Nord Stream

The new gas supply route for Europe

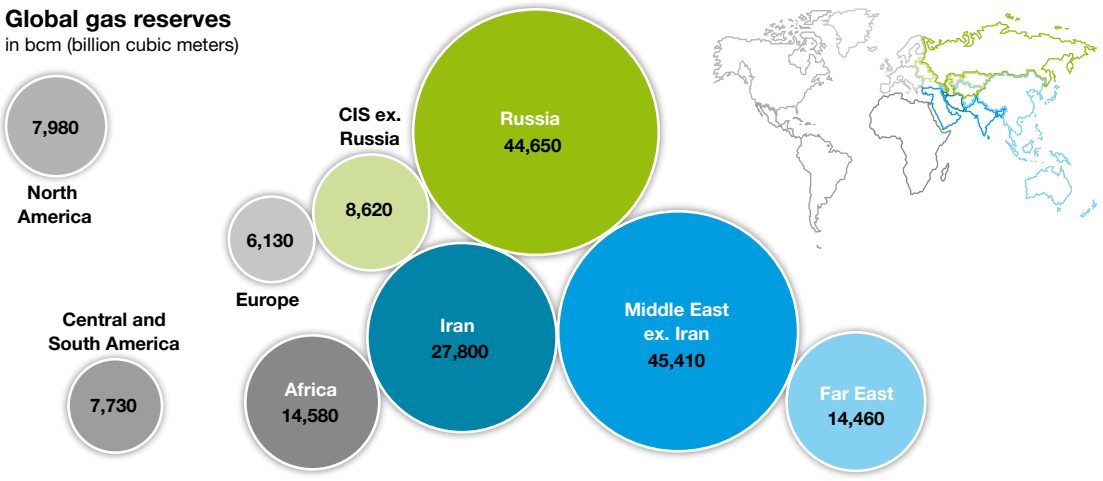
Nord Stream Environmental Impact Assessment (EIA) Documentation for Consultation under the Espoo Convention

Nord Stream Espoo Report: Non-Technical Summary

February 2009

> **Some of the largest known gas reserves on the planet are in Russia and off its coastlines.** The goal of the Nord Stream pipelines across the Baltic Sea is to build a new connection between these huge resources and the markets of the European Union, where demand for natural gas is increasing.

Global gas reserves
in bcm (billion cubic meters)



Source: BP-Stastistical Review of Worlds Energy 2008

Contents

The “Nord Stream Environmental Impact Assessment (EIA) Documentation for Consultation under the Espoo Convention” will be hereinafter and in the whole documentation referred to as “Nord Stream Espoo Report” or “Espoo Report”. The English version of the Nord Stream Espoo Report has been translated into the nine languages of the Baltic Sea region (“Translations”). In the event that any of the Translations and the English version conflict, the English version shall prevail.

Introduction

> **This document is the Non-Technical Summary of the Nord Stream Environmental Impact Assessment (EIA) Documentation for Consultation under the Espoo Convention, the so-called Espoo Report, prepared by Nord Stream AG ("Nord Stream") and intended for the non-specialist reader.** More detailed information is to be found in the main Espoo Report itself. The proposal is to bring, via twin pipelines through the Baltic Sea, natural gas from Russia to the European Union. This will connect the world's largest known gas reserves to the nearest major market. The proposal is called the "project".

The project's technical design ensures the pipelines' integrity and is led by and incorporating the findings of Environmental Impact Assessment (EIA) procedures. The EIA results allow procedures to be put in place that will minimise any environmental impact. Nord Stream commissions all of these assessment reports from renowned environmental consultant companies.

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Key findings resulting from these procedures are:

- Limited environmental impacts are expected from the project and such impacts are generally of minor significance (moderate at most) and of short-term duration.
- Thorough surveys of the seabed were conducted to identify a safe route.
- Pipeline route proposals were made considering environmental, social, socio-economic and technical criteria.
- Risk and environmental assessments show that no unplanned events will have an impact with a high significance rating.
- A top priority has been to avoid munitions dump sites on the seabed.
- Fishing can be impacted locally during operations due to the physical presence of the pipelines.
- All Nord Stream's environmental, safety and working activities are independently monitored by renowned expert companies.

Russia has some of the largest proven natural gas reserves in the world, and it lies near the European Union, where there are increasing energy needs. This document aims at identifying the transboundary impacts that are most likely to occur as a result of the proposed laying of twin pipelines through the Baltic Sea to transport natural gas from Russia to the EU. This Non-Technical Summary of the transboundary environmental report, the Espoo Report, was prepared by Nord Stream AG for the non-specialist reader. More detailed information about the project and its expected transboundary impacts are to be found in the main Espoo Report itself.

Nord Stream AG is the company behind the pipeline proposal, and has spent several years conducting research studies and making surveys. This research ranges from technical and environmental investigations to examining social and socio-economic concerns at the local, national and international levels.

National and international legislation require industrial projects to submit thorough Environmental Impact Assessments (EIAs) as part of the permitting process, and Nord Stream has undertaken such national EIAs in Russia, Finland, Sweden, Denmark and Germany. But these national EIAs, by definition, portray the impacts originating domestically only. That leaves a gap to be closed, namely to elaborate on those impacts that originate in one jurisdiction and impact in another and vice versa. This represents the purpose of the "Convention on Environmental Impact Assessment in a Transboundary Context" (Espoo Convention), namely to focus on those impacts which cross jurisdictional borders and hence require a detailed communication by the originating country to the potentially affected neighbour in order to enable the latter to include those impacts into the national decision making process. Therefore, the Nord Stream Espoo Report is the backbone to environmental-impact reporting, covering the project's potential environmental impacts across all national boundaries. As such it bridges the gap between the mere national view on impacts. Nord Stream has commissioned all of these assessment reports from external environmental experts, but submits them to all parties involved as its author.

FROM RESEARCH INTO THE PROJECT, SEVERAL KEY FINDINGS HAVE EMERGED

- The project's technical design is led by ensuring the pipelines' integrity and incorporating the findings of the EIAs and by adopting international standards for design and construction of underwater pipelines. The Assessment results allow procedures to be put in place that will reduce further any environmental impact.

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- Most environmental impacts of the project (moderate at most) are of short-term duration and restricted in areal extent, and mainly occur during construction and testing, prior to the start of the operation of the pipelines. The research and survey work, which began in 1997, uses the latest techniques and technologies. During the past four and a half years alone, more than 40,000 kilometres have been travelled along the possible routes, up and down the seabed.
- Route options were assessed in consideration of environmental, social, socio-economic and technical criteria.
- Risk and environmental assessments show that unplanned events which have a significant environmental impact are highly unlikely to occur; however procedures are in place to prevent and deal with even the most unlikely occurrences.
- During construction, impact by the pipelay vessel is localised along the pipelines' corridor and mainly temporary, as the pipelay vessel moves up to three kilometres each day.
- A top priority has been to avoid seabed munitions dump sites. Nord Stream's seabed surveys, covering more than 40,000 kilometres during the past four and a half years, have found everything from munitions to dumped domestic washing machines.
- Fishing can be impacted during operations due to the physical presence of the pipelines, but mitigation measures will be arranged with fishermen.
- All Nord Stream's design and construction activities are certified by independent agencies, licensed by public authorities for this work. The certification agencies are Det Norske Veritas (DNV) of Norway and SGS/TÜV Nord of Germany, independent foundations with the objective of safeguarding life, property and the environment.

Nord Stream is an international consortium whose shareholders are Gazprom of Russia (51%), Wintershall, part of BASF in Germany (20%), E.ON Ruhrgas of Germany (20%) and Gasunie of the Netherlands (9%). Each partner has considerable experience in natural gas projects.

The consulting firm Environmental Resources Management (ERM) of the UK produced the Nord Stream Espoo Report in cooperation with Rambøll of Denmark, Institut für Angewandte Ökologie (IfAÖ) of Germany, PeterGaz of Russia, and other well-known environmental specialists.

Shareholders

Each Nord Stream AG partner has years of experience in natural gas projects.

The Nord Stream Project

> **Russia has some of the largest proven natural gas reserves. The European Union's own supplies are dwindling, yet its energy demands are rising.** The Nord Stream project is designed to meet 25 per cent of Europe's additional demand for natural gas. Natural gas also produces low carbon dioxide emissions, helping Europe meet its goals for limiting climate change.

The twin pipelines will follow a 1,220-kilometre route along the bed of the Baltic Sea between Vyborg, in Russia, and Lubmin, near Greifswald, Germany. Construction is planned to start in 2010, with one pipeline operational in 2011 and the other in 2012. The pipelines will provide 55 billion cubic metres (bcm) of gas each year, enough energy to serve 26.5 million households.

Nord Stream's reports, surveys and research of potential environmental and socio-economic impacts are part of a process reaching back to 1997. In 2006, the European Union reaffirmed the project's importance by giving it the highest possible status under its Trans-European Energy Networks (TEN-E) initiative. >

Europe has an ever-increasing demand for energy and needs to find a variety of ways to meet that demand. The European Commission's Directorate-General for Energy and Transport (2007) says that, by 2025, Europe's gas imports are projected to grow by 195 billion to 509 billion cubic metres (bcm). Europe's own gas supplies are decreasing, as are other fossil fuels, and renewable energy alternatives cannot yet meet its needs. The Nord Stream project will meet about 25 per cent of Europe's projected import gap for natural gas.

Currently, pipelines through the North Sea and the Mediterranean carry about 45 per cent, or more than 130 bcm, of Europe's total natural gas imports. Offshore pipelines are tried-and-tested technology.

Of the fossil fuels (oil, coal and gas), natural gas is the most environmentally friendly, producing about 40 per cent fewer carbon dioxide emissions than coal. Natural gas from the Nord Stream project can provide enough energy for 26.5 million households each year. This is the equivalent of the energy from about 39 average nuclear plants, or 50 coal-fired power stations, or about 600-700 tanker trips carrying liquefied natural gas (LNG). For now, as the UN Intergovernmental Panel on Climate Change has stated, natural gas is seen as a "bridge" between phasing out fossil fuels and developing renewable energy sources in the future.

With about 45,000 bcm of natural gas, Russia has some of the largest proven natural gas reserves in the world. And it is on the EU's doorstep. Russia has provided gas to Western Europe for decades – even during the Cold War. There are already extensive pipelines delivering Russian gas across Europe. An additional gas transportation system feeding into this network is a logical and economically sensible proposal.

Nord Stream is fully committed to maintaining the Baltic Sea's unique ecosystem. Planning for the pipelines has taken into account the major concerns of interested parties including authorities, scientists, Non-Governmental Organisations (NGOs) and the public. The project complies with all applicable national, international, maritime and legal requirements.

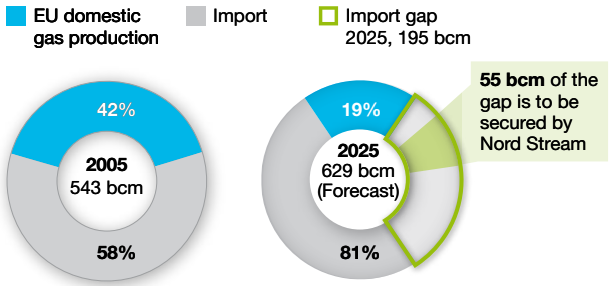
Survey Results Reflected in Project Design

Feasibility research for a pipeline across the Baltic Sea began in 1997. Since then, more than 2,500 square kilometres have been thoroughly surveyed. More than 150 monitoring stations have been used to investigate such diverse subjects as water quality, sediment contamination, plankton composition, bird habitats and marine life. During the past four and a half years alone, more than >

40,000 kilometres have been travelled along the seabed to conduct research and surveys. The results are reflected in the project design, which ensures long-term safety while minimising impact on the physical, biological and socio-economic environments. In fact, Nord Stream's research comprises the most detailed survey ever made of the Baltic Sea, and the company will share its results with all the relevant authorities.

Nord Stream plans to begin construction on the first of the 1,220-kilometre pipelines in 2010. Gas delivery will begin in 2011, with the second pipeline becoming operational in 2012. The proposed route links Vyborg, on the Russian coast, with Lubmin, near Greifswald, Germany. Each pipeline will deliver 27.5 bcm a year, for an annual total of 55 bcm.

The technical design for the project is already in place, and the process of securing the necessary permits for construction and operation under way. The European Union recognises the need to plan its long-term energy security and, under its Trans-European Energy Networks (TEN-E) guidelines, the EU has given Nord Stream its highest possible status as "a project of European interest".



Source: European Commission, Directorate-General for Energy and Transport, 2007

25% of Europe's projected import gap

When fully operational, the Nord Stream pipelines will be able to meet a large portion of Europe's future gas import needs.

Consultation with Competent Authorities and Other Stakeholders

> **The project requires consultation at all levels – with the public, special interest groups, governments and EU bodies.** Between 2006 and 2008, Nord Stream sent representatives to meetings, consultations, public hearings and conferences on the average of one per week. Many of the resulting suggestions have been incorporated into the project.

National Environmental Impact Assessments (EIAs) are central to such discussions. Their purpose is to assess the potential impact of the Nord Stream project on the Baltic Sea ecosystem and to seek cooperation among all relevant stakeholders towards developing safe and environmentally sound pipelines. EIA materials covering national and cross-border aspects are submitted to competent authorities and all construction-related permits must be obtained before construction can begin. The Espoo Convention is concerned with "transboundary" matters – issues that cross national boundaries. The public consultation process for these transboundary issues began in November 2006. >

The pipelines' route passes directly through the Exclusive Economic Zones (EEZ) and/or the Territorial Sea of Russia, Finland, Sweden, Denmark and Germany. In Espoo Convention terminology, these are "Parties of Origin". Countries on the Baltic Sea that may be affected by the pipelines are called "Affected Parties". Russia is a signatory to the Espoo Convention but has not ratified it yet. However, for the purpose of the Nord Stream project, Russia acts as a "Party of Origin".

The Espoo Report is published in all nine languages of the Baltic Sea states and English.

Because the project crosses national borders and may affect areas that are environmentally and socio-economically sensitive, Nord Stream has engaged in active consultation with all interested and affected parties. Consultations have included members of the general public, special interest groups, and representatives of national governments and the EU. Between 2006 and 2008, public hearings, meetings, conferences or consultations occurred at the rate of almost one each week. In the summer of 2008, Nord Stream launched a Pipeline Information Tour, inviting comment from the public in the whole Baltic Sea region.

National Environmental Impact Assessment (EIA) studies have been carried out in each of the five countries through whose waters the proposed pipelines' route passes: Russia, Finland, Sweden, Denmark and Germany. These are studies of environmental considerations in relation to the construction, pre-commissioning, commissioning and operation of the twin pipelines. The EIAs' purpose is to inform decision-makers and other stakeholders about the pipelines' potential impact on the Baltic Sea ecosystem, while guiding cooperation among all relevant countries, towards developing safe and environmentally sound pipelines. Nord Stream arranges these surveys and studies with competent organisations, all internationally acknowledged as experts in their fields. Rambøll of Denmark, Institut für Angewandte Ölologie (IfAÖ) of Germany and PeterGaz of Russia carried out EIAs and permit applications, for example. Marin Mätteknik of Sweden and DOF of Norway carried out seabed surveys. The Italian engineering firm Snamprogetti was responsible for the pipeline design; and, from the UK, Environmental Resources Management (ERM) compiled the Espoo Report.

Permits Must Be Obtained

The Nord Stream project is subject to national legislation in each of the countries through which it passes – Russia, Finland, Sweden, Denmark and Germany. According to the requirements of country-specific national legislation, the national applications and EIA materials are submitted to competent authorities and all necessary permits must be obtained before construction can start.

International consultation under Espoo Convention procedures began in November 2006, whereby Nord Stream submitted a so-called Project Information Document on the planned pipelines to the competent authorities of Russia, Finland, Sweden, Denmark and Germany in accordance with the Espoo Convention. Espoo is concerned with "transboundary" matters – issues crossing national borders – and identifies "Parties of Origin" and "Affected Parties". The former are those countries in which construction will take place, either in their Territorial Sea, their Exclusive Economic Zones (EEZ), or both. The latter are those which may be affected by the project in some way, although no construction will take place in their territory.

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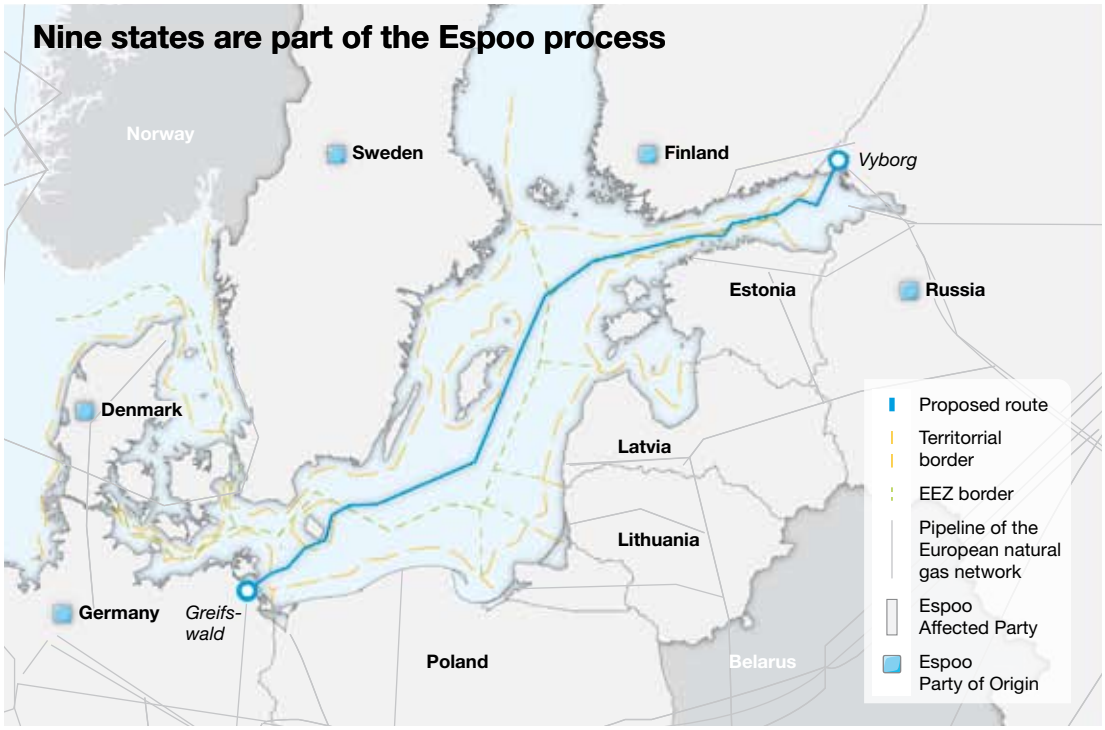

All Baltic Sea countries participate in the international consultations according to the Espoo Convention.

The five Parties of Origin include Russia, Finland, Sweden, Denmark and Germany. Estonia, Latvia, Lithuania and Poland are each an Affected Party. While construction is taking place in Russia, for example, then nearby Finland may be an Affected Party. Thus, all Parties of Origin are also Affected Parties, insofar as they are affected by the project taking place in another (neighbouring) country.

The Espoo Report, describing the environmental impact along the whole route, is published in the nine languages of all the Baltic Sea countries, as well as in English. International consultations have, so far, resulted in more than 200 comments, suggestions and ideas that have been received by Nord Stream. Many of these, where practicable, have been incorporated in the project design. The consultation process is ongoing, and Nord Stream remains committed to dialogue; a two-way communication process. In fact, the Nord Stream project represents the largest international consultation exercise to be held under the Espoo Convention.

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Choice of Environmental Surveys Completed as of November 2008

Receptor/ Resource	Scope of environmental survey	Contractor
Benthos	Sampling and analysis of soft-bottom macrofauna along the pipeline route in the Swedish part of the Baltic Sea, 2007	Stockholm University - Elsina Flach, Hans Cederwall, Göran Fornander & Alma Strandmark
	Macrozoobenthos along the Nord Stream pipelines in the Gulf of Finland characterised on the basis of Russian data from 2005 and 2006 (May 2008)	Dansk Bio. Laboratorium
	Macrozoobenthos along the Nord Stream pipelines in the Baltic Sea in 2006 and 2007 (February 2008)	
	Macrozoobenthos along the Nord Stream pipelines (S-Route) on basis of data from May 2008	
	Macrozoobenthos along the Nord Stream pipelines in Finland (Kalbådagrund) on the basis of data from May 2008	
Sea Birds	Baseline investigations of the use of sea area northeast of Ertholmene by breeding guillemots Uria aalgae and razorbills Alca torda in relation to the planned route of the Nord Stream pipelines	Danish Hydraulic Institute (DHI)
	Seabird surveys in the Danish EEZ south-east of Bornholm	Institut für Angewandte Ökologie (IfAÖ)
Water Quality	Consequences of dredging/trenching on the mobilisation of nutrients to the water column in the Baltic Sea	Larsson, Blomqvist (AMFAB)
Climate	Impacts on the Baltic Sea due to changing climate. (SMHI report no. 77, 2007)	Swedish Meteorological and Hydrological Institute (SMHI)
Deep Water	Possible effects upon inflowing deep water of a pipeline crossing the flow route in the Arkona and Bornholm basins. (SMHI report no. 61, 2007)	Swedish Meteorological and Hydrological Institute (SMHI)
Submarine Slides	Submarine slides in south-western Baltic Proper. (SGU.Report 2008:5)	Geological Survey of Sweden (SGU)
Noise	Noise study: Baltic Sea. Underwater pipeline. (February 2008)	ODS - Ødegaard & Danneskjold-Samsøe A/S
Sediment	Gas pipelines South of Bornholm. Survey South of Bornholm 4-13 May 2008. (Field report, including chemical analysis contaminants sediment)	Danish Hydraulic Institute (DHI)
	Survey around Bornholm from 27 to 31 August 2007. Results of physical and chemical analysis of surface sediments	
	Geological Survey of Sweden. Sampling of surface sediment along the pipeline route in the Swedish part of the Baltic Sea. (Geological Survey of Sweden, SGU-Dnr08-1232/2007)	Geological Survey of Sweden (SGU)
	FIMR Gas pipeline survey, leg I 27 - 31 August 2007 and leg II 17 - 21 Sept 2007	Finnish Institute of Marine Research (FIMR)

Choice of Geotechnical Surveys Completed as of November 2008

Receptor/ Resource	Scope of geotechnical survey	Contractor
Geotechnical Investigations	Geotechnical report. Investigation data North European gas pipeline Baltic sea- offshore section, 2006	PeterGaz / Fugro OSAE (Offshore Survey and Engineering)
	Investigation data Nord Stream pipelines Project Baltic Sea	Fugro OSAE (Offshore Survey and Engineering)
	Nord Stream geotechnical route survey, Baltic Sea	DOF Subsea

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Choice of Geophysical Surveys Completed as of November 2008

Receptor/ Resource	Scope of geophysical survey (including cultural heritage and munitions surveys)	Contractor
Route Survey	Detailed geophysical survey Baltic Sea and Gulf of Finland (2005)	PeterGaz
	Detailed geophysical survey 2006. Survey operations and results	
	Nord Stream project in the Baltic Sea, Greifswalder Bodden, final report	Fugro OSAE (Offshore Survey and Engineering)
Route and Munitions Survey	Munition screening and geophysical route survey, final report	Marin Mätteknik (MMT)
	Detailed survey, Route revision C14, Finnish waters, factual report	
	Detailed survey, Route revision C14, Swedish waters, factual report	
	Detailed survey, Route revision C14, Danish waters, factual report	
	Detailed survey, Route revision C14, German waters, factual report	
Chemical Munitions	Chemical warfare agents - Data results (DMU)	National Environmental Research Institute (NERI, in Danish DMU)
	Risk analysis of chemical munitions along the S-route based on results from chemical analysis of chemical munitions in sediment along the S-route	National Environmental Research Institute (NERI)
	Supplementary environmental field investigations inside Finland EEZ at alternative route Kalbådagrund and at preferred route of the planned Nord Stream gas pipelines	Finnish Institute of Marine Research (FIMR)
	Chemical analysis of sea-dumped chemical warfare agents in sediment	Finnish Institute for Verification of Chemical Weapons (Verifin)
	Analysis of arsenic compounds in sediment samples and sediment pore water samples from the Baltic Sea	National Environmental Research Institute (NERI)

Choice of Further Surveys Completed as of November 2008

Receptor/ Resource	Further surveys	Contractor
Route Alternatives	Study about wide area landfall alternatives	IMPAC, Institut für Angewandte Ökologie (IfAÖ)
	Study about small area landfall alternatives	
	Route alternative within German Sector (technical feasibility of Usedom route)	IMPAC
Noise	Technical acoustic survey	Ingenieurbüro Patzold
Emissions Atmosphere	Study about emission and atmospheric pollution	Ingenieurbüro Patzold
Temperature	Impact on the ambient temperature in the immediate vicinity of the pipelines at German Landfall	Snamprogetti
Fishery	Fishing in the Baltic Sea	Fishery Consultant Agner Svendsen (FOGA)
Tourism	Tourism on Bornholm - with special emphasis on the east coast and Dueodde	Centre for Regional and Tourism Research (CRT)

Process of the Project

> **Operated for decades, offshore pipelines are subject to international standards and rigorous certification.** All aspects of the project are covered, from the materials used, to pipeline security and risk assessments through every stage of development. Constructed one at a time, the twin pipelines consist of 12-metre pipes that are carried by ship to a special pipelay vessel. Here, the pipes are welded together and eased into the water. Up to three kilometres of pipeline can be laid in a day.

Once constructed, the pipelines are filled with water for at least 24 hours of pressure testing. After receiving all the necessary certificates, the pipelines are put into service. With a design life of 50 years, "decommissioning" is then carried out under equally rigorous regulatory control.

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Over the past forty years, the offshore industry has developed widespread expertise in designing, constructing and operating pipelines. Offshore pipelines are accepted as the safest, most efficient, and most environmentally friendly means of transporting gas and oil across long distances. Consequently, developers comply with demanding international standards and certification processes, covering every aspect and stage of the project. Extensive seabed surveys have been conducted, producing a detailed picture of sea floor conditions and potential obstacles. Based on these surveys, engineers have determined whether it is necessary to adapt the seabed to avoid long sections of unsupported pipeline, so-called “free spans.” Wherever possible, seabed adaptation (or “intervention”) has been avoided.

Between 1997 and 1999, planners investigated four potential routes, combining offshore and overland pipelines. The offshore option was chosen for technical, environmental and economic reasons. Further route optimisations were then considered to reduce the environmental impact even further. Minimising the need for seabed intervention works remained a central consideration throughout the process.

Pipeline Dimensions and Construction

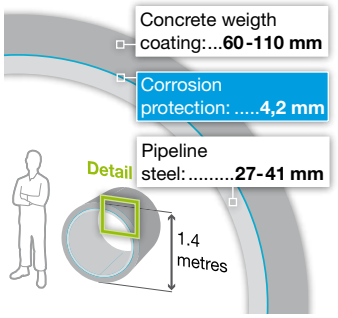
Each pipeline is made of individual 12-metre steel pipes with a constant inner diameter of 1,153 millimetres and a wall thickness of up to 41 millimetres. The pipelines are coated internally to reduce friction and externally to provide corrosion protection. An additional outer layer of concrete is applied to the pipelines with a maximum thickness of 110 millimetres. This layer is for weight and insures stability on the seabed.

The 12-metre pipes for the first pipeline are initially built at steel mills in Germany and Russia. From there, they are taken to specialised coating yards. Next, they are either transported for immediate use, or are stored in marshalling yards, dispersed around the Baltic Sea coast. The pipes are then delivered by specific carrier ships to the pipelay vessel. This is a sort of floating platform, crewed around-the-clock, laying up to three kilometres of pipeline a day. On board, the pipes are welded together in an enclosed, industrial facility, in which the pipelines’ welded joints are automatically and 100% inspected by ultrasonic-sound. Finally, after protecting each weld, the pipeline is fed out onto a ramp structure, called a “stinger”, which prevents overstressing of the pipeline as it enters into the water.

In the shallow waters in Germany, a smaller vessel will carry out the same operations under similar procedures.

Pipes receive many coatings

Pipe sections have a variety of coatings to improve strength and efficiency. They are relatively small in height considering the volumes they transport.



Saipem S.p.A. of Italy has been contracted to lay the Nord Stream pipelines. Saipem has substantial experience, constructing large-scale offshore pipelines for the oil and gas industries.

Testing the Pipeline

Once constructed, each pipeline is dry inside and filled with air. For pressure-testing, they are flooded with seawater which is then pressurised for at least 24 hours to a level higher than operational gas pressure. This test water is to be treated with oxygen scavenger and caustic soda, which are natural components of the seawater. Already in the pipeline, these substances will degrade into its natural existing components. Only after demonstrating their integrity will the pipelines then be put into service. It is currently foreseen that the test water will be discharged to the sea in the vicinity of the landfall site near Vyborg in Russia. After that, the pipelines are dried with air and filled and pressurised with natural gas.

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100,000 pipes must be welded and lowered on the seabed for each of the twin pipelines

Pipes delivered to pipe-laying vessel
Barges provide a steady stream of pipes to the pipe-laying vessel. The Nord Stream supply chain is efficient as well as environmentally friendly.

Construction begins
Each of the pipes is inspected after transport and fed into an enclosed production facility for joining to the pipeline string.

Welding inside and out
Each of the pipes is fused to the string through a sophisticated welding process. Each weld is inspected by ultrasonic-sound and sealed.

Lowering to the seabed
As the pipeline grows, the pipe-laying vehicle moves forward and the string is lowered to the seabed. Up to three kilometres of pipeline can be built each day.

Operating the Pipelines

During normal operation, pressurised natural gas is continuously introduced at Vyborg and taken out, at an equal rate in Greifswald, Germany. Pressure and gas flow are continuously monitored. Around-the-clock computer monitoring also balances the intake and extraction volumes, ensuring that maximum pressure is never exceeded. The pipelines are remotely monitored, 24 hours a day. Specialists are always on hand, prepared to take direct control to ensure safety in an emergency. The entire operational procedure is certified by the independent certification agencies, Det Norske Veritas (DNV) and, in Germany, SGS/TÜV Nord. The operational procedure must also be approved as part of the national approval process.

Maintenance and inspection are performed regularly throughout the pipelines' operation. Internal inspection is carried out by a remote-controlled intelligent device, a pipeline inspection gauge (PIG), which travels inside the entire length of the pipelines to check for irregularities. Also the outside of the pipelines and their support structures, as well as the seabed corridor, are regularly surveyed by a Remotely Operated Vehicle (ROV). Based on the outcome of these surveys, any necessary changes are assessed.

The pipelines are designed for at least 50 years of service. Their condition will be evaluated continuously to ensure safe operation. Thus, the service period might be prolonged, depending on the pipelines condition. When the pipelines are taken out of use, they may be entirely removed, partially removed, or left in place, unused. This will largely depend on the international regulations for decommissioning at that time.

Alternatives

> **Natural gas is the necessary, current answer to Europe's rising energy needs.** There are three possible ways of transporting it: as liquefied natural gas (LNG), creating high emissions of carbon dioxide; via over-land gas pipeline, requiring a high number of compressor stations, therefore creating more emissions and energy use; and by offshore gas pipeline, which has none of these disadvantages.

Different routes through the Baltic Sea have been exhaustively studied for more than a decade. Safety is always considered. The other three main criteria for evaluation are environmental, socio-economic (e.g. fishing, military, leisure), and technical issues (e.g. construction time and distance). Should there be competing interests, safety and environmental concerns always have the highest priority.

Applying all these criteria, the 1,220-kilometre, Vyborg-to-Greifswald route was judged as the best. Of three locations considered, Greifswald was assessed as the best place to bring the pipelines ashore. >

The Nord Stream project offers distinct advantages in terms of energy efficiency and environmental protection, compared to other options for natural gas transportation. Generally, the three options for gas transportation include: using tankers to carry it as liquefied natural gas (LNG); using overland gas pipelines and using offshore gas pipelines. Each potential choice for natural gas transportation is considered here.

LNG TANKERS

A year's gas supply from the Nord Stream project is about the same as would be achieved by 600 to 700 trips across the Baltic Sea by LNG tankers. Shipping involves additional sea traffic and thus has an influence on maritime safety, high pollution and noise factors. Converting natural gas to and from its liquid form also requires energy and produces unwanted emissions. LNG conversion and transport is the most carbon-intensive method of delivering natural gas. A pipeline, once constructed, avoids all of these disadvantages.

OVERLAND PIPELINE

An overland pipeline also has disadvantages compared to an offshore line, going through the sea. An overland route would be longer, causing more disruption to the environment, and also must negotiate towns, cities, roads, railways, canals, rivers, surface landforms, agricultural land, as well as sensitive ecosystems and cultural heritage sites. An overland pipeline also requires many compressor stations to maintain gas pressure, and these constantly use energy while creating noise and atmospheric emissions.

OFFSHORE PIPELINE

An offshore pipeline has none of the above disadvantages and, in addition, is able to transport more gas at sustained and greater pressures than overland. Being a shorter route, an offshore line is also more cost-effective to construct and maintain. Furthermore, there is no disruption to towns, agriculture or other infrastructure. The most significant disadvantage, as with any pipeline, are the impacts which arise during construction. Development of other offshore pipelines, however, tells us that these disadvantages are generally not extensive and mostly only of short-term duration. There is also less impact on people and the natural environment than with the other two options. During operation, impacts are mainly limited disruptions to commercial fishing activity and, to a lesser extent, some restrictions on shipping and navigation.

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Of the three options for transporting gas, the offshore pipeline is the best.

Zero Alternative

There is also the "zero alternative", meaning not building the project at all. There would, of course, be no environmental impact whatsoever along the pipeline corridor. However, the other ways of meeting Europe's growing energy demand – i.e., burning coal or oil – would produce much more carbon dioxide emissions – meaning far greater environmental impact – as opposed to natural gas. The Nord Stream project also will bring socio-economic benefits, such as increased local employment, particularly during construction.

Choosing the Route

The choice of the proposed offshore route through the Baltic Sea involved substantial research. Each choice was measured against three principal criteria.

The first criterion is environmental. Planners worked to avoid crossing areas designated as "protected" or "environmentally sensitive" – areas hosting ecologically sensitive species of animal or plant life. Project planners also wanted to minimise any work that might disrupt the seabed's natural composition. A second criterion considered social and socio-economic factors. The key here is minimising any restrictions on marine users – those working in shipping, fishing, offshore industry, the military or tourism or recreation – and with existing offshore installations, such as cables or wind turbines. (Avoiding old munitions dumps and cultural heritage sites also falls within this category.) The third criterion covered technical considerations. Here, it was important to consider how to reduce construction time – minimising potential disruptions, etc. – while minimising the operation's technical complexity, reducing certain costs and use of resources.

THESE CRITERIA WERE APPLIED TO FIVE MAIN ROUTING CHOICES. FOLLOWING THE ROUTE FROM RUSSIA TO GERMANY, THESE CHOICES INCLUDED:

- **North or south of Gogland, in Russian waters;**
- **North or south of Kalbådagrund, in Finnish waters;**
- **East or west of Gotland and around Hoburgs Bank, in Swedish waters;**
- **Around Bornholm, in Danish and German waters; and**
- **Bringing the pipeline ashore at Lübeck, Rostock or Greifswald in Germany.**

NORTH OR SOUTH OF GOGLAND (RUSSIA)

The northern route around the island of Gogland is proposed because it is furthest from any protected areas and proposed mineral extraction sites. It requires crossing of one existing cable, but no shipping lane and is shorter by 13 kilometres.

NORTH OR SOUTH OF KALBÅDAGRUND (FINLAND)

The southern choice is proposed because it has slight advantages, being technically less complex in requiring less seabed adaptation, and will have less effect on marine organisms.

EAST OR WEST OF GOTLAND AND AROUND HOBURGS BANK (SWEDEN)

Around the island of Gotland, the eastern route is proposed because it avoids major shipping routes. It is also furthest from military and munitions sites, and is shorter. Around Hoburgs Bank, a mid-route between the Natura 2000 area and a major shipping lane is preferred, avoiding impact on any protected sites. An alternative further southeast would have been closer to munitions dump sites. The alternative also would have required crossing undersea cables and a major shipping lane for a longer distance.

AROUND BORNHOLM (DENMARK)

A southern route, the so-called "S-route", is preferred around the island of Bornholm because it avoids the ship traffic lane north of Bornholm and has less impact on the environment. It also avoids several Natura 2000 areas. While being closer to the Pomeranian Bight, the route requires less seabed intervention and there are only three cable crossings.

BRINGING THE PIPELINE ASHORE AT LÜBECK, ROSTOCK OR GREIFSWALD (GERMANY)

Of these, the last location is preferred early on. Greifswald is proposed for several reasons. The route passes through fewer Natura 2000 sites and requires much less seabed intervention works. This route is also shorter, requiring less construction time, thus minimising the duration and amount of disruption caused. Finally, the Greifswald coastal stretch has far less tourism and residential use.

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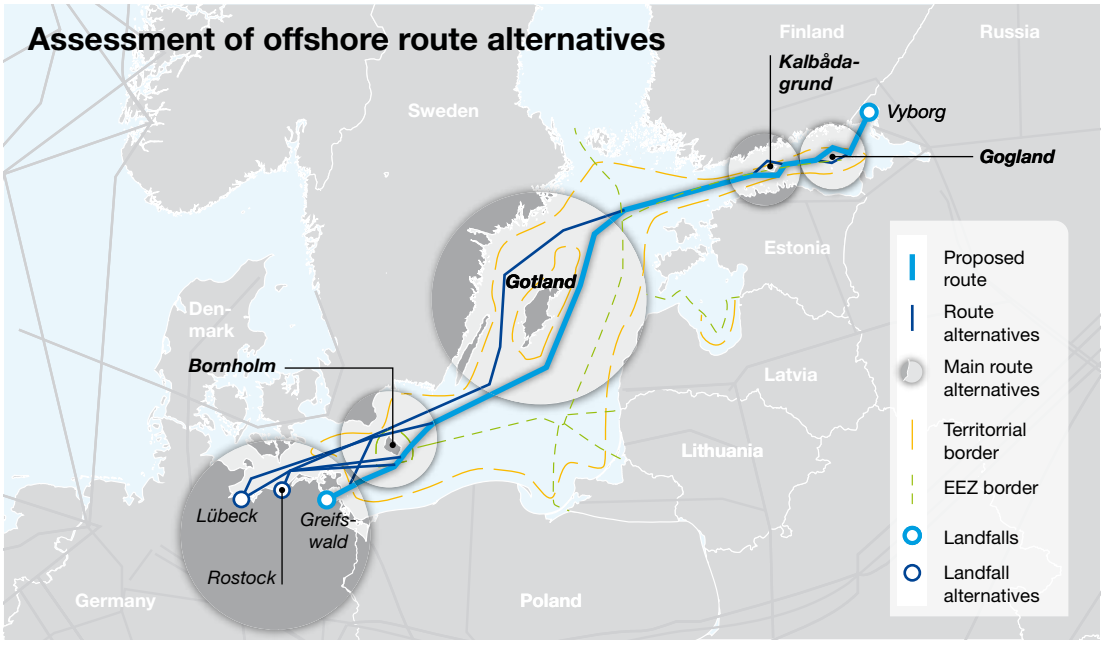

Alternatives were carefully considered before arriving at the proposed optimal route along the seabed.

Technical Choices

The three criteria – environmental, socio-economic and technical – were also applied to wider technical considerations. Much of this is governed by existing regulations, notably the Submarine Pipeline Systems Code DNV-OS-F101. For several decades, using DNV design codes has been established industry practice.

Significant decisions were made after considering environmental factors. It was decided not to use an Intermediate Service Platform (originally planned in Swedish waters), as the project is deemed technically feasible without it. This minimises impact to the seabed and reduces any danger to shipping. The pipeline materials and design have been chosen to minimise the use of natural resources. Logistical choices were made to enable the use of trains overland, rather than roads, and to keep all transport to a minimum. Where the pipelines need bridging support, it was decided to use gravel replacement rather than blasting and cutting and, at Greifswald, a piled cofferdam will reduce the effect on sensitive habitats.

Again on the technical side, environmental concerns have dictated where to discharge the water used for pressure testing the pipelines before they go into operation. Current plans foresee that this will be done near Vyborg because the lower salt levels and deeper water allow the test water to be diluted and dispersed more quickly and efficiently than at Greifswald. The test water is to be treated only with oxygen scavenger and caustic soda, which are natural components of the seawater, albeit at low concentrations. This minimises effects on water quality and marine life when it is discharged. Ongoing tests are evaluating whether such water treatment is necessary to prevent internal corrosion and insure the integrity of the pipelines.

Conclusion

Throughout the development of the project, Nord Stream has committed significant resources in finding and selecting the route with the least environmental and socio-economical impact. The 1,220-kilometre route as proposed from Vyborg, on Russia's Baltic Sea coast, to Greifswald, on Germany's northern Baltic coast, minimises environmental impact and commercial disruption while providing the basis for efficient, reliable, safe and affordable installation of the twin pipelines.

Assessment of Potential Risks

> **Risk assessment, essential in all major engineering projects, never stops, and is governed by established rules and procedures.** The Nord Stream project holds to relevant International Maritime Organisation (IMO) risk-assessment directives and Det Norske Veritas (DNV) standards, whereby assessment has been made of the risks both to people and to the environment. The critical periods for such risks are during construction and operation of the pipelines and would involve, for example, dragging anchors or shipping collisions, resulting in oil spills.

Once a risk is identified, procedures are developed and implemented to eradicate or "mitigate" it to an acceptable level. For example, exclusion zones around construction vessels make collisions with other shipping very unlikely. As standard industry practice, such vessels also are prepared and equipped to deal with fuel or oil spills during fuel bunkering operation.

The risk of damage has been carefully evaluated for each kilometre of pipeline, considering all possible impacts, and found acceptable. This means meeting internationally accepted criteria. Also, the pipelines will be marked on all nautical charts, minimising the chances of interference with shipping, such as anchoring operations.

The safety and risk assessment of the project is independently verified by the experts of DNV. Their assessment covers all construction stages including preparation work, pipe-laying, testing and the eventual operation of the pipelines.

>

Thorough risk assessments are normal practice in the pipeline industry and the Nord Stream project is no exception. The procedures governing all risk and safety assessments have been developed over years of experience, and through international agreement. Under the control of Det Norske Veritas (DNV), the Nord Stream project meets all relevant International Maritime Organisation (IMO) risk-assessment directives and criteria. Risk assessments are made to cover every aspect and every stage of the project, from planning, construction and operation to taking the pipelines out of service – i.e. decommissioning. Only if a risk is finally assessed as acceptable, by these standards, then the work under consideration is allowed.

In general terms, then, an identified risk must be categorised for its potential seriousness or "significance" (which is a combination of its potential consequence and its likelihood of occurrence). Possible options are then explored to reduce or, better still, to eliminate the risk. Once procedures have been identified to achieve this, they are incorporated into the project design.

Assessments have been made of risks both to people and to the environment. The most likely periods of risk have been determined to occur during construction and, to a lesser extent, operation of the pipelines. The most likely risks during construction are of shipping collisions with passing vessels and oil spills during refuelling. Due to the planned mitigation measures (exclusion zone and oil pollution emergency plan) both risks are considered to have been reduced to an acceptable level.

Example Case Scenario

During pipeline construction, the most significant risk to people is from a shipping collision. The pipe-laying vessel is moving at about three kilometres a day, in good weather, and supply ships carrying pipeline sections are going to and fro regularly. A collision with a passenger, fishing, military or freight vessel would endanger lives on all vessels, while raising the threat of oil spillage.

Standard industry experience shows that the most important mitigating procedure is to impose an exclusion zone around the construction vessels, making the risk of a shipping collision negligible. In addition, the relevant maritime and coastguard authorities will be informed of all vessel movements, which will also be broadcast on appropriate media such as Navtext. Maritime collision poses a very serious risk, and, by itself, rates as a high-consequence event, and therefore unacceptable. The exclusion zone procedure incorporated into the project makes this event improbable and hence the risk now of only minor significance, and thus broadly acceptable. If a collision did nevertheless occur then there are procedures in place to deal with this. The mitigation measures described above have greatly minimised the risk of a collision, consequently minimising the risk of an oil spill. At the same time, every vessel will carry an oil-pollution emergency plan, approved by the authorities. Thus, the risk of an oil spill is regarded as being of minor significance.

A risk may be regarded as being of minor significance, and therefore broadly acceptable; this does not mean that it is forgotten. Risk-assessment data tell us, for example, that full pipeline ruptures are so rare, one is unlikely to occur during the life of the pipelines. The principal potential cause of pipeline failure is a large ship's anchor catching it. To prevent this event, the pipelines will be marked on all nautical charts. Procedures will be in place, for example, to warn vessels to avoid the vicinity of a rupture, while immediate action is taken to isolate and depressurise the defective pipeline and thereby end the danger.

Conclusion

Risk-reducing measures are implemented for all risks that are assessed as unacceptable. In addition, the whole safety and risk assessment of the project is independently verified and approved by the experts of DNV and SGS/TÜV. This third-party assessment process covers all stages of construction – such as preparation work, pipe-laying and testing – as well as the eventual operation and decommissioning of the pipelines.

Impact Assessment Methodology

> **Methods used for assessing environmental impacts and presenting the findings is in accordance with international guidelines.** In addition, the "Convention on Environmental Impact Assessment in a Transboundary Context" (Espoo Convention) the impact assessment process due to the cross-border, or "transboundary", nature of the project.

The "significance" of a potential impact is assessed in terms of various factors. These are its source (the nature of the originating activity that gives rise to the impact); how long it lasts (its duration); the physical range, or scale, that it covers; its intensity, the value and/or sensitivity of the environment where the impact occurs and finally the effects of measures taken to minimise or avoid that impact.

The time scale of the impact varies according to the stage of project implementation. Construction, testing and putting the pipelines into operation will be the most important stages in this respect. It is im- >

portant to remember, though, that any potential impact during these stages is not simultaneously along the whole length of the pipelines, but is in localised places.

The range, or scale, of the impact is considered in the following terms:

- A local scale impact = up to 500 metres from the source event
- A regional scale impact = 500 metres to 10 kilometres
- A national scale impact = over 10 kilometres

Then the potential impact must be assessed in terms of how seriously any parts of the environment might be affected. Here the important point is the relative value or sensitivity of the "resource and/or receptor" – i.e. whatever is going to be affected by the impact. The resources and/or receptors are categorised into three environments: physical, biological as well as social and socio-economic. For unplanned events the likelihood of occurrence is also taken into consideration.
Finally, the "significance" of the potential impact is then assessed after taking into account measures that will be put in place to minimise or "mitigate" that impact.

A potential impact results from either a planned activity or an unplanned event. A planned activity impact will be of "minor, moderate or major significance", the latter being unacceptable. An unplanned event's impact will be "low, moderate or high", again with the latter being unacceptable. In either case, the "significance" rating is made after counteracting, or "mitigating", measures have been implemented. No impact from the Nord Stream project, planned or unplanned, has been categorised as "major" or "high" by renowned expert consultancies.

In the same way that a risk assessment identifies possible safety risks, an impact assessment works out what environmental, or social and socio-economic, impacts a course of action will have. Having identified any potential impact, mitigation procedures are designed into the project. There are international guidelines governing this whole process for the Nord Stream project. Because of its cross-border, or "transboundary", nature the regulations from the "Convention on Environmental Impact Assessment in a Transboundary Context" (Espoo Convention) come into play.

There are EIAs carried out nationally, for each country through which the pipelines pass and where a permit to construct and operate the pipelines is required.

Within this stringent context, a potential impact is analysed and given a "significance" rating. >

Factors Used to Assess the Level of Significance of an Impact

- **SOURCE** – the activity that gives rise to the impact
- **TEMPORAL SCOPE** – whether the activity giving rise to the impact takes place during construction, pre-commissioning and commissioning, operation or decommissioning of the pipelines
- **SPATIAL SCOPE** – the locations or areas along the pipelines route where the initiating activity will take place
- **DURATION** – how long the impact continues, which may be temporary, short-term, long-term or permanent
- **SCALE** – the physical range over which the impact may be experienced
- **INTENSITY** – the effect or level of damage that is suffered. Criteria have been established for determining whether the intensity is low, medium or high
- **ENVIRONMENTAL VALUE OR SENSITIVITY** – any part of an environment that will be affected is known as a "receptor" or a "resources". Three environments are identified – physical, biological, social and socio-economic. Receptors and resources differ in their value and/or sensivity to the impact under consideration (and indeed, may vary in sensitivity along the pipelines route)
- **MITIGATION** – measures introduced to minimise or eradicate ("mitigate") the impact
- **SIGNIFICANCE RATING** – assessment of these factors leads to an impact having a "significance" rating

The Source

This can be at any stage of the project. There are two broad sources that may cause the potential impact. These are either planned activities or unplanned events. Each activity or event can give rise to a number of impacts.

Temporal Scope

In terms of temporal scope, most impact occurs during construction. Crucially, however, this will not be simultaneously along the whole length of the 1,220-kilometre pipelines route, but only in the vicinity of where the pipe-laying vessel is completing up to three-kilometres a day of work.

Scale or Physical Range

The physical range or scale of a potential impact has been an important part of the assessment process and is classified as follows in this Espoo Report:

- A **LOCAL SCALE** impact is one where the effects are experienced up to 500 metres from the source event
- A **REGIONAL SCALE** impact is experienced for more than 500 metres but less than 10 kilometres from the sources event
- A **NATIONAL SCALE** impact is experienced over a distance of more than 10 kilometres from the source event

Impact Magnitude

Impact magnitude is a combination of scale, duration and intensity.

Environmental Value or Sensitivity

Here the important point is the relative value and/or sensitivity of the "resource" or "receptor" – i.e. whatever is going to be affected by the impact. The resources or receptors are categorised into three environments.

- The **PHYSICAL ENVIRONMENT** – such as the seabed, the water column, the atmosphere
- The **BIOLOGICAL ENVIRONMENT** – such as marine plant, animal life and nature conservation areas
- The **SOCIAL AND SOCIO-ECONOMIC ENVIRONMENT** – such as fisheries, shipping and navigation, tourism and recreation, cultural heritage, offshore industries and military operations

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Minimising the Potential Impact

A key objective of the EIA is to identify all possible means of minimising or eradicating the potential impact. For an unplanned event another important aspect of its "significance" is how likely it is to occur. The mitigation procedures are designed to greatly minimise this likelihood as well as the consequence.

Examples of mitigation measures are the avoidance of sensitive sites, scheduling activities to avoid the breeding periods of sea birds and spawning periods of fish, and the use of control measures to manage the suspension of re-suspension and spreading of sediments.

These measures required to counteract or "mitigate" an impact are built into the project design and are incorporated in accordance with regulations, standards, industry best-practice and any specialist observations.

Significance Rating

Finally, the potential impact must be assessed in terms of how seriously any parts of the environment might be affected. The "significance" of the potential impact is assessed after taking into account measures that will be put in place to minimise or "mitigate" that impact. An impact arising from a planned activity will, depending on its magnitude and the environmental value or sensitivity, be given a significance rating of insignificant, minor, moderate or major.

An impact arising from an unplanned event will be given a significance rating of insignificant, low, moderate or high depending on its magnitude, the environmental value or sensitivity and the likelihood of occurrence.

Any impact of major or high significance which cannot be mitigated sufficiently for it to be designated to a lower category of significance, is regarded as unacceptable. A moderate or minor impact is dealt with in a manner approved of by regulations and best-practice methods.

Planned Activities and Unplanned Events

With either activity the highest significance rating of "major" or "high" is regarded by Nord Stream to be unacceptable and the activity will not be allowed. Remember, however, that the rating is not given until all mitigation procedures have been put in place. These are designed to minimise or eradicate the "significance" of the potential impact such that the highest rating is very unlikely.

All the Environmental Impact Assessment studies are thoroughly carried out and no impact from the Nord Stream project has been categorised as "major" or "high".

Examples

1. AN EXAMPLE OF ASSESSING A PLANNED ACTIVITY – PIPELINE-LAYING

This is perhaps the most obvious planned activity in the project.

Firstly, any potential impacts are likely to come from the presence of the lay barge, underwater and airborne noise and vibration, and from the physical disturbance of sediments as the pipelines are laid on the seabed leading to an overall increased opaqueness (turbidity) of the water.

There is no discernible significance from these on either the physical environment or the socio-economic environment, largely because the impact is localised and short-term. Impacts to these receptors are therefore largely insignificant.

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Disturbance to the biological environment will be at the sea surface, where the vessels are working. This will affect seabirds and, in the water itself, mostly fish and (depending on location) sea mammals. It will, though, be of short-term duration and localised as the pipe-laying vessel proceeds down the route at its speed of up to three kilometres a day. Hence pipe-laying is of minor significance and only affects the biological environment.

2. AN EXAMPLE OF ASSESSING A PLANNED ACTIVITY – MUNITIONS CLEARANCE

With munitions clearance, one impact may be identified as the potential to release contaminants from sediments that are disturbed as a result of the pressure wave that will accompany detonation of the munitions. This will affect the water column (physical environment) and has the potential to impact on fish. However the impact is regarded as being of minor significance because this will not last for more than a couple of days.

3. AN EXAMPLE OF ASSESSING AN UNPLANNED EVENT – PIPELINE FAILURE

Leakage from a rupture of one of the pipelines would certainly be an unplanned event. The essential impacts would result from the release of natural gas. There could possibly be effects in all three environments.

The “significance” depends upon the magnitude of the event; the value or sensitivity of the parts affected in the three environments and upon the probability of the event occurring. The first factor is, of course, very variable (depending principally on the size of the hole in the pipeline), but statistics for the last factor tell us that the event is extremely unlikely, so the event is regarded as leading to an impact of minor significance in all three environments. Preparations and procedures are, nevertheless, in place should it happen.

4. AN EXAMPLE OF ASSESSING AN UNPLANNED EVENT – SHIPPING COLLISION

A ship collision involving a project vessel and resulting in a large oil spill would obviously be extremely serious. However, because of the measures already in place, such as exclusion zones around construction vessels, the likelihood is extremely low. Thus, a collision can be classified as being of minor significance because it is highly unlikely. Should it nevertheless happen, measures are in place to deal with it.

Assessment of Potential Impact of the Nord Stream Pipeline

> **The 1,220 kilometres of the pipelines' route have been assessed by Nord Stream, looking at the potential impacts of both planned activities and unplanned events.** This section summarises the assessment findings along the entire pipelines' route during construction, pre-commissioning and commissioning as well as operation. There are three environments which may be affected by the project and, for the most part, the effects are temporary, limited to construction.

- The physical environment – such as the seabed, the water column and the atmosphere
- The biological environment – such as marine plant and animal life, and nature conservation areas
- The social and socio-economic environment – such as fisheries, shipping and navigation, tourism and recreation, cultural heritage, offshore industries and military operations

The types of planned activities with potential impact on these environments include mine clearance, seabed intervention works, all construction, vessel movements and anchoring, test water discharges, operation and pipeline decommissioning. Unplanned events, though highly improbable, include fuel and oil spills, disturbance of dumped conventional and chemical munitions, and pipeline failure. >

This section summarises the impact assessment findings along the whole route for both of the pipelines during construction, pre-commissioning and commissioning. With regard to the operational phase, this section summarises the overall impacts attributable to the presence of the two almost parallel pipelines on the sea floor for the duration of their operational life. The entire length of the twin pipelines' route, 1,220 kilometres, has been assessed for likely impact scenarios from planned activities and unplanned events.

Planned activities are the normal process of engineering the project. Provisions are in place to minimise the likelihood of unplanned, but foreseeable events; and procedures are in place to deal with them should they happen.

There are three categories of environment, "receptors" or "resources", which might be affected by these activities:

- **THE PHYSICAL ENVIRONMENT** – including physical processes, the water column, the seabed and the atmosphere
- **THE BIOLOGICAL ENVIRONMENT** – including plankton, marine benthos, fish, sea birds, marine mammals and nature conservation areas
- **THE SOCIAL AND SOCIO-ECONOMIC ENVIRONMENT** – including fisheries, shipping and navigation, tourism and recreation, cultural heritage, offshore industry and military operations

Planned Activities

The notes that follow on the three categories of environment and impacts of planned activities refer to the accompanying table (see pages 32 / 33). Letters in brackets – RU, FI, SE, DK, and DE – refer to Russia, Finland, Sweden, Denmark and Germany, respectively. These are the countries in which the original activity occurs. As in other assessments, an impact is rated for its significance. For planned activities, the ratings are "minor", "moderate" or "major". Resources or receptors that will not be affected or insignificantly impacted by planned activities include physical processes, tourism and recreation, cultural heritage, offshore industry and military operations. Therefore, impacts assessed to be insignificant are not discussed.

Physical Environment

THE WATER COLUMN (RU, FI, SE, DK, DE)

This is the vertical section of water from the seabed to the surface, which will experience an impact from mine clearance (RU, FI, SE) and from seabed intervention works (RU, FI, SE, DK, DE). In both cases, these activities cause the re-suspension of sediments resulting in a minor impact. The water column will also be affected by discharging the pipeline's test-pressure water near Vyborg (RU). Modelling shows this impact will be regional, short-term and of minor significance.

THE SEABED (RU, FI, SE, DK, DE)

Impacts on the seabed will be of minor significance, occurring during the construction phase mainly as a result of seabed intervention works and during the operational phase as a result of the presence of the pipelines on the seabed. There will be a minor impact to the seabed from mine clearance, resulting in the physical alteration of the seabed as well as the re-suspension and spreading of sediments in specific locations where munitions clearance will take place (RU, FI, SE). Along the whole pipelines' route, the controlled use of anchors during construction will result in a minor physical alteration to the seabed. Minor impacts to the seabed will occur along the pipelines' route in areas where seabed intervention works will take place (RU, FI, SE, DK, DE). Specific works such as dredging and sheet piling, in German waters, will physically alter the seabed as well as result in the release of contaminants in the sediment causing a minor impact to the seabed (DE). Minor impact is also expected on the seabed from the release of metal particles from anti-corrosion anodes (RU, FI, SE, DK, DE).

>

THE ATMOSPHERE (RU, FI, SE, DK, DE)

This third component of the physical environment will be subject to emissions (carbon dioxide, nitrogen oxides and sulphur dioxide) from ship engines, but only in small quantities, compared to the annual emissions from normal shipping in the Baltic Sea, and will result in impacts of minor significance.

Biological Environment

This comprises plankton, seabed dwelling organisms ("benthos"), fish, sea birds, marine mammals and conservation areas. This section examines separately each of the above "receptors" in the biological environment, and considers the impact assessments for different types of activity.

In general terms, all parts of this environment are expected to feel minor – or, rarely, minor-to-moderate – impact from mine clearance (RU, FI, SE) and from such seabed intervention works as dredging, rock placement and trenching (RU, FI, SE, DK, DE). Disturbance from pipe laying is expected to be minor. Each of these activities may result in the disturbances of sediments, release of contaminants, clouding of waters ("turbidity"), vibrations, noise and visual disturbance.
More specific effects from other activities on the different parts of this environment are as follows:

PLANKTON

Plankton are expected to experience insignificant impact, given that they are relatively mobile.

MARINE ORGANISMS ("BENTHOS") (RU, FI, SE, DK, DE)

The re-suspension and spreading of sediments and the release of contaminants due to munitions clearance (RU, FI, SE), seabed intervention works and wreck removal (DE) may smother benthos, result in toxic effects and reduce sunlight levels affecting photosynthesis necessary for plant life. There will also be loss of seabed habitats from seabed intervention works, pipe laying and associated anchor handling, hyperbaric tie-ins (FI, SE) and wreck removal (DE). The long-term presence of the twin pipelines will introduce a secondary habitat for benthos. All these impacts are generally rated as being of minor significance, except in the Pomeranian Bay, Oderbank and Boddenrandschwelle where the impacts are rated as moderate due to the high sensitivity of benthic species, including sea grass, in these areas.

FISH (RU, FI, SE, DK, DE)

During seabed intervention works, fish will be impacted by increased noise and vibration, resulting in a minor-to-moderate impact. The same will be true regarding the release of sediments, specifically in the Greifswalder Bodden area. Munitions clearance may have specific effects such as tissue damage, behavioural changes and displacement from spawning grounds, and is, again, rated as a minor-to-moderate impact (RU, FI, SE). The physical presence of the pipelines and sound of gas travelling through it may startle fish within about a one-kilometre radius until they become as accustomed to it as they are to shipping noise for example. This is regarded as a minor-to-moderate impact.

SEA BIRDS (RU, FI, SE, DK, DE)

In all situations, sea birds may be displaced temporarily from their localised territories, making the initial impact minor-to-moderate, particularly during munitions clearance in Russia. Munitons clearance will have effects above and below the water surface. Impacts above the water surface would stem from the noise and vibration, along with visual and water disturbance. Diving birds in particular would be more sensitive to such disturbances. Impacts below the water surface would include clouding and generalised disturbance of the water, affecting birds that feed on fish and forage for marine organisms assessed to be minor-to-moderate. In addition, minor-to-moderate impacts are expected from the seabed intervention works, anchor handling, pipe laying and support vessel movement.

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Impact Assessment Summary, Part One

Receptor/ Resource	Impact	Activity	RU	FI	SE	DK	DE
Water Column	Increase in turbidity, release of contaminants	Munitions clearance	○	○	○		
		Seabed intervention works	○	○	○	○	○
	Change in water quality	Pressure-test water discharge	○				
Seabed	Release of contaminants	Seabed intervention works, anchor handling					○
	Physical alteration of the seabed	Munitions clearance	○	○	○		
		Seabed intervention works	○	○	○	○	
		Dredging, sheet piling					○
		Anchor handling	○	○	○	○	○
	Release of pollutants from anticorrosion anodes	Pipeline presence	○	○	○	○	○
Atmosphere	Emissions of pollutant gases	Seabed intervention works, Pipe laying	○	○	○	○	○
Marine Benthos	Increase in turbidity	Munitions clearance	○	○	○		
		Seabed intervention works, anchor handling, pipe laying	○				◐
	Release of contaminants	Munitions clearance (MC), seabed intervention works, pipe laying, anchor	○	○	○	○ (no MC)	○ (no MC)
	Noise and vibration	Munitions clearance	○	○	○		
	Physical loss of seabed habitats	Munitions clearance	○	○	○		
		Wreck removal					◐
		Seabed intervention works, anchor handling, pipe laying	○	○	○	○	◐
		Hyperbaric tie-ins			○		
	Smothering	Wreck removal					◐
		Seabed intervention works, pipe laying	○		○	○	◐
	Physical alteration of the seabed	Routine maintenance	○	○	○	○	◐
	Introduction of secondary habitats	Pipeline presence	○	○	○	○	◐
Fish	Increase in turbidity	Seabed intervention works					◐
	Release of contaminants	Munitions clearance (MC), seabed intervention works	● (MC)				◐
	Noise and vibration	Munitions clearance	◐	◐	◐		
		Hyperbaric tie-ins		◐	◐		
		Seabed intervention works	◐			◐	◐
		Pipeline presence	◐	◐	◐	◐	◐
		Construction and support vessel movement					◐
	Physical alteration of the seabed	Pipeline presence	○	◐	◐	◐	◐
Sea Birds (see also the start of Part Two)	Increase in turbidity	Munitions clearance, seabed intervention works	◐				◐
	Noise and vibration	Seabed intervention works, construction and support vessel movement			◐	◐	◐

○ Minor ◐ Minor-to-moderate ● Moderate

>

Impact Assessment Summary, Part Two

Receptor/ Resource	Impact	Activity	RU	FI	SE	DK	DE
Sea Birds (See also The End of Part One)	Loss of seabed habitat	Munitions clearance, boulder removal, wreck removal, seabed intervention works, pipe laying, anchor handling	◐				◐
	Visual/physical disturbance	Munitions clearance, seabed intervention works, pipe laying, construction and support vessel movement	◐		◐	◐	◐
Marine Mammals	Noise and vibration	Munitions clearance	●	●	●		
		Seabed intervention works	◐		◐	◐	◐
		Seawater intake	◐				
	Change in water quality	Pressure-text water discharge	◐				
Nature Conservation Areas	Increase in turbidity	Munitions clearance	●				
		Seabed intervention works, pipe laying, anchor handling	●				●
	Noise and vibration	Munitions clearance	●				
		Seabed intervention works					●
Fisheries	Restriction on navigation for fishing vessels	Munitions clearance	○	○	○		
		Construction and support vessel movement and imposition of exclusion zone	○	○	○	○	○
	Disruption of current fishing patterns	Pipeline presence and free spans (and potential associated exclusion zones)	◐	◐	◐	◐	
	Damage to fishing equipment	Pipeline presence and free spans	○	○	○	○	
Shipping and Navigation	Restriction on navigation for shipping	Munitions clearance	●	●	○		
		Construction and support vessel movement and imposition of exclusion zone	●	●	○	○	◐

○ Minor ◐ Minor-to-moderate ● Moderate >

Impact Assessment Summary Tables

The findings of the impact assessment are illustrated on a country basis in the 'Impact Assessment Summary' table above. It lists the receptor or resource affected, the impact and the associated activities. Where an impact on a receptor or resource is found to be minor, minor-to-moderate or moderate, this is shown for each relevant country using the key below the table. No impact on a resource or receptor is assessed major. For example, munitions clearance will result in increased turbidity and the release of contaminants. This will have a minor impact in Russia, Finland and Sweden and no impact in Denmark or Germany.

MARINE MAMMALS (RU, FI, SE, DK, DE)
Noise and vibration are thought to have the most effect on marine mammals, thus no impact is expected during the final, operational stage. In the Vyborg area in Russia, during the discharge of water used to test the pipeline pressure, there will be some short-term noise and vibration, having a minor-to-moderate impact. A similar impact is expected during seabed interventions works especially sheet piling, dredging and trenching. Munitions clearance will result in moderate impact but, again, only for a short duration.

NATURE CONSERVATION AREAS (RU, DE)
Impacts to nature conservation areas in the vicinity of the pipelines' route will occur if the protected habitats and/or species, which are the qualifying interests of the designation, are affected. Munitions clearance sites are not located near conservation areas but noise and vibration may impact (moderate) designated species (marine mammals, sea birds and fish) that move out of the boundaries of a specific area. Seabed intervention works are within half a kilometre of the Russian nature conservation area Skala Hally. In Germany, both the Island of Usedom National Park and the south-east Rügen UNESCO Biosphere Reserve are within one kilometre. All three locations are assessed to experience moderate impact from seabed intervention works. Protected sea bird populations may experience a visual and physical impact of moderate significance due to construction and support vessel movement in the Greifswalder Bodden.

The Social and Socio-Economic Environment

The social and socio-economic environment includes fisheries, shipping and navigation, tourism and recreation, cultural heritage, military operations, and such offshore projects as wind farms and cables. Most impacts in this environment have been rated as insignificant, except those that are detailed in the sections below.

During construction and related vessel movements, disruption to shipping and fishing is expected to be of minor and minor-to-moderate significance due to an exclusion zone around the project vessel. This zone greatly minimises the danger of any vessel collisions.

FISHERIES (RU, FI, SE, DK, DE)
Navigational impacts are anticipated to occur anywhere along the pipelines' route as a result of increased construction and support vessels in the area and the creation of an exclusion zone. The impact on fisheries is of minor significance. Fishing and trawling is the subject of special and continuing research, particularly regarding the presence of the pipelines once they are in operation. The pipelines can attract fish by acting as an artificial reef and it is anticipated that fish stocks will not be affected. As the situation in the Baltic Sea – both with regards to sediments and bottom structure, as well as fishing equipment and vessels is rather different – Nord Stream has embarked on a concerted consultation programme with fisheries representatives to better understand the level of constraint that the twin pipelines will impose on current patterns and practices, and the extent to which these can be adapted to accommodate the permanent presence of the pipelines. Currently, limited information is available which has resulted in a precautionary assessment of impacts to current fishing patterns and damage to fishing equipment from snagging on

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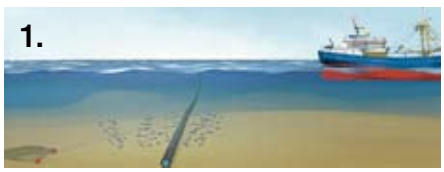
Consultations with the fishing industry



Trawling can proceed for most of the route. Areas with support structures or extended seabed indentations may be restricted. Mitigation measures will be arranged with the fisheries.

Trawl gear can be pulled over the pipelines where the seabed is smooth and the pipelines lies flat on the bottom. Tests are ongoing.

the pipelines. These impacts have been assessed to be of minor-to-moderate and minor significance respectively. With specific regard to fishing, Nord Stream will arrange mitigation measures with the fisheries and implement the recommendations of the independent Norwegian assessors DNV.

SHIPPING AND NAVIGATION (RU, FI, SE, DK, DE)

Navigational impacts are anticipated to occur anywhere along the pipelines' route as a result of increased construction and support vessels in the area and the creation of an exclusion zone. The impact on shipping and navigation is of minor significance.

Unplanned Events (RU, FI, SE, DK, DE)

The notes that follow summarise the effects of the main unplanned events. These could, if they occur, have a very significant impact on all three environments. Measures are in place, however, to minimise the likelihood of unplanned events and to manage them should they occur. Offshore pipeline experience extends over several decades, and has produced tried-and-tested models of accident scenarios, offering a detailed understanding of impact possibilities.

As in other assessments, the significance of unplanned events is rated as "low", "moderate" or "high". Essentially, the significance rating is the result of analysing the probability, or likelihood, of an event and analysing its possible consequence. As with other assessments, the significance rating is given after mitigation measures have been incorporated.

FUEL AND OIL SPILLS (RU, FI, SE, DK, DE)

Fuel and oil spills could result during construction or during necessary operational maintenance of the pipelines. Refuelling of vessels at sea and/or accidental damage to vessels due to a collision could result in spills. Depending on the location and size of the spill, the consequences could range from minor to major. However, given the low probability of a spill (particularly a major spill), any impact on the water column, plankton and the atmosphere would be of low significance. Impacts on marine organisms, fish, marine mammals and conservation areas would be low-to-moderate. Impacts on fisheries, shipping and navigation, tourism and recreation would be of low significance.

DISTURBANCE OF CHEMICAL MUNITIONS AND OF CONVENTIONAL MUNITIONS (RU, FI, SE, DK, DE)

There is a general possibility of disturbing munitions in the Baltic Sea but, along the pipelines' route itself, there is only a low probability of disturbance. Conventional munitions comprise anything from grenades to aerial bombs, submarine-combatting rockets, torpedoes and marine mines. Nord Stream has undertaken a great deal of research in this subject, with munitions surveys since 2005, and a specific Chemical Munitions Screening Survey in 2008. These surveys are in addition to those of other organisations such as NATO and HELCOM (the Helsinki Commission).

The survey method began with a scan for large objects along a two-kilometre-wide corridor. The scan was progressively narrowed to a 15-metre-wide corridor, screening for objects as small as a mobile phone. Remotely Operated Vehicles (ROVs) were used, equipped at different times with multi-beam echo sounders (MBES), sub-bottom profilers, magnetometers, side-scan sonars (SSS), gradiometers and cameras. Needless to say, thousands of objects were found and evaluated by independent experts. Most objects (such as old washing machines) were harmless. In Swedish waters, for example, more than a thousand objects were investigated in 2006. Of these, only one was potentially munitions-related.

Around 100 soil samples were analysed for chemical munitions from Danish waters alone. The chemical testing is split between two independent laboratories; DHI in Denmark and VeriFin in Finland. Sampling was duplicated, for parallel testing in both laboratories.

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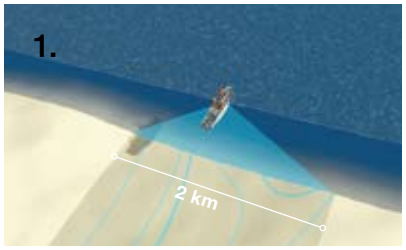
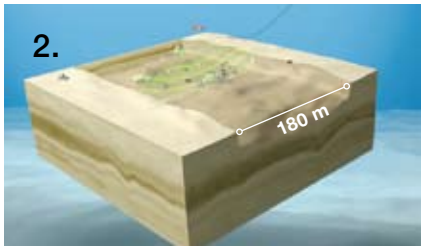
Narrowing the search for the safest route



A geophysical survey carried out in 2005 established an initial 2 kilometre wide corridor to be further investigated.



Two potential routes were investigated in a detailed geophysical survey of an 180 metre corridor. This provided both engineering data and the image resolution required to identify munitions.

In 2007 and 2008 a 25 metre corridor for each pipeline was inspected with high resolution equipment. Potentially dangerous objects were evaluated by independent experts.

Nord Stream's survey material represents the largest amount of data ever collected along the corridor area. To ensure that this work meets and exceeds recommended good practice, Nord Stream has organised seminars, allowing experts from national agencies to review, discuss and evaluate data.

Detailed clearance procedures are risk-assessed and appropriate mitigation measures are implemented based on the prior experience of the mine-sweeping units of the various Baltic navy fleets. It should be noted that national navies of the countries surrounding the Baltic Sea routinely clear (by detonation) munitions in the Baltic. More than 400 munitions have been cleared in this way since 1997.

Along most of the pipelines' route, the probability of disturbing chemical munitions is low. However, the route does pass close to two known munitions dump sites, at the islands of Bornholm and south of Gotland. The period of construction is most likely time for such an accident, which could release toxic chemicals into the water. There would be minor consequences for the water column and for sea birds; but moderate on fish, marine mammals and conservation areas. Consequences for marine benthos could be major. Given the low probability of disturbing such munitions, the impacts are assessed as moderate for marine benthos and low for other biological receptors. The impact on the social and socio-economic environment is regarded as insignificant.

Regarding conventional munitions, should an accidental detonation occur, the impact is likely to be the similar as for planned munitions clearance, albeit with consideration of low-to-moderate probability. Impacts are generally of low significance but extend to moderate for conservation areas.

Pipeline Failure

A pipeline failure means a leak or a full bore rupture once the pipelines are in operation. A release of gas resulting from such a rupture could have impacts of minor consequence on most resources or receptors extending to moderate in the case of fish, marine mammals and nature conservation areas. The risk assessment has shown that the probability of occurrence is low and as result the significance of such impacts is low.

Conclusion

As mentioned before, the assessors have concluded that any impact that might result from planned activities will be predominantly of minor and, occasionally, of moderate significance. For unplanned events, the same is true with the significance rating mainly being low and, occasionally, moderate. In both cases, the assessments apply to all three environments.

No impact along the whole pipelines' route was found to be major or of high significance.

Transboundary Impacts

> **The Espoo Convention requires each Party to the Convention to exchange information on any projects that may affect another country – i.e. that may have "transboundary" impacts.** Nord Stream's Environmental Impact Assessments (EIAs) help serve this purpose.

The Espoo Convention differentiates between a country where construction and operations are taking place – the "Party of Origin" – and the country affected by this work – an "Affected Party". Thus, in Espoo Convention terminology, if construction work is done in Finland that affects both Russia and Estonia, then Finland is the "Party of Origin" while Russia and Estonia are each an "Affected Party".

The Nord Stream project involves construction work within the national jurisdictions of five countries. These five "Parties of Origin" are Russia, Finland, Sweden, Denmark and Germany. There are four countries which may be "Affected Parties" – Latvia, Lithuania, Estonia and Poland.

The assessment takes into account both the type of impact and its proximity to the Exclusive Economic Zone (EEZ) of another country. All nine Baltic Sea countries will be affected at some stage by planned activities. Estonia will experience more transboundary impact than others during construction, but this will still be of minor significance.

Most activities and events, planned or unplanned, are of short-term duration and are assessed as being of minor significance. A limited number are assessed to be of minor to moderate significance. >

The Espoo Convention requires Parties to inform one another if a proposed activity might have an impact across national boundaries. Nord Stream's national Environmental Impact Assessments (EIAs) and the Espoo Report are transparent and verifiable tools for achieving this communication. Espoo defines the country where the activity causing the impact takes place as the "Party of Origin". It defines the country where the impact occurs as the "Affected Party". The five countries whose waters the pipelines will cross are Russia, Finland, Sweden, Denmark and Germany (RU, FI, SE, DK, DE). Therefore each will be a "Party of Origin". Russia has signed but not ratified the Espoo Convention, but for the purposes of the Nord Stream project is designated as a Party of Origin and participates in the consultation process to the extent possible under its legislation.

At different times, the four countries Estonia, Latvia, Lithuania and Poland (EE, LV, LT, PL) will be affected by work in those first five countries. Thus, each will be an "Affected Party". During the course of construction work in Finland, for example, which affects Russia and Sweden, the latter two countries would also, at that time, be "Affected Parties". In this way, each Party of Origin nation, under certain circumstances, will also be an Affected Party.

In this transboundary context, EIAs examine the possible effects of planned activities and unplanned events in neighbouring countries. Each impact from a planned activity is rated as being of "minor", "moderate" or "major" significance. After applying mitigation procedures, if an impact is still rated as "major" – and no other mitigation measures can diminish this rating – then the activity is not allowed to take place, or an alternative must be found. The impact ratings from unplanned events are "low", "moderate" or "high" significance. By definition, such events could happen at any time, anywhere, and be of varied consequence. Unplanned events are generally of low probability but they are not ignored. Measures and procedures are in place to deal with them should they occur. Measures are also in place to minimise their probability.

The tables in this section (see page 39/40) give details of which activities and events will have a transboundary impact on the nine countries' Exclusive Economic Zones (EEZ), Territorial Sea, or both. All nine countries will be affected at some stage by impacts emanating from a neighbouring country. This will be during both construction and operation of the pipelines. Any impact during construction is assessed to be minor, short-term and transitory as the construction activity moves gradually along the pipelines' route at about three kilometres a day. Any impact from the presence of the operational pipelines' are expected to be minor-to-moderate and longterm.

Planned Activities – All Countries (RU, FI, SE, DK, DE, EE, LV, LT, PL)

During construction, the atmosphere will be subject to minor impact from combustion-gas emissions, mainly originating from ships' engines. Fishing and shipping vessels will be impacted (minor and minor-to-moderate due to an exclusion zone around construction activities). During pipeline operation, minor-to-moderate impacts to the fishing patterns of sea-bottom trawlers may occur in specific locations where the pipelines are unattached to the seabed (a "free span" area).

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Transboundary Impact Assessment Summary Tables

The next two tables show the findings of the transboundary impact assessment for both the Parties of Origin and Affected Parties as a result of planned activities and unplanned events. For planned activities, the impacts are separated into the phase of the project they are anticipated to occur, construction and operation. The table lists the transboundary impact and the associated activities as well as the receptor or resource affected. Where an impact on a receptor and resource is found to be minor, minor-to-moderate or moderate, this is shown for each relevant country using the key below the table. No transboundary impact is assessed major. For example, during the construction phase, munitions clearance will result in increased turbidity. This will have a minor impact on the water column and marine benthos in Finland and Estonia.

Transboundary Impact Assessment Summary for Planned Activities

Phase	Trans-boundary Impact	Activity	Receptor/ Resource	Parties of Origin					Affected Parties			
				RU	FI	SE	DK	DE	EE	LV	LT	PL
Con-struction	Increase in turbidity	Munitions clearance	Water column		○				○			
			Marine benthos		○				○			
		Seabed intervention works	Water column						○			
		Pipe laying and anchor handling	Marine benthos	○	○	○	○	○				
	Release of contaminants	Munitions clearance	Water column		○				○			
		Seabed intervention works	Water column						○			
		Pipe laying and anchor handling	Marine benthos	○	○	○	○	○				
	Noise and vibration	Munitions clearance	Fish		○				◐			
			Marine mammals		○				◐			
			Marine benthos						○			
		Pipeline presence	Fish	○	○	○	○	○				
	Emission of pollutant gases	Construction	Atmosphere	○	○	○	○	○	○	○	○	○
	Physical alteration of the seabed	Anchor handling	Seabed	○	○	○	○	○				
	Physical loss of seabed habitats	Anchor handling	Marine benthos	○	○	○	◐	●				
		Pipe laying	Marine benthos	○	○	○	◐	●				
	Smothering	Pipe laying	Marine benthos	○	○	○	◐	●				
	Visual/physical disturbance	General construction and vessel movement	Sea birds				●	●				
	Ice breaking	Construction and support vessel movement	Marine mammals						●			
	Restriction on navigation for fishing vessels	Munitions clearance and imposition of an exclusive zone	Fisheries	◐	◐	○	○	○	◐	○	○	○
		Construction and support vessel movements and imposition of an exclusive zone	Fisheries	◐	◐	○	○	○	◐	○	○	○
	Restriction on navigation for shipping vessels	Munitions clearance and imposition of an exclusive zone	Shipping and navigation	◐	◐	○	○	○	◐	○	○	○
		Construction and support vessel movements and imposition of an exclusive zone	Shipping and navigation	◐	◐	○	○	○	◐	○	○	○
Opera-tion	Disruption of current fishing patterns	Pipeline presence	Fisheries	◐	◐	◐	◐	◐	◐	◐	◐	◐
	Damage to fishing equipment	Pipeline presence	Fisheries	○	○	○	○	○	○	○	○	○
	Physical alteration of the seabed	Pipeline presence	Fish			○	◐	●				
	Introduction of secondary habitats	Pipeline presence	Fish	○	○	○	◐	●				

○ Minor ◐ Minor-to-moderate ● Moderate >

Transboundary Impact Assessment Summary for Unplanned Events

Unplanned Event	Receptor / Resource	Parties of Origin					Affected Parties			
		RU	FI	SE	DK	DE	EE	LV	LT	PL
Fuel/oil spill	Water column	○	○	○	○	○	○	○	○	○
	Atmosphere	○	○	○	○	○	○	○	○	○
	Plankton	○	○	○	○	○	○	○	○	○
	Marine benthos	◐	◐	◐	◐	◐	◐	◐	◐	◐
	Fish	◐	◐	◐	◐	◐	◐	◐	◐	◐
	Sea birds	◐	◐	◐	◐	◐	◐	◐	◐	◐
	Marine mammals	◐	◐	◐	◐	◐	◐	◐	◐	◐
	Nature conservation areas	◐	◐	◐	◐	◐	◐	◐	◐	◐
	Fisheries	●	●	●	●	●	●	●	●	●
	Shipping and navigation	○	○	○	○	○	○	○	○	○
	Tourism and recreation	○	○	○	○	○	○	○	○	○
	Offshore industry	○	○	○	○	○	○	○	○	○
Disturbance of conventional munitions	Water column	○	○	○	○		○			
	Marine mammals	○	○	○	○		○			
Pipeline failure	Atmosphere	○	○	○	○	○	○	○	○	○

○ Low ◐ Low-to-moderate ● Moderate

Unplanned Events – All Countries (RU, FI, SE, DK, DE, EE, LV, LT, PL)

Unplanned events would be an oil spill and a natural gas release following a pipeline rupture. In theory, these could affect one, several, or all areas of the country EEZs. The scale and impact of such an event would depend upon the intensity of the event. Another possible unplanned event might be the disturbance and detonation of conventional munitions. Because procedures are in place to minimise the likelihood of these events, their likely occurrence is low. Given this low probability, it is considered that the impacts from an oil spill are of low-to-moderate significance. Again, with the low probability of a pipeline rupture, the impacts from a natural gas release are rated to be of low significance. There is the possibility that accidental detonation of munitions would have an effect on neighbouring waters, should it happen within 10 kilometres of an EEZ boundary. The water column would become opaque and the noise and vibration would disturb marine mammals. Again, with such a low probability of this event, the overall assessment of impact significance is low.

Conclusion

The transboundary impacts from planned construction activities are generally assessed to be of minor significance extending to moderate in some cases. Most transboundary impacts will occur in the Gulf of Finland with corresponding transboundary impact experienced in the Estonian EEZ.

It is expected that during operation of the pipelines the only significant transboundary impacts expected will affect fisheries. On going studies are being carried out to better improve Nord Stream's understanding of the Baltic Sea fishing fleets and their capacity to accommodate the pipelines on the sea floor. As a result of the uncertainty of how bottom trawling will adapt to the effects of the pipelines, a precautionary impact rating of low-to moderate has been given. For unplanned events, given their low probability yet wide-ranging possibilities of scale, the overall impact significance is regarded as low, with low-to-moderate impacts on certain resources or receptors in the event of an oil spill.

Environmental Management and Monitoring

> **Nord Stream is putting into place an environmental management system at every stage of the project.** There is a Health, Safety and Environmental Management System (HSE MS), conforming to international standards. Contractors to the project will also be subject to the HSE MS.

A Third Party Communications Procedure will receive, log and deal with all comments, suggestions and criticisms.

An Operations Department responsible for the operation and maintenance of the pipelines is being established by Nord Stream, and a Director of Operations has already been appointed.

The project design already has measures to minimise any environmental impact. Nord Stream will also set up a fully integrated environmental monitoring programme in close co-operation with the national authorities.

>

Nord Stream is committed to carrying out all work safely and in an environmentally responsible manner. A way was required of ensuring and verifying that this remains the case. Hence, Nord Stream has organised a Health, Safety, and Environmental Management System (HSE MS) which conforms to the stipulations of international standards.

This HSE MS provides the framework for developing all the standards, planning, and procedures for every stage of the project. All contractors, at any stage of the project, will also have to adopt such management systems, meeting or exceeding them as a core factor in their contracts.

This ensures that those engaged on the project have a consistent approach towards the environment, social matters, standards and requirements.

Construction, pipelines' testing (pre-commissioning), putting the pipelines into service (commissioning), full operation and taking the pipelines out of service (decommissioning) are the five major stages. Prior to each stage an Environmental and Social Management Plan (ESMP) will be created.

Each ESMP will include all Nord Stream's commitments from the national Environmental Impact Assessments (EIAs) and all obligations defined in the permits from each country. There will also be subsidiary plans (such as covering vessel movements) for each ESMP. Even if carried out by a contractor, Nord Stream is accountable for effective implementation.

FROM EXPERIENCE OF INTERNATIONAL PIPELINE PROJECTS, THE FOLLOWING PLANS ARE DEVELOPED:

- **Pipe laying reinstatement**
- **Pollution prevention**
- **Waste management**
- **Emergency notification and response**
- **Vessel management**
- **Pre-commissioning**

For each major contract, there will be a Nord Stream-appointed company representative who is responsible for checking the contractor's HSE performance and for verifying that all EIA commitments and permit conditions are met.

THE ENVIRONMENTAL MONITORING PROGRAMME HAS THE FOLLOWING OBJECTIVES:

- To verify the broad findings of the modelling used to predict the impacts
- To ensure that the construction and operation of the pipelines is not causing known impacts to a greater significance than predicted or impacts not previously identified in the assessment of impacts
- To verify the effectiveness of mitigation measures
- To identify at an early stage unforeseen adverse effects, and to take remedial action
- To monitor the rehabilitation of the environment after the construction
- To collaborate with existing data collection programmes and thus avoid duplication and provide the opportunity to add value and
- To meet the requirements of the national permits

Environmental monitoring will be directed at those areas of environmental sensitivity that are predicted to experience significant (moderate significance) impacts from the project or where there is significant uncertainty as to the reliability of the impact assessment. The Environmental Monitoring Programme is a direct response to the environmental impacts and issues that have been addressed in the assessment of impacts, specifically those requiring mitigating measures and monitoring, and the particular reporting requirements on national levels.

>

It is therefore important to note that the requirement for monitoring of particular parameters or the degree (spatial and temporal frequency) of monitoring will vary considerably from place to place along the pipelines' route.

Impact monitoring during construction ensures that critical environmental impacts are within or ideally below the predicted levels. Compliance monitoring in the post-construction phases ensures that the levels of specific environmental parameters are corresponding to normal levels, compliant with laws, regulations, standards or guidelines.

Nord Stream is committed to share its data with interested parties and make arrangements to facilitate this process. Nord Stream is also committed to share its monitoring programme results with national authorities and the interested public on a regular basis.

National permits for construction and operation of the twin pipelines are currently under application from Russia, Finland, Sweden, Denmark and Germany. Once conditions and monitoring requirements are agreed upon, and prior to any construction work, Nord Stream will put together a detailed and integrated Environmental Monitoring Programme for the entire project.

Communications to and from Nord Stream

Members of the public, NGOs, contractors and their workers, and other interested parties may want to contact Nord Stream throughout the project. A structured "Third Party Communication Procedure" is being developed to receive all comments, suggestions, and criticisms. All such correspondence will be logged and managed in a transparent process.

Operations Department

A dedicated Operations Department is being established. During testing and initial management of the pipelines, a full systems' check will be carried out, comprising all communications, protocols, automation systems, pressure-safety systems and all mechanical systems, alarms and set points. Once completed, the pipelines will be tested for leaks using the appropriate industry and national regulations.

Once in operation, the pipelines will be under the control of the Operations Department in all circumstances. All protocols, procedures, emergency procedures, reporting lines and responsibilities are with this department. To ensure that all goes according to plan, Nord Stream has already appointed its Director of Operations.

Nord Stream
The new gas supply route for Europe

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Nord Stream Environmental Impact Assessment (EIA) Documentation for Consultation under the Espoo Convention (Nord Stream Espoo Report): Non-Technical Summary

This document is the Non-Technical Summary of the transboundary environmental report of the Nord Stream pipelines. Submitted February, 2009 by Nord Stream AG, Grafenauweg 2, CH-6304 Zug. Tel. +41 41 7669 191