-sided berths, it would also be possible to arrange side ramps to the second deck of the ships as more land area will be available inside the berth.

The required area could be reduced by moving out some facilities like fire brigade, water supply, sewage treatment, fuel station etc. By siting separately common services for all the terminals would reduce the area of land required for the RoRo terminal. A minimum area of 10 ha is required, approx. 400 m along the shore and 250 m wide. The number of tracks on the marshalling yard can be adapted to suit the site. The railway berth should preferably be placed west of the RoRo berth to facilitate construction of the marshalling yard and to better coordinate the tracks with the container terminal.

The container terminal will require a wider and squarer area to be efficient and to minimise internal transports. It should thus be placed south of the ferry terminal, where it is shallower. The two terminals can be located next to each other, in order to profit from a common railway and marshalling yard. This is however not necessary. If any of the two terminals can be constructed in an existing port with an existing railway connection, they can as well be separated.

"Do-nothing" Alternative

If the Multi-purpose Terminal is not constructed the cargo will be shipped to and from existing Russian ports in the Gulf of Finland. The flow of cargo will increase and physical expansions of existing ports might be necessary. In the do-nothing alternative the ports of St. Petersburg, Primorsk, Vysotsk/Vyborg and Lomonosov are studied, Figure 23.

Figure 23 Existing ports in the Gulf of Finland.

The major impacts for the alternatives are compiled and commented on in Table 8. The table is extended for each alternative in the respective chapter and details are commented on.

Alternative	Major impacts	Comments
Proposed localisation	During construction: Water pollution Infringement on the natural environment	The most important impacts during construction are the extensive destruction of the eco-systems on land and in the water area and effects of dredging.
	During operation: Air pollution Noise Risk conditions	Impacts of importance during operation of the port will be air emissions, noise and risk conditions.
	Indirect impacts during operation: Water pollution Risk conditions	Important indirect impacts from vessels to and from the port will be the risk of accidental water pollution as well as discharge of ballast water and anti-fouling leakage.
North of proposed localisation	During construction: Water pollution Infringement on the environment	The most important impacts during construction are the destruction of the ecosystems on land and in the water area.
	During operation: Air pollution Noise Risk conditions	Impacts of importance during operation of the port will be air emissions, noise and risk conditions.
	Indirect impacts during operation: Water pollution Risk conditions	Important indirect impacts from vessels to and from the port will be the risk of accidental water pollution as well as discharges of ballast water and anti-fouling leakage.
Do-nothing	During construction During operation Indirect impacts during operation	The environment in Luga Bay will not be further effected. The conditions and the impact of an expansion of existing ports are however not known. The descriptions are made from the basic conditions, in the first place, localisation.

Table 8 Overview – major impacts of alternatives.

A localisation of the port to Ust-Luga will renew the infrastructure in the region. There will be employment for approximately 500 persons in a fully expanded port. New houses must be built, common facilities have to be developed and connections to and from Ust-Luga be improved.

The existing fish industry in Ust-Luga could be affected of lower catch and diminished fish stocks in Luga bay. It is possible though for the industry to compensate with fish from other parts of the Finnish Gulf or the Baltic Sea.

4.1 Impact Assessment for the Proposed Localisation

Only the major impacts that have a decisive influence on the environment and health are described. Aspects having minor impact are marked in grey in Table 9 and will not be described further. The impacts described as minor are not insignificant but with the right preventative measurements, their negative impact can be reduced.

Impacts		Comments
Construction phase	Air pollution	Mainly exhaust fumes from construction machines and vehicles. Dust from land forming and construction.
	Water pollution	Dredging will cause turbidity and periodically disturb ecosystems.
	Noise	Noise from machines and vehicles used for land formation and construction. The noise will not exceed equivalent levels of 45 dB(A) at closest residential houses. The noise levels estimates therefore to be of minor impact.
	Infringement on natural environment	There will be an extensive destruction of land and seafloor which causes damage to valuable ecosystems and habitats.
	Radiation conditions	No important electro-magnetic radiation sources are known and there is a safe distance to residential houses.
	Risk conditions	Risks of accidental discharge of oil or fuel from constructing machines, vehicles and dredgers at sea and/or on land area. The risk is considered to be on a minor level, considering the proposed mitigation measures.
Operation phase Direct impacts	Air pollution	Exhaust fumes from vessels at quay and from cargo handling equipment.
	Water pollution	Discharge of waste and storm water to Luga Bay is preceded by sedimentation dams, oil separator and mechanical filter. Household sewage is purified in a biological treatment plant with sedimentation, denitrification and UV-disinfection. The purification methods meet, according to the Russian OVOS, the requirement of the rules of protection of coastal seawaters from pollution and the requirement of HELCOM.
	Noise	Noise emitted from vessels at quay, from loading and unloading vessels and cargo handling equipment.
	Infringement on natural environment	No other damages are expected than impact from water pollution and accidental discharges.
	Radiation conditions	Radiation sources are the high voltage line to the port area, a transformation station and radio stations for navigation and communication purpose. The distance from sources to residential houses is safe.
	Risk conditions	Accidental discharges of oil and waste from handling of fuel bunker and waste management.
Operation phase Indirect impacts	Air pollution	Air emissions from vessels, road and railway traffic outside the port are important sources of air pollutants. The main impact will be as contribution to background levels in the region and to the global warming effect.
	Water pollution	Discharge of ballast water with alien species and use of anti-fouling systems on vessels.
	Noise	Noise emitted from vessels in the entrance channel and the fairway will not cause environmental disturbance. Noise from increased road and railway traffic will increase the equivalent levels in houses close to roads and railways used for transport of goods.
	Infringement on natural environment	No damage expected except for impacts from accidental discharges of oil or slugde and discharged ballast water.
	Radiation conditions	No important radiation sources, safe distance to residential houses.
	Risk conditions	Accidental pollution of oil and other hazardous substances from vessels in a sensitive environment. Road and railway traffic through nature reserve.

Table 9 Impacts of Proposed localisation alternative.

4.1.1 Impacts Associated with Construction

Water Pollution

During the construction of the Multi-purpose Terminal as well as the Port complex, extensive dredging activities will be performed. Dredging is made for the fairways and operational docks. The volume of the dredging activities is 2.6 million m^3 over an area of 325,000 m^2. The amount of dredged material and soils that cannot be used for construction purposes is approximately 1.6 million m^3; this material will be dumped at sea. The sea dump, marked in Figure 24, is located according to the letter of OAO "Ust-Luga Company" #878-03/20 from 30.10.2002 and permission of Gosinspection #162 from 30.07.1997. The site is located in a hollow in a zone (–20 m) of low dynamic water activity. The disposed soils should be unpolluted and of a material similar to the seabed material (clay) at the deposited site.

Figure 24 Dumping site location, and dredging areas in Port complex. The map also shows the maximum impact area of turbidity increase, due to the dredging operations for the complete Port complex.

Dredging spill. During dredging operation and dumping zones of high turbidity are formed in the water. A model for turbidity spread zones has been made for the Mineral fertilizer terminal. A similar spread can be expected for the Multi-purpose Terminal and the rest of the Port complex. The model was calculated for an average annual wind speed of 4.7 m/s in southeast, south, southwest and west directions, as well as the most common wind 6 m/s in southwest direction. The greatest turbidity spread occurs with the southwest wind. The isoline 10 mg/l equals to the background turbidity at medium waves. This means that an impact area within approx. 200–1500 m can be expected at the dredging areas, and 200–1000 m at the dumping area depending on the wind speed and direction. Figure 24 shows a maximum impact area of turbidity increase caused by dredging, dumping and land formation, based on the described model. It is important to notice that the whole area might not be effected at the same time period, nor to the maximum extent. Some areas are already dredged and constructed.

The dredged material is not considered to be contaminated according to compared guidelines (see chapter 3.9). Turbidity caused by the dredging and dumping is a temporary disturbance but can have effect on the under-water ecosystems depending on the intensity and duration of the disturbance. Sandy sediments settle faster than fine particles. If the sediments has a high content of organic material, hydrogen sulphur can dissolve in the water during dredging and hydrogen sulphur has a toxic effect on the ecosystem.

Infringement on Natural Environment

The land and sea areas of the new terminal will destroy the habitats for the flora and fauna. These areas include:

- Areas of terminals
- Areas with new industrial buildings and houses
- Entrance channel and turning area
- Areas along roads and railways
- Areas along electric power lines and transformation stations.

The area on land is not inhabited and is totally 0.6 km^2. The area that is completely destroyed, including newly formed territory of the coal terminal, is 0.8 km^2. The destroyed area along highways and railway amounts to 1.4 km^2.

The land and shore required for the port complex contains a great number of rare plants. Approximately 30 sites of rare plants will be destroyed in a full-expanded port. Additional 10–15 sites for rare plants are threatened. Reeds along the shoreline is a habitat for birds.

Approximately 20% of the most valuable shoreline habitats for birds in Luga Bay will be destroyed in a fully expanded port. The number of birds will decrease and some species could disappear. The impact on rare animals will be limited because there are only a few rare animals present in the vicinity of the port complex. Rare plants can be moved but there it is hard to foresee if they will manage in a new site.

Area of destructed seafloor is estimated to 260,000 m^2 including the terminal and operating area space for vessels. The water depth in large parts of the destructed area is 0 to 5 meters.

Activities like dredging, reclamation and soil dumping will destroy the habitats of benthic animals. Part of the bottom at the shallow part of the bay is withdrawn irrevocably. The shallow water area is a spawning and feeding ground for fish and is also important as a nursery ground for juveniles. The area for feeding, spawning and nursery for juveniles decreases in Luga Bay.

The re-establishment of zoo benthos in dredged areas takes time, especially as natural sedimentation makes maintenance dredging necessary. Deepened areas are therefore no longer suitable as feeding ground.

Today there are mainly less valuable species of fish in the areas for the terminal construction. But the area has a good potential for fish reproduction with ideal water depths and good nutrient conditions close to the River Luga mouth.

Because of land formation and dredging an area of shallow water will destruct the seafloor. This area is a spawning ground especially for stickleback. The whole port complex, the oil terminal excluded, will withdraw a third of the shallow waters east of River Lugas mouth.

At the dumping site for dredged materials, spawning grounds for sprat will be affected. The total spawning ground for sprat in the Luga Bay region are estimated to 9,900 hectares. The area for dredged material dump is estimated to 895 hectares. An essential part of the spawning ground for sprat, approximately 10%, will be damaged.

The impact of the destruction of spawning grounds will be a lower fish reproduction in the bay. This could affect bird life and the bay as a feeding ground for fish of prey. The damage to fish stock has in the OVOS been economically calculated to 9,300,000 rubels or approximately 300,000 Euro (prices II quarter of 2002).

The infringement on natural environment does not include protected areas according to Russian legislation or the Ramsar convention. The port complex does however infringe on areas that could have been considered to be an object of protection according to Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the habitat directive) and also the Council Directive 79/409/EEC on the conservation of wild birds.

4.1.2 Impacts Associated with Operation

Air Pollution

Principally sources of emissions of air pollutants from the different terminals of the port complex are given in Table 11.

Terminal	Main emission sources	Pollutants
Multi-purpose Terminal	Loading and transport equipment (fuel combustion), heating	Exhaust fumes – NO_x, CO, SO_x, VOC, PM etc.
	Vessels at quay	Exhaust fumes – NO_x, CO, SO_x, VOC, PM etc.
Mineral fertiliser terminal	Loading fertiliser to holds	Fertiliser as dust – NPK, KCl
	Loading and transport equipment (fuel combustion), heating	Exhaust fumes – NO_x, CO, SO_x, VOC, PM etc.
	Vessels at quay	Exhaust fumes – NO_x, CO, SO_x, VOC, PM etc.
Coal terminal	Unloading, storage and loading	Coal as dust – PM
	Loading and transport equipment (fuel combustion), heating	Exhaust fumes – NO_x, CO, SO_x, VOC, PM etc.
	Vessels at quay	Exhaust fumes – NO_x, CO, SO_x, VOC, PM etc.
Ore terminal	Unloading, storage and loading	Ore as dust – PM
	Loading and transport equipment (fuel combustion), heating	Exhaust fumes – NO_x, CO, SO_x, VOC, PM etc.
	Vessels at quay	Exhaust fumes – NO_x, CO, SO_x, VOC, PM etc.
General cargo terminal Wood terminal Food terminal	Loading and transport equipment (fuel combustion), heating	Exhaust fumes – NO_x, CO, SO_x, VOC, PM etc.
	Vessels at quay	Exhaust fumes – NO_x, CO, SO_x, VOC, PM etc.
Fuel and oil reservoirs	Vapour losses when filling	VOC

N – nitrogen, P – phosphorus, K – potassium, KCl – potassium chloride, NO_x – nitrogen oxides, CO – carbon oxide, SO_x – sulfur oxides, volatile organic carbon, PM – particulate matter.

Table 10 Sources of air pollutants.

The annual emissions of air pollutant from the fully expanded port complex are shown in Figure 25.

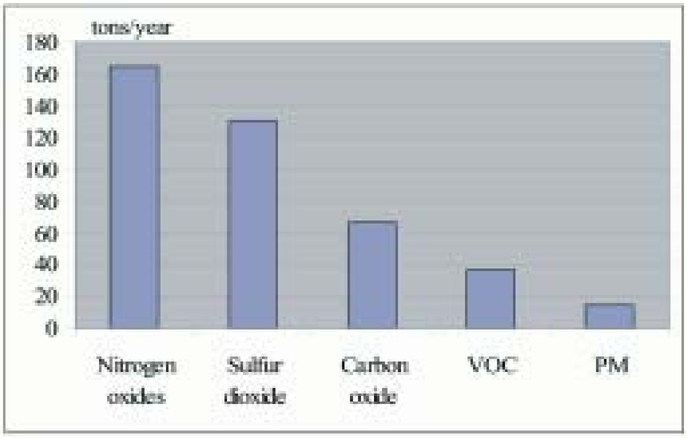

Figure 25 Total annual emissions from port complex.

Air emission leads to high levels of pollutants in the close vicinity of the port complex. When the sources of air emissions are mainly exhaust fumes from fuel combustion, the limiting polluting factors in inhabited areas are usually levels of nitrogen dioxide (NO_2), sulphur dioxide (SO_2), carbon monoxide (CO), benzene and airborne fine particulate matter (PM_{10}).

Air pollutant simulation was carried out for a number of air pollutants. Simulations of NO_2 and SO_2 are shown below but it is hard to do simulations of air dispersion for PM_{10} and results will be uncertain. Thus no simulation was done for PM_{10}.

Simulation of NO_2 dispersion in the air is shown in Figure 26. The maximal levels of NO_2 in nearby settlements vary from 50 to 72 µg/m^3 with highest levels in Koskolovo and in the eastern part of Luzhitsj. A few country houses along the River Khabolovka, close to the port, will have concentrations up to 85 µg/m^3.

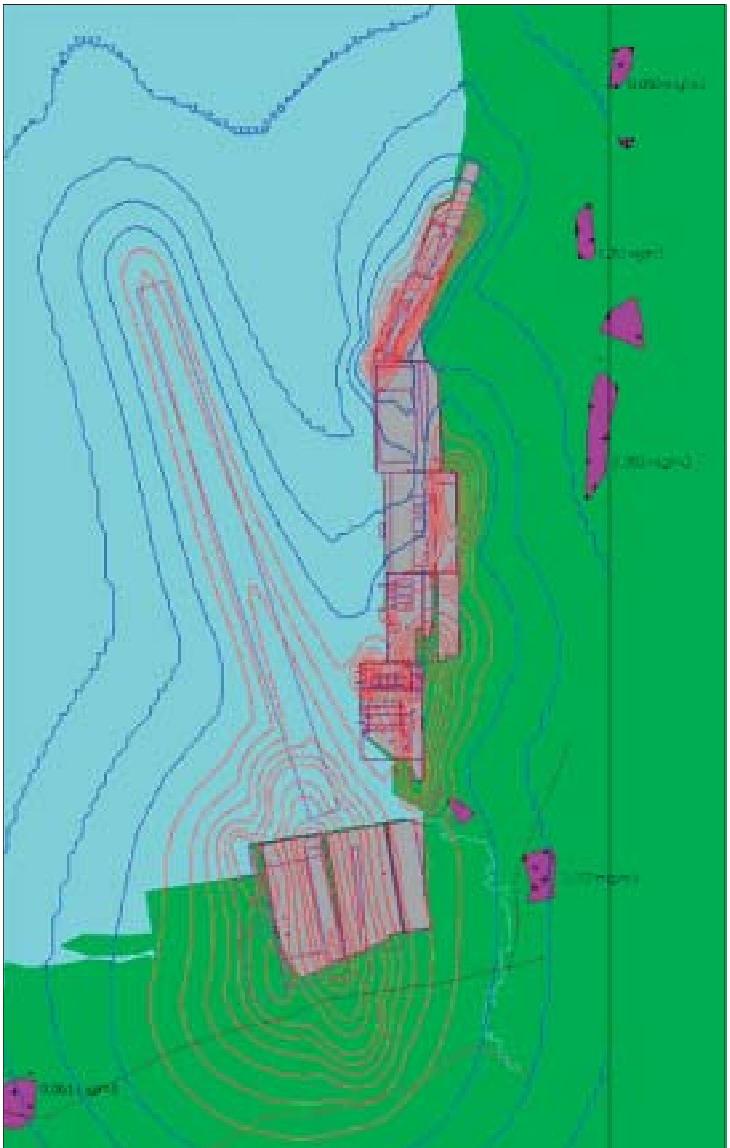

Figure 26 Maximal concentrations of nitrogen dioxide.

A simulation for SO_2 is shown in Figure 27. Maximal concentrations vary from 35 to 50 µg/m³.

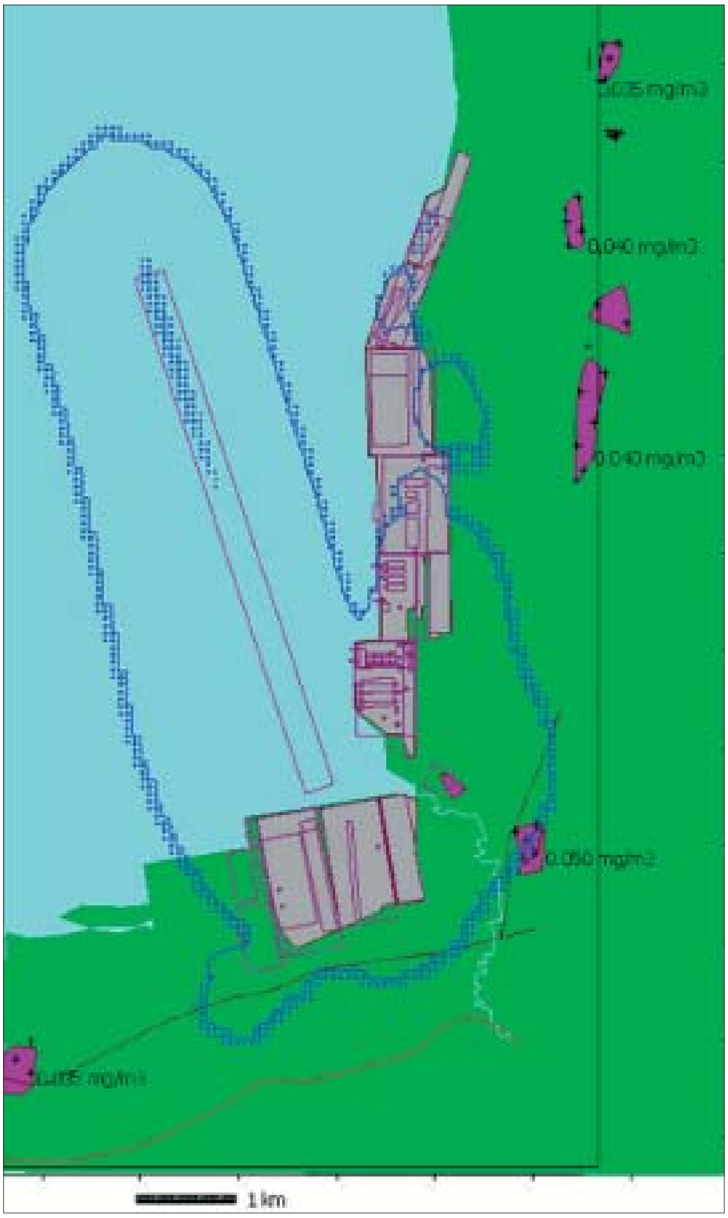

Figure 27 Maximal concentrations of sulphur dioxide.

The air concentration of CO in the nearby settlement will according to simulations be maximum 2 mg/m^3.

The fuel station at the Multi-purpose Terminal will be the major source of benzene emissions but will give rise only to low concentrations in nearby settlements.

There are Environmental Quality Standards within the European Union. Some of them concern the levels of air pollutants. EC directives (96/62/EC and 1999/30/EC) limiting the highest levels of NO_2, SO_2, lead, CO, benzene and PM_{10} in inhabited areas in order to prevent harmful effects for human health.

Facts about Environmental Quality Standards

Environmental Quality Standards (EQS) are binding limits for environmental states, which may not be infringed after a certain specified date. EQS:s shall specify what can be regarded from a scientific point of view as being acceptable environmental quality for certain geographical areas or for the country as a whole.

The Air Quality "Framework" Directive 96/62/EC came into force in November 1996. This Directive establishes the basic principles of a common strategy to set objectives for ambient air quality in order to avoid, prevent or reduce harmful effects for human health and the environment. The Framework Directive requires that, if limit values are exceeded, Member States devise abatement programmes to reach the limit values within a set deadline. A summary of these limit values is shown below.

Limit/threshold values

pollutant	averaging period	protects	value	no. of exceedences	to be met	reference
Sulphur dioxide	1h	health	350 $\mu g/m^3$	< 25 times	01-01-05	1999/30/EC
Sulphur dioxide	24h	health	125 $\mu g/m^3$	< 4 times	01-01-05	1999/30/EC
Sulphur dioxide	year/winter	ecosystems	20 µg/m3	none	19-07-01	1999/30/EC
Nitrogen dioxide	1h	health	200 $\mu g/m^3$	< 19 times	01-01-10	1999/30/EC
Nitrogen dioxide	year	health	40 $\mu g/m^3$	none	01-01-10	1999/30/EC
Nitrogen oxides	year	ecosystems	30 $\mu g/m^3$	none	19-07-01	1999/30/EC
PM10 [1]	24h	health	50 $\mu g/m^3$	< 36 times	01-01-05	1999/30/EC
PM10 [1]	year	health	40 $\mu g/m^3$	none	01-01-05	1999/30/EC
Lead [2]	year	health	0.5 $\mu g/m^3$	none	01-01-05	1999/30/EC
Ozone	8h	health	120 $\mu g/m^3$	< 26 days	2010	COM(2000) 613final [3]
Ozone	May–July	ecosystems	AOT40<18 mg/m^3 h	none	2010	COM(2000) 613final [3]
Benzene	year	health	5 $\mu g/m^3$	none	01-01-10	2000/69/EC
Carbon monoxide	8h	health	10 mg/m^3	none	01-01-05	2000/69/EC

Notes:
[1] Stage 1
[2] Different limit value and attainment date around industrial installations
[3] Amended in agreed Common Position 10-10-2000

Source: EEA

In comparison with the European EQS the maximal short-term levels of air pollutants NO_2, SO_2 and CO in nearby settlements will be low even when the port is fully expanded. With predominantly southerly winds the estimated concentrations of NO_2, SO_2 and CO, on day and year basis will be lower than the European EQS. The total air emissions seem however to be exceptionally low, see comments in chapter 4.5.

The concentration of PM_{10} in nearby settlements is not possible to predict at this stage. Lead and ozone has not been calculated. There is no known major source for lead and it is not likely to be in conflict with the EQS. Ozone is formed by atmospheric reactions in presence of sunlight, NO_2 and VOC. The atmospheric reaction occurs remote from the emitting source, hence the port emissions of NO_2 will contribute to ozone concentrations in the region.

The impact of the emissions from an oil terminal has not been calculated. The impact depends on the emission preventive measures such as vapour trap systems or petrol vapour recovery systems.

Emissions of NO_2 and SO_2 from the port will contribute to acidification in the region. NO_2 and SO_2 will also contribute to the transboundary transported acidification substances.

Emissions of NO_2 contribute to eutrophication, both regional and transboundary.

Noise

Noise is mainly generated from auxiliary engines of vessel at quay and from loading, unloading and storage of cargo. The noise sources also include railway and ferry traffic. The port is operated 24 hours a day, seven days a week.

A calculation of the equivalent noise levels for the Multi-purpose Terminal was carried out taking into account the noise reduction due to existing forests and land formations. The noise levels in Figure 28 shows the contours for equivalent noise of maximal 55 dB(A) and 45 dB(A).

Figure 28 Contours of equivalent noise levels – operation of Multi-purpose Terminal.

Noise can cause hearing impairment, interfere with communication, disturb sleep, cause cardiovascular and psycho-physiological effects, reduce performance, and provoke annoyance responses and changes in social behaviour.

According to World Health Organisation (WHO) guidelines for community noise, critical health effects occur at levels given in Table 12. The equivalent levels of 55 dB(A) daytime and 45 dB(A) at night outside residential houses agree with many national standard values.

Specific environment	Critical health effect(s)	LAeq [dB]	LAmax, fast [dB]
Outdoor living area	Serious annoyance, daytime and evening	55	–
	Moderate annoyance, daytime and evening	50	–
Dwelling, indoors Inside bedrooms	Speech intelligibility and moderate annoyance, daytime and evening	35	
	Sleep disturbance, night-time	30	45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	60

Table 11 WHO – Guideline values for community noise in specific environment.

The contours in Figure 28 show that no residential building are exposed to equivalent noise levels above 45 dB(A).

Maximum noise levels are not calculated. Experience from other ports shows that the maximal noise levels, L_{Amax}, are approximately 20 dB(A) higher than the equivalent value. The maximum noise levels at residential houses are estimated to be lower than standard values.

No calculation has been made for the whole port complex although the equivalent noise levels are estimated to be slightly higher and they are within the standard values of WHO. The landscape formation, with a ridge along the coastline, helps to screen the nearby settlements.

The auxiliary ship engines generate low frequency, disturbing noise. This type of noise is hard to screen and will likely be heard both inside and outside the houses in the settlements in the vicinity of the port.

Risk Conditions

The most significant risks, by the degree of environmental impact, are accidents with petroleum products. Table 12 shows that the highest risks during port operation are connected with fuel bunkering, although the risks are not high considering the whole scale 1–9.

Scenario	Event	Impact[1)]	Probability[2)]	Risk
Accidental discharge from handling of fuel bunker in the port area	From bunker vessels and fuel piping	Petroleum products that spread in sea water are toxic for organisms living in the water. Birds and animals may also be harmed. Depending on the climatic conditions at the incident occasion (warm or icy conditions) the products can evaporate rather quickly or remain in the area for a longer period. (1.5)	2	3
Hazardous goods	Loading, unloading and storage	Main impacts in the water environment. Depending on accident type and hazardous product, the impact can become major or lesser. (1-3)	1	1–3
Accidental fuel and waste products discharge on land	Discharge while refuelling vehicles, and during waste handling and storage	Petroleum products might infiltrate into the ground soils at the refuelling stations or the boiler house. Relatively easy to decontaminate on land areas. Minor damages. (1)	2	2

[1)] Impact level by a three graded scale, where 1 represents a low impact, 2 high impact and 3 catastrophic impact.
[2)] Probability by a three graded scale, where 1 represents low probability, 2 probable and 3 a high probability for the event.

Table 12 Risk scenarios with environmental impact during the operation.

4.1.3 Indirect Impacts Associated with Operation

Water Pollution

Ships visiting the Port complex discharges **ballast water** that may effect the ecosystem in the port area as well as the Baltic Sea. Alien organisms from water areas outside the Baltic Sea can be transported with the ballast water.

The introduction of invasive marine species into new environments by ships' ballast water has been identified as one of the four greatest threats to the world's oceans. The other three are land-based sources of marine pollution, over-exploitation of living marine resources and physical alteration/destruction of marine habitat.

Ballast water is absolutely essential to the safe and efficient operation of modern shipping, providing balance and stability to un-laden ships. However, it may also pose a serious ecological, economic and health threat.

As a result, whole ecosystems can be changed. For example it has depleted native plankton stocks to such an extent that it has contributed to the collapse of entire Black

Sea commercial fisheries. In several countries, introduced, microscopic, ‘red-tide’ algae (toxic dinoflagellates) have been absorbed by filter-feeding shellfish, such as oysters. There are hundreds of other examples of catastrophic introductions around the world, causing severe human health, economic and/or ecological impacts in their host environments.

Non-native species are a serious threat to the natural ecosystems and harm habitats in the Baltic Sea and Luga Bay. Examples of introduced alien species, which have caused damage in the Baltic Sea, are the fish Round Goby in the Gdansk Bay and water fleas in the Gulf of Finland.

A new ballast water convention is under development. IMO (International Maritime Organization) has developed guidelines (Resolution A.868 (20)) for the control and management of ships ballast water to minimise the transfer of harmful aquatic organism and pathogens. The guidelines recommend measures aimed at:

- Minimising the uptake of organism during ballasting.
- Minimising the build up of sediments in ballast tanks, which may harbour organisms.
- Undertaking ballast water management measures, including ballast exchange at sea, to minimise the transfer of organisms.

Anti-fouling paints are used to coat the bottoms of ships to prevent marine species such as algae and molluscs attaching themselves to the hull and thereby slowing down the ship and increasing fuel consumption. The paints are designed to deliberately leach pesticide like tributyltin, copper and Irgarol into the environment.

The emissions of pesticides can be especially harmful in shallow bays especially during periods of marine flora and fauna reproduction. The important species Bladder Wrack (not present in Luga Bay) is especially sensitive and its ability to sprout will decrease already at very low concentrations of pesticides.

International conventions by IMO and European Regulation (EC No 782/2003 – prohibition of organotin compounds on ships) will limit the use of anti-fouling in the future. It is likely though that some types of pesticides still will be used in the future, however with less impact. The conventions do not prohibit the use of copper and Irgarol.

The impact of anti-fouling compounds on marine life in the bay is hard to predict. The concentrations of pesticides in a water mass and sediment depends on the vessel traffic (amount, average destinations and use of different kinds of anti fouling systems) and sea currant conditions etc. No simulation of dispersion has been made. The extent of vessel activity associated with the whole port and proximity to shallow areas indicates that a negative impact on marine life is probable.

Some **maintenance dredging** will probably be necessary as sedimentation will continue in the dredged areas. The dredged material will have to be dumped.

Risk Conditions

Of the possible scenarios identified accidental discharge of oil waste is ranked as the highest risk. The next most dangerous impact on the environment is accidents causing rupture of vessel fuel tanks. These accidents can occur by ships running aground or collisions. Contamination of water area, coast and coastal water vegetation will be the consequence. The risk in Luga Bay is estimated to be low because of an initial low frequency of vessels to the port and absence of rocky shores and reefs. In a more expanded port, with higher frequency of vessels the risk will increase because of higher probability for collisions. A well developed vessel traffic service, VTS, will decrease the risk and is a condition for this assessment.

Scenario	Event	Impact[1)]	Probability[2)]	Risk
Accidental discharge of bunker oil in Luga Bay	Ship accident/collision, with discharge of bunker oil	A large volume of petroleum products can spread in the water with serious effects on the marine and coastal ecosystems. If oil spills reach the coast and islands of Kurgalsky reef the breeding-grounds of grey seal and ringed seal can be polluted. Oil pollutions that reach the vegetated shores might be difficult to remove. The outflow of petroleum products (for example ferries of the "Mukran", "Heroes of Shipka" type) can be from 344 up to 602 tons of bunker fuel (50 % of the ship stocks). (2.5)	1	2.5
Accidental discharge of bunker oil in the Baltic sea	Ship accident/collision, with discharge of bunker oil	A large volume of petroleum products can spread in the water with serious effects on the marine and coastal ecosystems. The worst effects occur at near coast accidents. (2)	2	4
Hazardous goods	Goods transported on ships, roads and rail-ways	Accidents with discharge of hazardous products may be a threat inside water protection areas, nature reserves, in populated areas etc. (1–3)	1	1–3
Accidental discharge of waste products in the Baltic sea	According to HELCOM many oil spills in the Baltic sea are delibe-rate	Small amounts of especially petroleum products, discharged with a relatively high frequency can have a total high impact on the marine ecosystem. (2)	3	5

[1)] Impact level by a three graded scale, where 1 represents a low impact, 2 high impact and 3 catastrophic impact.
[2)] Probability by a three graded scale, where 1 represents low probability, 2 probable and 3 a high probability for the event.

Table 13 Risk scenarios with indirect environmental impact during the operation.

4.2 Impact Assessment of Alternative North of Proposed Localisation

Only the major impacts that have a decisive influence of the environment and people's health are described. Aspects having minor impact are marked with grey in Table 14 and will not be described further. The impacts described as minor are not insignificant but with the right preventative measurements, they are of less importance.

Impacts		Comments
Construction phase	Air pollution	Mainly exhaust fumes from construction machines and vehicles. Dust from land forming and construction.
	Water pollution	Land formation will cause turbidity in the water area and periodically disturb ecosystems.
	Noise	Noise from machines and vehicles used for land formation and construction. The distance to residential houses are approximately 1,5 km. The noise levels estimates to be a minor impact.
	Infringement on natural environment	There will be a destruction of land and seafloor that causes damage to ecosystems and habitats.
	Radiation conditions	No important electro-magnetic radiation sources and a safe distance to residential houses.
	Risk conditions	Risks of accidental discharge of oil or fuel from constructing machines, vehicles and dredgers to sea and/or land area. The consequences of an accident estimates to be of minor importance.
Operation phase Direct impacts	Air pollution	Exhaust fumes from vessels at quay and from cargo handling equipment
	Water pollution	Discharge of waste and storm water to Luga Bay is preceded by sedimentation dams, oil separator and mechanical filter. Household sewage is purified in a biological treatment plant with sedimentation, denitrification and UV-disinfection. The purification methods meet, according to the Russian OVOS, the requirement of the rules of protection of coastal sea waters from pollution and the requirements of HELCOM.
	Noise	Noise emitted from vessels at quay, from loading and unloading vessels and cargo handling equipment.
	Infringement on natural environment	No other damages expected than impact from water pollution and accidental discharges.
	Radiation conditions	Radiation sources are the high voltage line to the port area, a transformation station and radio stations for navigation and communication purpose. The distance from sources to residential houses is safe.
	Risk conditions	Accidental discharges of oil and waste from handling of fuel bunker and waste management.
Operation phase Indirect impacts	Air pollution	Air emissions from vessels, road and railway traffic outside the port are important sources of air pollutants. The main impact will be as contribution to background levels in the region and to the global warming effect.
	Water pollution	Discharge of ballast water with alien species.
	Noise	Noise emitted from vessels in the entrance channel and the fairway will not cause environmental disturbance. Noise from increased road and railway traffic will increase the equivalent levels in houses close to roads and railways used for transport of goods.
	Infringement on natural environment	No damage expected except for impacts from accidental discharges of oil or slugde and discharged ballast water.
	Radiation conditions	No important radiation sources, secure distance to residential houses.
	Risk conditions	Accidental pollution of oil, sludge etc. from vessels in a sensitive environment. Road and railway traffic through nature reserve.

Table 14 Impacts of alternative North of proposed localisation.

4.2.1 Impacts Associated with Construction

Water Pollution

The impacts due to land formation and dredging operations will be smaller than for the proposed alternative, see chapter 4.1. The need for dredging and landfill is lesser, and thus also the turbidity impact area.

Infringement on Natural Environment

The existence of rare and protected species in the area north of the proposed localisation is not investigated. The habitats on land along this steeper coastline are estimated to be less valuable. There are fewer bogs and marshes. Habitats close to the shore are estimated to be most valuable but this area along the coastline is narrow.

Shallow water extents approximately 100–200 meters from the shoreline and the area for construction is estimated to be less valuable as spawning and nursery ground for fish. A filling and construction of a terminal in this area will nevertheless cause destruction to natural environment and habitats for fish and marine organisms.

4.2.2 Impacts Associated with Operation

Air Pollution

Sources of air pollutants will be similar to those described earlier in chapter 4.1.2, although the location of the sources and the nearby settlements will differ. The distance between the sources (vessels at quay, loading/unloading equipment, boiler houses and fuel stations) to the settlement will be about the same as for the proposed location alternative. The concentration of air pollution will thus be about the same in habited areas.

The impact of air pollutants in a regional and transboundary perspective will be the same as for the Proposed location alternative.

Noise

The Multi-purpose Terminal will have approximately same distance to nearby settlements. The coastal ridge between the terminal and settlements are higher here than in the Proposed localisation alternative. Equivalent noise levels are estimated to be the same or lower than in the Proposed localisation alternative and settlements will be exposed to low frequency noise.

Risk Conditions

The probability and the consequences of accidents will be almost the same as described in chapter 4.1.2. The greater water depths in this alternative allow safer navigation and there is a greater distance to the environmentally sensitive areas in the south part of the Luga Bay.

4.2.3 Indirect Impacts Associated with Operation

Water Pollution

The same problem with discharge of ballast water as described in chapter 4.1.3 will occur. The discharges will happen further north in the bay but the threat and potential effect will be almost the same.

The use of anti-fouling on vessels gives a negative impact on marine life closest to the port. The water depth and water masses are greater here thus the anti-fouling substances will be diluted. A negative impact on bentic animals and flora as well as for species living in the open water masses will anyhow occur.

Risk Conditions

The probability and the consequences of an accident will be almost the same as described in chapter 4.1.3. The greater water depths in this alternative are a favour for safer navigation. The distance to the environmentally sensitive areas in the south part of the Luga Bay is greater.

4.3 Impact Assessment of the Alternative Do-nothing

The impacts of the do-nothing alternative are hard to predict. More cargo will be shipped out from existing Russian ports. This means a higher frequency of vessels and land transport by railway and road at these ports. It also could mean an expansion of these ports which impacts are hard to foresee. An overview of impacts based on the ports geographical site is shown in Table 15.

Port	Impact or potential impact on environment	Impact on health
St. Petersburg	The location of St. Petersburg port, in the very eastern end of the Gulf of Finland, means vessel traffic in a sensitive environment. Eastern part of Gulf of Finland is very shallow and the fairway passes Ramsar wetland sites and nature-protected areas. An accident with oil or chemical discharges means danger to marine life and bird life.	Entrance roads and railway trough densely inhabited areas of St. Petersburg leads to increased concentrations of air pollutants and higher noise levels. The St. Petersburg area has already severe problems with air pollution and noise from an intense traffic.
Primorsk	The port of Primorsk is situated close to valuable nature areas. The port is located beside a Ramsar wetland site in a nature reserve. The fairway is narrow and a vessel accident could mean great danger to marine life. The railway and roads to the port passes several nature reserves.	The density of population around port of Primorsk is low. There are no larger cities around access roads a railways leading to the port. The impact on people's health estimates to be low.
Vysotsk/Vyborg	Vysotsk and Vyborg are located in a shallow archipelago close to nature reserves. The fairway passes a Ramsar wetland and is narrow. A vessel accident could in this area cause great danger to marine life.	The ports of Vysotsk and Vyborg are located nearby residential houses. A decrease of activity in these ports means an increased impact on people's health. Access roads and railway do not pass dense inhabited areas.
Lomonosov	The port location, in the eastern shallow part of the Gulf of Finland, means vessel traffic in a sensitive environment. The fairway passes wetland sites and nature-protected areas. An accident with oil or chemical discharges means danger to marine life and bird life.	The port is located close to residential houses. Access roads and railway passes densely inhabited areas. An increased impact on people's health is expected.

Table 15 Brief description of impacts from existing Russian ports.

All existing ports are a more or less unsuitably located from an environmental point of view. Some of them are located close to inhabited areas or have access roads or/and railway through inhabited areas.

4.4 Impacts Associated with Closure and Decommissioning

The closure of the port does not include decommissioning of the developed land area and quays. The impact on the environment in Ust-Luga region and Luga Bay will be positive due to diminished emissions and discharges to air and water. Depending on the alternative means of transportation to be used, different negative impacts will occur in other geographical areas. The alternative to use existing ports has been described as an alternative in this EIA.

4.5 Identification of Key Uncertainties and Data Gaps

There are still some key uncertainties and data gaps that are explained below.

Notification

There is no evidence of any documentation about notification procedure to the neighbouring states, se chapter 4.8.

Waste

In order to reduce the discharges of ship-generated waste into the sea, the Ferry Terminal is obligated to have reception facilities for ship-generated waste and cargo residue according to the international conventions and the EC law. There is however no information found that describes how waste from ships normally using the port will be taken care of.

Air

Results from the air emissions investigation and calculation seem to be exceptionally low in comparison with other ports in operation. The emissions from vessels at quay, which often have a bigger impact than the one from working machines, seem not to have been included.

4.6 Comparison of Impacts Associated with Alternatives, including the Do-nothing Alternative

The major impacts of the three alternatives – Proposed localisation, North of proposed localisation and the Do-nothing alternative – are compared in Table 16. The comparison is briefly made because of uncertainties in especially the do-nothing alternative. It deals with the impact in a large scale, for alternatives on Russian territory around the Gulf of Finland. In comparison, the different impacts have different dignity. An addition of columns should not be made. Negative impacts of low significance are indicated "0", negative impact of medium significance are indicated "–" and negative impacts of high significance are indicated "– –".

Impact	Proposed localisation	North of proposed localisation	Do-nothing	Comments
Air pollution	–	–	– –	Air pollution does not have a severe impact in the two first alternatives. Some of the existing ports are located in densely inhabited areas. The regional and transboundary transport of air pollutants will be approximately the same for the alternatives
Water pollution	–	–	0	Dredging and/or filling in sensitive water areas during construction will occur in the first two alternatives, although to a larger extent for the proposed localisation for which also maintenance dredging will be necessary. A more or less uninfluenced area will be exposed for potential harmful organisms in ballast water and vessels with anti-fouling systems on their hull.
Noise	–	–	– –	Few people in the settlements close to the port in the first to alternatives will be exposed to rather low levels of equivalent noise. Some low frequency noise will occur. Many of the existing ports are located close to densely inhabited areas and the access roads and railways will pass trough residential areas.
Infringement on natural environment	– –	–	0	The largest infringements in valuable nature environment are made in the proposed alternative. The alternative north of the proposed will give less impact. In existing ports some expansion will be necessary but in most cases the infringement is estimated to be of low significance.
Risk conditions	–	–	– –	Existing Russian ports are located in places where fairways are narrow and pass valuable and protected nature environments. An accident with discharge of oil could lead to large negative impacts. Accidental discharges of oil in the Luga Bay could also lead to large damage to marine life and sea birds. The navigation conditions here are better and the probabilities of accidents are lower.

Table 16 Comparison of alternatives.

From the table the conclusion can be drawn that the two alternatives in the Luga Bay are preferred to an expansion of existing Russian ports in the Baltic Sea. Of the two alternatives in the Luga Bay the alternative North of proposed localisation might be preferred due to a lesser infringement on valuable natural environment and a lesser degree of dredging activities.

4.7 Summary of Least-cost Analysis of Alternatives

The technical and economic feasibility study for the proposed localisation is not completed. The study will confirm the Project components and design concept as well as estimate construction costs and the construction time frame.

4.8 The Conformity of the Legal and Institutional Framework

The conformity of the legal and institutional framework has been made with consideration to the international conventions and the EC law described in chapter 1.2. During a visit to St. Petersburg in May 2003 relevant Russian authorities and organisations were interviewed and they verbally confirmed the project conforms to Russian laws but this could not be verified.

It was not possible to obtain a clear understanding of the divisions and limits of powers and responsibilities of the existing Russian authorities and entities that operate ports and monitor the environment within the Russian Federation. In an ideal situation the entities who operate ports should be responsible for complying with the relevant laws and regulations whereas another independent authority should be responsible for regularly monitoring environmental parameters and have the powers to take prompt action in cases of transgression.

Laws and regulations exist that cover the environmental protection of international waters. It is important however that the Russian legal framework for environmental monitoring and control of territorial waters and operations of ports is compatible to the relevant laws of neighbouring states, EC, and international conventions and protocols. A system of realistic and easily applied penalties would help with the effective policing and control of environmental pollution.

The following sections discuss specific aspects of environmental risks during the construction phase and operation phases.

Approvals

The location of the terminals in the port complex (a general lay out) has been approved by State Environmental Expertise, Leningrad Oblast. In a presidential decree from 1993 it is stated that the port complex may operate at a maximum capacity of 35 million tons. The design and Russian OVOS of the Ferry Terminal are approved and confirmed by several institutions and authorities, e.g. State Sanitary and Epidemiological Inspection. After a public hearing the State Independent Expertise and State Committee of Construction will verify that technology norms and standards are met. State Environmental Expertise, Ministry of Natural Resources, will then finally approve the project. All background materials and documents (the Russian OVOS) are ready to be presented for the State Environmental Expertise.

Dredging activities and the disposal of dredged materials into the sea require special permissions, which have been given by the Baltic Marine Sea Inspection, Ministry of Natural Resources. In the approval there are limitations in order to protect the marine environment, e.g. dredging operations are not allowed during the summer months.

Notification

There is no evidence of any documentation about notification procedure to the Finnish and Estonian authorities concerning the project according to Espoo Convention or the EIA Directive. During interviews with the Ministry of Transport there also seems to be some uncertainty about who is responsible for the notification procedures, Ministry of Foreign Affairs or Ministry of Natural Resources.

HELCOM has not been notified according to the Helsinki Convention. During interviews with the Baltic Marine Sea Inspection (BMSI), Ministry of Natural Resources, it appears that BMSI does not consider the Multi-purpose Terminal to have a significant impact on the marine environment in the Baltic Sea.

Although the direct impacts of the activities in the Multi-purpose Terminal are not of such significant transboundary impact that notification is needed, the indirect impacts could however be considered to cause a significant transboundary impact. Emissions from NO_2 and SO_2 are so-called long-range transboundary airborne pollutants, which will contribute to acidification. Emissions from NO_2 will also contribute to regional and global eutrophication. There are also the risks of accidental pollution of the marine environment from ships. The fairways to the terminal pass for instance areas designated as Baltic Sea Protection Areas governed by HELCOM although the areas are within Russian territory.

It is important that the authorities consider the overall impact from the completed port complex including the oil terminal. This overall approach should be taken into consideration in the EIA, which is under development, for the port complex.

Waste and Marine Environment

In order to reduce the discharges of ship-generated waste into the sea, the Multi-purpose Terminal is obligated to have reception facilities for ship-generated waste and cargo residue according to the international conventions and the EC legislation. Treatment, recovery and disposal of ship-generated waste and cargo residues shall be carried out in accordance with the waste framework directive. However no information was found that describes how waste from ships normally using the port will be taken care of.

Nature and Marine Environment

A wetland area, which is designated for the list of wetlands of international importance according to the Ramsar Convention, is located not far from the Multi-purpose Terminal. The construction works will not affect the area, so compensatory actions according to the convention are not required.

The Multi-purpose Terminal infringes on areas (large shallow inlets and bays) that could have been considered to be an object of protection according to the habitat and bird directives (Natura 2000) but do not apply, as the Russian Federation is not a Member State in the European Union.

A very large land and water area will be required for constructing the Multi-purpose Terminal. The shallow water area is a valuable spawning and feeding ground of fish and is also important as a nursery ground for juveniles. The Helsinki Convention stresses the sustainable use of natural resources in the Baltic Sea Area. The relation between this big terminal area and planned port activities may be questioned and a smaller area could be more appropriate.

Close to the Multi-purpose Terminal and the channels there are several sensitive and vulnerable habitats, that could be seriously effected by accidental pollution from ships, e.g. Baltic Sea Protection Area (Ostrov Seskar and Ostrov Malyy) and Ramsar area (Kurgalsky Peninsula).

Air

In comparison with the European Environmental Quality Standards (EQS) the levels of air pollutants NO_2, SO_2 and CO from vessels and land based transports in nearby settlements is estimated to be low for the fully developed port. With predominantly southerly winds the concentrations of NO_2, SO_2 and CO, on day and year basis, is even estimated to be lower than the European EQS. There are however some uncertainties regarding the air emission calculations, see comments in chapter 4.5.

Safety at Sea

The Marine Administration of Sea Port of St. Petersburg, Leningrad oblast, is responsible for the operation and maintenance of navigation aids. Later on, when the entire port complex is operating, there will probably be a Marine Administration of Ust-Luga. The Department of Safety Marine Movements, Ministry of Transport, can order assistance by oil cleaning ships and equipment from the different ports in case of accidents.

The European Union is re-organising so that European Maritime Safety Agency, EMSA, will ensure a high, effective and uniform level of maritime safety and pollution prevention from ships. The Committee of Safe Seas and the Prevention of Pollution from Ships, COSS, will improve the implementation and enforcement of the international and the EC regulations at a centralised level.

Responsibilities between different authorities and entities are still unclear. According to HELCOM’s overview of accidental spills into the Baltic Sea there is for instance an absence of observed oil spills in the eastern and southeastern part of the Gulf of Finland, which can be explained either by lack of reports or no Russian flight surveillance activity.

5 Description of Proposed Mitigation Measures and / or Measures to Enhance Environmental Benefits

The mitigation measures suggested below are address key impacts and are based on international environmental conventions and regulations.

5.1 Construction Phase

To avoid negative impacts on the environment during the construction of the port the following measures should at least be taken.

Dredging activities and the disposal of dredged materials have been approved by the Baltic Marine Sea Inspection, Ministry of Natural Resources. In the approval there are limitations in order to protect the marine environment, e.g. dredging operations are not allowed during the summer months.

Dredging and other work in water should be avoided during storms and similar conditions to minimise the distribution of suspended material, i.e. to reduce the turbidity in the water.

A dredging plan according to World Bank guidelines should be developed.

Construction works should be done according to Russian regulation concerning safety measures and sanitary conditions.

There is a special manual for prevention of pollution from dredgers and other vessels involved with the dredging activities that should be taken into consideration.

When work is in progress the dredging area needs to be clearly marked, both day and night, in order to reduce the risk for accidental incidents, which might cause contamination of the water.

Different types of dredgers have different impacts on the environment. Suction dredgers are more efficient, faster and more mobile than bucket dredgers and hence are better suited to working in sensitive areas. The ability to complete the dredging operations during a short time period is also preferred since the ecologically sensitive areas will be exposed to increased turbidity for a shorter time. Some suction dredgers release the process water near the sea bottom. This minimises turbidity increases near the surface.

If dredged material shall be used as fill, an efficient system for pumping and spreading the dredged material on land will be required. Drained water should pass some dams with low water speeds in which the suspended materials settle on the bottom.

The water surface should be monitored for oil slicks during dredging and work stopped if any slicks are observed. Incidents should be reported to the Port Service and recorded in the Dredger log book. No work should restart until approval by the environmental authorities.

A waste management system must be available on site in order to collect oil spills, sludge, contaminated water etc.

To compensate for losses in habitats a biodiversity management plan should be developed.

5.2 Operation Phase

The Kurgalsky Peninsula, which is a designated wetland on the list according to the Ramsar Convention, and Kotelsky zakaznik nature reserve are located close to the Multi-purpose Terminal. Those areas are sensitive and vulnerable habitats, which could be exposed to accidental pollution from ships. It is therefore necessary to have procedures for decontamination operations, monitoring and information system etc. An oil contingency plan for the whole terminal area should be developed.

To obtain safer fairways and reduce the risks for accidents due to collisions a Vessel Traffic Service (VTS) should be introduced when the capacity of the port is approximately 10 million tonnes.

In order to reduce the discharges of ship-generated waste to sea, the Multi-purpose Terminal is required to have waste disposal facilities in accordance to the international conventions and the EC law. According to these regulations, a waste reception and handling plan shall be developed and implemented in the port. Procedures for notification and information must be publicised and issued to the shipmasters and other persons concerned. Treatment, recovery and disposal of ship waste and cargo residues shall be carried out in accordance with the waste framework directive using methods that neither endanger human health nor harm the environment.

Even though the port planning does not foresee the port will be used to handle hazardous materials an area should be set aside for the storage of such goods. Procedures must also be developed for the handling and storage of such goods, as well as establishing responsibilities, training and so on. There are also special regulations concerning the transport of hazardous goods in International Maritime Dangerous Goods Code (IMDG Code).

There is no information whether the implementation of an environmental management system (EMS) according to ISO 14001 is considered, but an EMS has several advantages worth mentioning. Apart from the fact that the operator is committed to comply with environmental legislation and to work with continual improvements and prevention of pollution, the operator also must have an organisation structure where roles, responsibilities and authorities are defined. EMS also requires the control of documents that shall be readily identifiable, maintained in an orderly manner, and retained for a specified period. The operator shall also be prepared for emergencies and have established procedures for responding to accidents and emergencies.

The port operator can play a limited role in reducing the environmental risks of shipping by for example providing shore based electricity, structuring of port dues, maintaining navigation aids in good work order, environmental differentiation of fairway dues etc.

Berthed vessels need a lot of power to replace on board generators. The benefits of providing shore based power supplies depend on various factors such as the time the vessel is berthed at the quay, the fuel used, the performance of the engines etc.

In order to decrease ship generated air pollution, particularly the exhaust of emissions of nitrogen oxides and sulphur, systems with environmental differentiate fairways and port dues could be introduced. Ships that have taken environmental protection measures being charged reduced dues, while ships with higher emission levels will pay higher dues.

6 Outline of an Environmental Monitoring Plan

The environmental monitoring plan considering the suggested mitigation measures will be developed.

7 Public Consultation

Within the project two public consultations are to be performed, an initial scoping meeting and a final public consultation meeting for presentation and discussion of the draft EIA document.

7.1 The Initial Scoping Meeting

An initial scoping meeting was held on 11 March 2003 at the Administration of Municipal Formation “Kingisepp region”, Leningrad oblast, Kingisepp. The meeting was attended by 123 persons and minutes from the meeting is found in App. II. Main conclusions and recommendations from the meeting were:

1. To recognise the necessity to establish a ferry complex facility Ust-Luga– Baltiisk–Baltic ports of Germany at the Marine Trade Port of Ust-Luga for organisation of ferry connection between Kaliningrad oblast and Leningrad oblast. This measure will provide enhancing of foreign trade economic efficiency between Russia and the European community. It should also improve competitive capacity of the “North-South” and “East-West” international transport corridors, and ensure reliable and economically viable connection with the Kaliningrad oblast.
2. To comment the completeness of the EIA study being performed at the present designing stage as well as the structure and scope of the scheduled nature protection measures.
3. To completely take into account, in the framework of environmental protection measures of the design “Environmental Protection” Chapter, the comments and proposals, presented during the public consultation meeting,
4. To publish, after mutual approval, the minutes of the public consultation meeting of the “Combined multi-purpose cargo and passenger transport connection with a railway and motor vehicles ferry facility of the “Ust-Luga–Baltiisk–Baltic ports of Germany” route” project (concerning the ferry terminal facility at the MTP of Ust-Luga).

7.2 Final Public Consultation Meeting

The final public consultation will be held during the period of 120 days following the public release of the EIA document. The meeting is planned to September 2003. At this meeting the draft EIA document will be presented and discussed. Minutes from the meeting will be included in the final EIA.

Scandiaconsult International AB has, on assignment by the European Bank of Reconstruction and Development (EBRD), made the EIA for the Multi-purpose Terminal. The assignment was commenced in April 2003 and the draft EIA is made available to the public on 30 June 2003.

The staff responsible for preparing the EIA was:

- Karin Bergdahl, MSc; Port/Marine Environmental Expert
- Håkan Lindved, BSc; Air/Noise and Waste Expert
- Sten Munthe, civil engineer, Head Air/Port Division, Vice President Scandiaconsult International; Ports Expert
- Maria Paijkull, MD Law; Environmental Law Expert
- Catharina Pettersson, PhD, Head Environmental Department; Geochemistry Expert

The Scandiaconsult project number was 540711-01.

The assignment was made under the EBRD Consultancy Contract number C13078/SWEF-2002-12-01.

Annex II

Minutes from
public consultation meeting about project
"Combined Multi-Purpose Terminal in Ust-Luga.
Ferry facility with passenger, road vehicle and rail services
on the line Ust-Luga – Baltiysk – Ports of Baltic Sea".

Date:

11.03.2003

Region:

Kingisepp

Place of meeting:

Administration of Municipal Formation "Kingisepp region", Leningrad oblast, Kingisepp.

Brief description of the project:

Construction of a sea trade port Ust Luga consisting of a ferry facility Ust Luga – Baltiysk – Ports of Baltic Sea in the range of realization of federal purposeful program "Modernization of Russian transport system, 2002 – 2010 years" and according to the Decree of Government of Russian Federation about construction of ferry facilities in Ust Luga and Baltiysk (East Peninsula) during 2002 – 2005 years for organization of ferry connection between Kalinigrad oblast and Leningrad oblast.

Stage of design:

Substantiation of investments for construction.

Customer:

OAO "Baltic ferry"

General Designer:

ZAO "GT Morstroy"

Author of AEI:

ZAO "Ecotrans – Dorservis"

Announcement of the public consultation meeting is placed on the territory of Municipal Formation "Kingisepp region", Leningrad oblast, Kingisepp and was published in the newspaper "East coast" from 05th of March, 2003.

The following persons were present:

Authorities of Leningrad oblast	Chairman of Committee on timber industry	V.V.Ivanov
	Committee on transport	V.P.Nikitin
	Representative for Authorities of Leningrad oblast	M.A.Antonenko
	Vice-chairman of Building Committee	A.M.Burtsev
Authorities of Kingisepp region	Chief of Administration of Municipal Formation “Kingisepp region, Leningrad oblast”	A.I.Nevsky
	Assembly chairman of “MO Kingisepp region” representatives	V.S.Bilinsky
	Deputy Chiefs of Administration	A.S.Terentiev V.V.Kiyanova V.M.Batianov
	Chiefs of Administration of Ust Luga district	V.A.Ziabkin
	Chiefs of Administration of Soykin Okrug	I.A.Krisin
	Representatives for Soykin Okrug	L.O.Belous J.I.Averina
	Deputy Chief of Assembly of representatives	V.I. Gnezdikov
	Representatives for Administration	V.L.Gribkov Ju.R.Sarned A.G.Balitsky
Representatives for Ministries and Department s	Ministry of Health Protection	M.P.Ivanov R.K.Fridman
	Ministry of Transport	A.I.Nedviga V.I.Fedosenko N.F.Kuzmina C.V.Krisanova
	Main Administration of Natural Resources and preservation of the environment (Ministry of Natural Resources about St. Petersburg and Leningrad oblast)	S.I.Lasareva
Representatives for EBRD	Officials of the Department of ecological assessment	Mikko Venermo Blanc Luc
Customer representatives	Managing Director of OAO “Ust luga”	V.S.Izrailit

	First Deputy Director of OAO “Ust luga”	A.V.Zubarev
	Deputy Director on construction of OAO “Ust luga”	Ju.M.Malakhov
	Managing Director of OAO “Baltiisky Parom”	A.L.Zamurayev
	Executive Director of OAO “Baltiisky Parom”	Ju.A.Petrushkov
Representatives for General Designer	Chief Engineer of project. ZAO “GT Morstroy”	A.V.Evdokimov
Representatives for Author of AEI-section of project	Deputy Chief Engineer of ZAO “Ecotrans – Dorservis”	V.N.Pshenin M.N.Romanov
Representatives for State Organizations	Sea Administration of Viborg port and Visotsk port	E.V.Soroko V.n.Evtushenko P.P.Belorukov V.E.Stepanov
	Slutsk fish hatchery	I.N.Voltchenko
	Baltic Sea Inspection	L.A.Filatova
	Chief of Ust Luga hunting ground	N.N.Baranov
	Center of “Gossanepidnadzor” (e.g state sanitary epidemiological inspectorate)	O.B.Zaitsev
	FLTs (e.g. Federal licence center) of Gosstroy Russian Federation	V.P.Risev
	Chief Doctor of Kingisepp TsRB (e.g. Central Region Hospital)	A.A.Linnik
	NII (e.g. research institute) of atmosphere (Ministry of Natural Resources)	V.B.Miliaev
Representatives for Public Organizations	“Green Krest of North-west”	Ju.S.Shevchuk
	“Green World”	V.L.Zimin
	Kingisepp Region Organization of quondam war prisoners of concentration camps	E.E.Makarova
Representatives for other interested organizations	OOO ‘KTK”	Shilikin
	Director of OOO “SK Kentavr”	K.M.Platonova
	“Nord-West marikoservice”	S.B.Gussev
	OAO “Trestsevzapmorgidrostroy”	Ju.P.Panov
	ZAO ‘Baltstroy”	V.P.Tchastovsky
	NCC Intenational	M.Miller

	Firm "Konto"	V.G.Seleznev G.R.Yatmanov A.E.Antsulevich
	"Uncommercial partnership of businessmen of Kingisepp Region"	I.K.Shlemen
	"Kingisepp-Dorstroy"	A.V.Shkidina
	Chairman of kolkhoz (e.g. collective farm) "Baltica"	V.G.Gavrilov
	"Sevzapstroymekchanizatsia"	L.I.Kravtsov
Representatives for SMI (e.g. mass communication media)	Newspaper "Vremia" (Kingisepp)	D.O.Trofimov
	Kingisepp local television	2 persons
	Informational agency AKM	V.Aleynikova
	Agency Interfax	A.Nazarova
	Newspaper "Vesti" (St. Petersburg)	E.Mavrina
	Newspaper "Delovoy Petersburg"	A.Ershov E.Yakovleva
Representatives for inhabitants	The students and lecturers of Lyceum No 36 (Kingisepp)	40 persons
	The students of Lyceum (Novgorod)	10 persons
	Inhabitants of Kingisepp region	S.V.Morozova P.G.Nenchinov P.S.Beliavsky V.S.Ivanov O.D.Shutsky and others
Sum total: 123 persons		

The following notes and propositions were made:

No	Notes and propositions	Declarant
1	To execute more detail and serious ecological expertise on design stage.	Chiefs of Administration of Ust Luga district V.A.Ziabkin
2	To establish constantly functioning committee about study of notes and propositions during project realization (this committee shall be established on the level of Legislative Assembly of Leningrad oblast)	Chiefs of Administration of Soykin Okrug I.A.Krisin
3	To place high emphasis for problem of removal of waste products.	Representative of MoNR
4	To place high emphasis for problem of water treatment on the port territory.	"Green Krest of North-west", Ju.S.Shevchuk

5	To inform of community more often about procedure of project realization.	

Main conclusions and recommendations:

1. To recognise the necessity to establish a ferry complex facility Ust-Luga – Baltiisk – Baltic ports of Germany at the Marine Trade Port of Ust-Luga for organisation of ferry connection between Kaliningradskaya oblast and Leningradskaya oblast. This measure will provide enhancing of foreign trade economic efficiency between Russia and the European community. It should also improve competitive capacity of the "North-South" and "East-West" international transport corridors, and ensure reliable and economically viable connection with the Kaliningradskaya oblast.

2. To comment the completeness of the AIE study being performed at the present designing stage as well as the structure and scope of the scheduled nature protection measures.

3. To completely take into account, in the framework of environmental protection measures of the design "Environmental Protection" Chapter, the comments and proposals, presented during the public consultation meeting,

4. To publish, after mutual approval, the minutes of the public consultation meeting of the "Combined multi-purpose cargo and passenger transport connection with a railway and motor vehicles ferry facility of the "Ust-Luga – Baltiisk – Baltic ports of Germany" route" project (concerning the ferry terminal facility at the MTP of Ust-Luga).

Signatures:

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Assembly chairman of "MO Kingisepp region" representatives	V.S.Bilinsky
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