Nord Stream
The new gas supply route for Europe

Nord Stream Extension
Project Information Document (PID)

Nord Stream AG

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Nord Stream AG prepared this Project Information Document (PID) in English to describe the proposed Project and to thereby enable authorities to determine their role in the environmental and social impact assessment and associated permitting processes in accordance with their country-specific laws and regulations. The PID has also been prepared to provide all stakeholders with an overview of the Project, enabling them to determine their level of interest in the Project. This PID does not document environmental and social commitments to which the Project shall be bound. The Project will identify such commitments during the Environmental Impact Assessment (EIA) and permitting process, and will then provide relevant documentation in the Project's EIA Reporting and in the permit application documents. The English version of the PID 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.

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Executive Summary

A robust pipeline infrastructure, which connects the Russian natural gas pipeline grid to the European energy markets and safeguards reliable and secure natural gas supply, is required to fulfill contractual agreements between Russian and European natural gas companies over the coming decades. The successful construction of the two Nord Stream pipelines clearly indicates that from an environmental, technical and economic point of view, subsea natural gas transportation through the Baltic Sea is a sustainable solution for meeting European natural gas demand. The first two Nord Stream pipelines have been completed according to schedule while adhering to high quality, safety, environmental and social standards.

In a feasibility study Nord Stream AG in Zug, Switzerland, developed different route corridor options for up to two additional pipelines through the Baltic Sea, and obtained the approval of its shareholders to further develop the proposed Nord Stream Extension Project (“the Project”). Depending on the business interests of Nord Stream AG’s shareholder group, the shareholder structure of the Project might change at a later stage.

After the Estonian government decided in December 2012 not to grant Nord Stream AG a permit to perform a reconnaissance survey in Estonian EEZ waters, the originally identified route corridor options had to be reduced. All remaining route corridor options now follow a routing from a landfall in Russia through Finnish, Swedish and Danish waters to a landfall in Germany.

The proposed Project comprises the planning, construction, operation and future decommissioning of up to two additional natural gas offshore pipelines through the Baltic Sea spanning from Russia to Germany, each with a transport capacity in the order of 27.5 billion cubic metres (bcm) of natural gas per year and with similar properties to that of the existing two Nord Stream pipelines: 48 inch steel pipes with internal flow coating and external corrosion protection coating and concrete weight coating, an inner pipe diameter of 1,153 mm, segmented pipe wall thicknesses along the pipeline route corresponding to decreasing design pressures in the range of 220 bar, 200 bar, and 177.5 bar, and total pipeline length of around 1,250 km.

Environmental assessments will play an important role in the final overall routing and in the final design of the additional Nord Stream pipelines. Existing knowledge from Nord Stream line 1 and line 2 project will be used, but detailed route investigations will be based on new reconnaissance and detailed level surveys, basic engineering, environmental impact assessments and stakeholder feedback, and shall lead to a final route proposal with alternatives in each legislation, which will then be described in detail in the country-specific permit applications for pipeline construction and operation. Specific project details, including pipeline design, routing, landfall sites, and construction methods may change from those described in this PID.

Detailed EIA procedures differ among the concerned countries. Therefore impact assessments will follow the country-specific standards and will respect the countries’ national boundaries. The Project’s consultation under the Espoo Convention is proposed to run in parallel with all the national EIA procedures to the extent possible. A preliminary cross-check of country-specific EIA procedure timelines has indicated that a parallel Espoo procedure with synchronised public participation phases might be feasible.

After completion of construction of Nord Stream line 1 and line 2 the results from Nord Stream’s Environmental and Social Monitoring Programmes demonstrate that Nord Stream’s pipeline construction did not cause any unforeseen environmental impact in the Baltic Sea. So far, all monitoring results have confirmed the findings of the environmental impact assessments and verified that construction-related impacts were minor, locally limited and predominantly short-term. With regard to the saline water influx into the Baltic Sea, as one of the key concerns, the effect of pipeline presence on the seabed in the Bornholm Basin was monitored during the Nord Stream Line 1 and Line 2 project and assessed to have no measurable impact.

The Project’s pipeline system is preliminarily scheduled to be constructed from 2016 to 2018. The first public participation phase for the proposed EIA programme is expected to take place in April / May 2013.

Abbreviations

ADCP	Acoustic Doppler Current Profiler
AIS	Automatic Identification System
BCM	Billion cubic metres
BUCC	Back-up Control Centre
BSPA	Baltic Sea Protected Areas
CO_2	Carbon dioxide
COLREGs	International Regulations for Preventing Collisions at Sea
COMBINE	Cooperative Monitoring in The Baltic Marine Environment
CTD	Conductivity, Temperature, Depth
CWA	Chemical Warfare Agents
CWC	Concrete Weight Coating
DDT	Dichlordiphenyltrichlorethan
DNV	Det Norske Veritas
DW	Deep Water
EBRD	European Bank for Reconstruction and Development
EEZ	Exclusive Economic Zone
EIA/ESIA	Environmental Impact Assessment/Environmental and Social Impact Assessment
EIB	European Investment Bank
EMP	Environmental Monitoring Programme
ESM	Environmental and Social Management
ESMP	Environmental and Social Management Plan
ESMS	Environmental and Social Management System
Espoo Convention	UNECE Convention on Environmental Impact Assessment in a Transboundary Context
EU	European Union
FOI	Totalförsvarets forskningsinstitut
GOFREP	Gulf of Finland Mandatory Ship Reporting System
HCB	Hexachlorobenzene
HELCOM	Helsinki Commission
HSES-MS	Health, Safety, Environmental and Social Management System
ICES	International Council for the Exploration of the Sea
IUCN	International Union for Conservation of Nature (World Conservation Union)
IEA	International Energy Agency
IBA	Important Bird Area
IFC	International Finance Corporation
IMO	International Maritime Organisation
ISO	International Organization for Standardization
LFFG	Landfall Facilities in Germany
LFFR	Landfall Facilities in Russia
LNG	Liquefied Natural Gas
MAC	Maximum Allowable Concentrations

MARPOL	International Convention for the Prevention of Pollution From Ships
MCC	Main Control Centre
NAVTEX	Navigational Text Messages
NEL	Nordeuropäische Erdgasleitung
NGO	Non-governmental Organisation
NOx	Nitrogen Oxides
NPUE	Number Per Unit Effort
OECD	Organisation for Economic Co-operation and Development
OHSAS	Occupational Health and Safety Assessment Series
OPAL	Ostsee-Pipeline-Anbindungs-Leitung
PCB	Polychlorinated Biphenyl
PID	Project Information Document
PIG	Pipeline Inspection Gauge
PSSA	Particularly Sensitive Sea Area
PSU	Practical Salinity Unit
ROV	Remotely Operated Vehicle
SAC	Special Area of Conservation
SCI	Sites of Common Interest
SPA	Special Protection Area
SS	Suspended Sediment
TBT	Tributyltin
UGSS	Russia's Unified Gas Supply System
UGTS	Ukraine's Gas Transit System
UN	United Nations
UNCLOS	United Nations Convention on the Law of the Sea
UNECE	United Nations Economic Commission for Europe
UNESCO	United Nations Educational, Scientific and Cultural Organisation
VASAB	Vision and Strategies around the Baltic Sea
VHF	Very High Frequency
WD	Water Depth
WPUE	Weight Per Unit Effort

1 Purpose of This Information Document

The purpose of this Project Information Document (PID), prepared by Nord Stream AG in Zug, Switzerland, is to

- describe the proposed Nord Stream Extension Project (referred to here as "the Project")
- provide authorities with information about the Project to enable them to determine their role in the environmental and social impact assessment and in the permitting processes in accordance with their country-specific laws and regulations
- provide all stakeholders with a good overview of the project, allowing them to determine their level of interest in the proposed Project.

Ongoing route corridor investigations, basic engineering, stakeholder consultation, results of the environmental and social impact assessment and regulatory review will influence the Project's design and planning. Therefore, specific Project details – e.g. pipeline design, exact routing, landfall sites, and construction methods – may change from those described in this PID. There may also be changes to the overall Project based on the outcome of ongoing commercial negotiations. All clarifications and changes will be included in the Project's EIA Reporting and the permit application documents.

To make allowance for any possible outcome this document describes the Project in its widest scope by assuming two pipelines of maximum diameter (48 inch).

The information in this PID reflects the preliminary Project design as of March 2013. This PID does not document environmental and social commitments to which the Project shall be bound. The Project developer will identify such commitments during the EIA and permitting process, and will then provide relevant documentation in the Project's EIA Reporting and the permit application documents.

This PID includes general information on the envisaged Project and its purpose, the identified pipeline route corridor options and selection criteria, a general description of the technical design, an overview of the environmental characteristics within the project area and the suggested environmental and social impact assessment approach, transboundary issues and cumulative impacts to be studied, an outline of mitigation measures for potential adverse environmental impacts, and a preliminary schedule for the Project.

1.1 Contact Details

More information may be obtained from

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2 Basic Information

2.1 The Project Developer

Nord Stream AG, based in Zug, Switzerland, is an international consortium of five major natural gas companies established in December 2005 under the former name of NEGP for the purpose of planning, construction and subsequent operation of a natural gas pipeline system through the Baltic Sea. The shareholders of the Nord Stream consortium are the Russian company OAO Gazprom (51 %) and the four European companies Wintershall Holding GmbH (15.5 %), E.ON Ruhrgas AG (15.5 %), N.V. Nederlandse Gasunie (9 %), and GDF SUEZ (9 %). Nord Stream AG successfully constructed the two Nord Stream pipelines, showing that subsea natural gas transportation through the Baltic Sea is a sustainable solution for meeting European natural gas demand.

In a feasibility study Nord Stream AG identified different route corridor options for the envisaged possible extension of its existing twin natural gas pipelines system through the Baltic Sea. Based upon the feasibility report findings Nord Stream AG then obtained the approval of its shareholders to further develop that Project. Depending on the business interests of Nord Stream AG's current shareholder group, the shareholder structure for the Project might change at a later stage.

2.2 The Project

The Project comprises the planning, construction and operation of up to two additional natural gas offshore pipelines through the Baltic Sea spanning from Russia to Germany, each with a transport capacity in the order of 27.5 billion cubic metres (bcm) of natural gas per year and with similar properties to that of the existing two Nord Stream pipelines: 48 inch steel pipes with internal flow coating and external corrosion protection coating and concrete weight coating, inner pipe diameter of 1,153 mm, segmented pipe wall thicknesses along the pipeline route corresponding to decreasing design pressures in the range of 220 bar, 200 bar, and 177.5 bar, and total pipeline length of around 1,250 km. The Project's pipeline system is preliminarily scheduled to be constructed from 2016 to 2018.

Based on existing knowledge Nord Stream AG evaluated several route corridor options, including a routing through Estonian EEZ waters. Subsequently Nord Stream AG applied for survey permits in the corresponding countries to commence as soon as possible with the further investigations for an optimised pipeline routing. The Estonian government decided in December 2012 not to grant Nord Stream AG a permit to perform a reconnaissance survey in Estonian EEZ waters. Thus the originally identified route corridor options had to be reduced. All remaining route corridor options follow a routing from a landfall in Russia through Finnish, Swedish and Danish waters to a landfall in Germany (Figure 1).

Detailed investigations will be based on new reconnaissance and detailed level surveys, environmental surveys, basic engineering, risk assessments, environmental and social impact assessments and stakeholder feedback. All this information will lead to a final route proposal with alternatives in each legislation, which will then be described in detail in the Project's EIA Reporting and the country-specific permit applications for pipeline construction and operation.

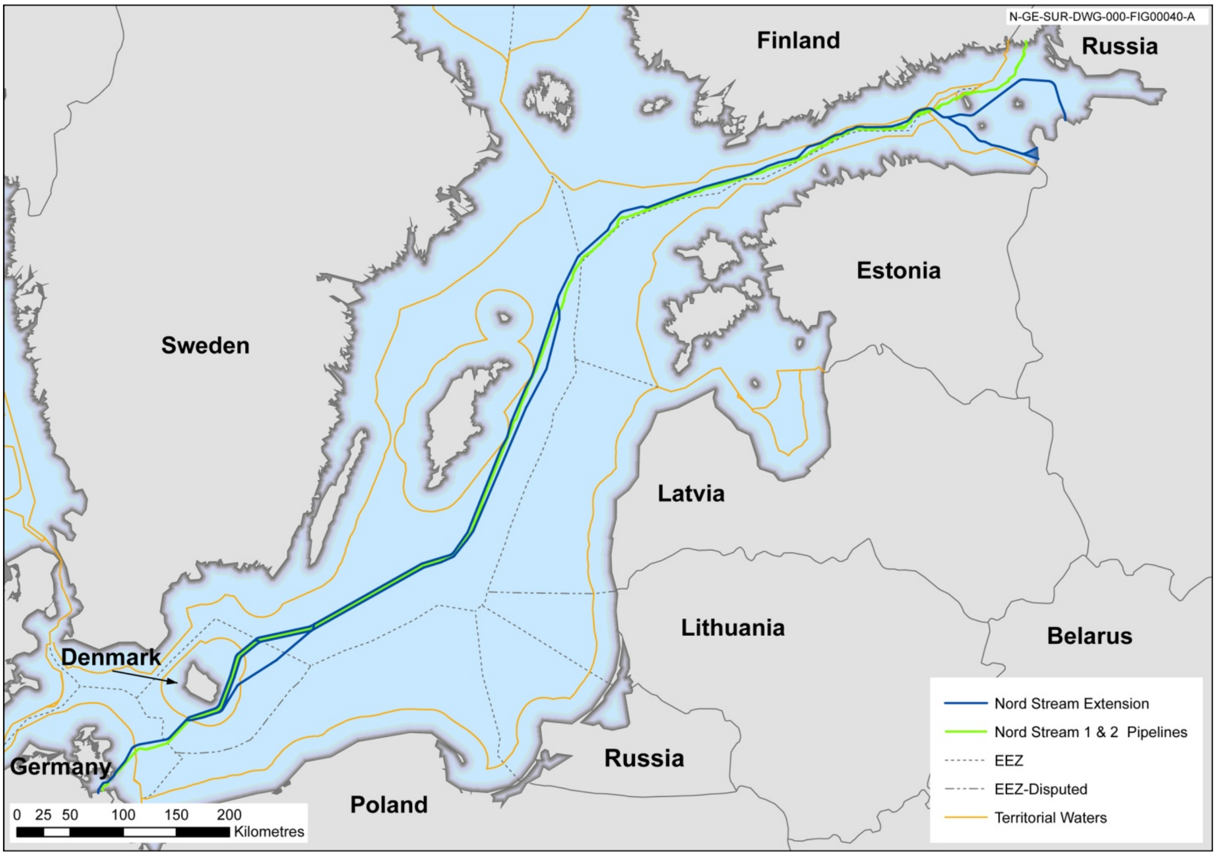

Figure 1: Route corridor options developed for the Project

2.3 Present Status of Nord Stream Line 1 and Line 2

Nord Stream is a pipeline system through the Baltic Sea, transporting natural gas via a direct connection from the Russian natural gas pipeline grid to the EU markets. Currently, two offshore pipelines run from Vyborg near St. Petersburg in Russia to Lubmin near Greifswald in Germany and provide a total transport capacity of 55 bcm of natural gas a year. The pipelines were built and are now operated by Nord Stream AG based in Zug, Switzerland.

The existing twin pipelines' route, 1,224 kilometres long and entirely offshore through the Baltic Sea, passes through the Exclusive Economic Zones of Russia, Finland, Sweden, Denmark, and Germany and through the Territorial Waters of Russia, Denmark, and Germany with landfalls in Russia and Germany. Pipelay of the first pipeline of the twin pipeline system began in April 2010, and was completed in June 2011. Transportation of natural gas through line 1 began in November 2011. Pipelay of line 2, which runs almost parallel to line 1, was completed in April 2012. In October 2012, gas transport through the second pipeline started. At the German landfall the natural gas is delivered into the two German pipeline systems OPAL "Ostsee-Pipeline-Anbindungs-Leitung" and NEL "Nordeuropäische Erdgasleitung" for further transport into the European natural gas grid.

The Baltic Sea, being a large body of relatively shallow brackish waters with limited water exchange with the North Sea, is a sensitive eco-system and unique in terms of its flora, fauna, and human activities. Nord Stream AG has carefully studied these factors and taken them into account in the project activities of the existing twin pipelines. Extensive route alternative surveys and environmental impact assessment studies ensured that routing, design and construction activities of the first two pipelines minimised any potential adverse environmental and social impact. Nationally focused EIAs and the international consultation process governed by the Espoo Convention were key elements in the project's permitting process. Furthermore, as an essential part of the project financing, the relevant requirements of international finance institutions, such as the Equator Principles, the OECD Common Approaches and Performance Standards of the International Finance Corporation (IFC) were met, including the development and implementation of an Environmental and Social Management System (ESMS).

In addition to presenting a state-of-the-art technical design, Nord Stream AG demonstrated in a very transparent way that it is competent in the sustainable management of environmental and social aspects and risks associated with the implementation of a pipeline project in the Baltic Sea region. All construction work for the pipeline system was carried out in an environmentally and socially responsible manner, successfully protecting the unique eco-system of the Baltic Sea. The implementation of an Environmental and Social Management System enabled Nord Stream to monitor its contractors and closely follow up all commitments and obligations, in turn ensuring good management of construction and operations activities and transparent and comprehensive reporting to authorities and stakeholders.

After completion of construction of line 1 and line 2 the results from Nord Stream's Environmental and Social Monitoring Programmes demonstrate that Nord Stream's pipeline construction did not cause any unforeseen environmental impact in the Baltic Sea. So far, all monitoring results have confirmed the findings of the environmental impact assessments and verified that construction-related impacts were minor, locally limited and predominantly short-term. With regard to the saline water influx into the Baltic Sea, as one of the key concerns, the effect of pipeline presence on the seabed in the Bornholm Basin was monitored during the Nord Stream Line 1 and Line 2 project and assessed to have no measurable impact. Also transboundary effects have been verified as being insignificant, at maximum at a minor impact level.

3 Purpose of and Need for the Project

A robust pipeline infrastructure, which connects the Russian natural gas pipeline grid to the European energy markets and safeguards reliable and secure natural gas supply, is required to fulfil contractual agreements between Russian and European natural gas companies over the coming decades. The successful construction of the first two Nord Stream pipelines clearly indicates that from an environmental, technical and economic point of view, subsea natural gas transportation through the Baltic Sea is a sustainable solution to meet European natural gas demand. The first two Nord Stream pipelines have been completed according to schedule while adhering to high quality, safety, environmental and social criteria.

Natural Gas is the Only Fossil Fuel with Expected Growth in the EU's Energy Mix

Currently making up one quarter of the EU's primary energy consumption, natural gas accounts for a significant proportion of energy consumption within the EU member states. By 2035, the share of natural gas in the EU's primary energy mix is expected to rise from 25 % to 30 % (see Figure 2).

The share of natural gas will grow in lieu of other, less environmentally friendly, fossil fuels. The share of oil is predicted to go down from 33 % in 2010 to about 25 % in 2035 and the share of coal to decline from 16 % (2010) to 9 % (2035).

The percentage of nuclear energy in the EU's primary energy mix is forecasted to remain almost unchanged at 14 % (2010) and at 13% (2035). Although nuclear power generation does not emit carbon dioxide, nuclear power plants are highly disputed regarding their safety and radioactive waste management and therefore are not regarded as a priority option to substitute fossil energy.

The proportion of energy supplied by renewable sources in the EU is forecasted to increase from 11 % in 2010 to approximately 23 % in 2035, still leaving a significant share of the energy mix to other sources – with natural gas, as a low-emission fuel, being the widely preferred option.

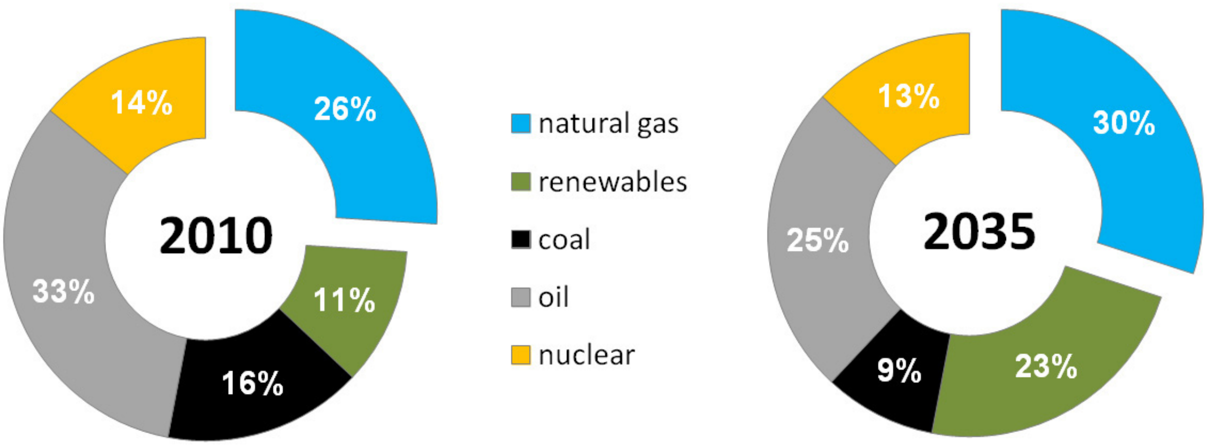

Figure 2: EU energy mix – the growing demand for natural gas (Sources: Eurostat 2012; IEA World Energy Outlook, 2012)

Natural Gas and Renewable Energy Are Perfect Low-Carbon Economy Partners

One benefit offered by natural gas is becoming more vital with the increasing use of renewable energies: natural gas power plants can superiorly compensate for fluctuations in renewable energy supply.

Although hydroelectric power generation is popular in the Nordic countries, it is not an option for many EU member states that lack the requisite hydrological properties and resources. This leaves wind and solar energy as key renewable energy sources. These, however, are characterised by highly volatile capacities due to variable winds and sunshine. Fluctuations can be observed on a seasonal basis as well as on a day-to-day or intra-day basis which means that complementary sources are needed to provide a stable, consumer oriented electricity supply. Natural gas-fired turbines can be brought online in minutes rather than the hours it takes for coal-fired plants, or even days in the case of nuclear reactors. Natural gas-fired power plants can adapt rapidly to changing capacities that occur when energy from intermittent renewable resources is fed into the electricity grid. Thus, natural gas as a bridge technology is regarded as perfect transition partner for a low-carbon economy with renewables as the target technology.

Natural Gas Plays a Key Role in the Energy Transition

On 15 December 2011, the European Commission adopted the communication "Energy Roadmap 2050", which is the basis for developing a long-term European energy framework together with all stakeholders. According to the communication, "gas will be critical for the transformation of the energy system". It acknowledges that the "substitution of coal (and oil) with gas in the short to medium term could help to reduce emissions with existing technologies until at least 2030 or 2035. Although gas demand in the residential sector might drop by a quarter by 2030 due to several energy efficiency measures in the housing sector, it will stay high in other sectors, such as the power sector, over a longer period."

It further notes that "With evolving technologies, gas might play an increasing role in the future." The European Commission emphasises that in order "to support decarbonisation in power generation and to integrate renewable energies, flexible gas capacities […] are needed." (European Commission (EC), Energy Roadmap 2050 [online], 15 December 2011, accessed 23/08/12, page 11). According to the Greenpeace study "Energy (R)evolution 2012" it is safe to conservatively assume that coal-fired power plants emit about 740 g CO_2/kWh and gas-fired ones only about 350 g CO_2/kWh, which is 52.7 % less than coal.

EU's Natural Gas Import Requirement Will Continue to Grow

Current total proven natural gas reserves in the EU are relatively low compared with the projected annual demand. At 1,100 bcm, the Netherlands has the largest remaining proven reserves within the EU. The United Kingdom, which currently contributes approximately 25 % of the annual natural gas production in the EU, has remaining proven reserves of approximately 200 bcm.

At present, natural gas production in the EU covers roughly 38 % of demand in the EU, and production from existing natural gas reserves in the EU will decline from around 201 bcm per year in 2010, to only 94 bcm per year in 2035. In the United Kingdom, the market with the largest gas demand in Europe with 82 bcm in 2011, the decline in domestic production has already been significant in recent years – from 115 bcm in 2000 to 47 bcm in 2011. A further drop to 10 bcm in 2035 is forecast. In the Netherlands, production will drop from 79 bcm in 2009 to 28 bcm in 2035. Thus, even if demands remain stable, the natural gas import requirements of EU markets will significantly increase. This gap needs to be filled by additional imports and/or unconventional production.

Alternative Sources and Transport Means Prove to Be Insufficient or Too Uncertain

Norwegian gas production has grown rapidly in the last 10 years, but production from known fields in Norway is expected to begin declining from the early 2020s. The discovery and development of new fields requiring further capital investment would be necessary for Norway to maintain its production after this period and any increase in supply capacity to the EU would require additional gas transportation infrastructure.

Liquefied Natural Gas (LNG) deliveries to the EU member states are expected to almost double by 2030. However, due to global market competition, a further increase is unlikely. LNG transport, compared with offshore pipelines, tends to be less energy-efficient and involves higher carbon emissions. The LNG process is complex, and involves liquefaction of gas at the point of export, specialised shipping transport, and finally re-gasification. In July 2009, the European Commission's Joint Research Centre released a report on the advantages and drawbacks of LNG. According to the report, "The LNG supply chain tends to be more energy and greenhouse gas intensive than the supply chain for pipeline gas, because of the extra processing steps." To replace the annual capacity planned for the Project would require some 600 to 700 round-trips per year by LNG tankers from an LNG facility in Russia to an LNG facility in North West Europe. Over and above additional carbon emissions, ship traffic causes emissions of other air pollutants, noise in the marine environment and influences maritime safety, particularly in heavily trafficked areas.

There is significant uncertainty surrounding the future of unconventional gas extraction in Europe, concerning geology as well as costs, environmental aspects, public acceptance and the lack of a drilling industry. Unconventional gas raises many environmental concerns, including groundwater pollution, methane emissions and seismicity. It could have high environmental costs which are reflected by moratoria and other restrictions on hydraulic fracturing activities (which are an essential component of unconventional gas extraction) in countries such as France, Belgium, Germany, and Bulgaria. First drilling results in Poland were so far rather modest. The low political and public acceptance and the uncertain economic viability make unconventional gas an uncertain option to cover future EU gas demand.

The delivery of large volumes of natural gas to the European natural gas market from the Caspian region is becoming less likely, as demand in Turkey is rising and the relevant projects have been scaled down. Furthermore, since 2009, China, which has built the related infrastructure in Turkmenistan, has been importing natural gas from Turkmenistan. Gas exports from Central Asia (Turkmenistan, Uzbekistan and Kazakhstan) to China are much more straightforward for these countries and therefore more likely than to Europe.

An overland pipeline project from Russia to North West Europe, for example through the eastern or northern and western Baltic Sea bordering states, would be longer and include significant environmental and social challenges when compared with an offshore pipeline on the sea floor of the Baltic Sea. Overland pipeline challenges include human settlements, roads, railways, canals, rivers, surface landforms, agricultural land, as well as potentially sensitive eco-systems and cultural heritage sites. An overland pipeline would also require additional infrastructure sites such as compressor stations approximately every 200 km to maintain pressure for gas transport flow, which would require significant land and energy usage while emitting noise and atmospheric emissions.

Russia Is a Sound Natural Gas Supply Source for the EU Member States

With 44,600 bcm, Russia has 21.4 % of the world's currently known conventional natural gas reserves. Russia is by far the country with the largest gas reserves in the world, followed by Iran (15.9 %), Qatar (12.0 %), Turkmenistan (11.7 %), and the United States (4.1 %). Most of the natural gas reserves in Russia are located in Western Siberia, where all the largest OAO Gazprom fields, either producing (Urengoy, Yamburg, Zapolyarnoe) or under development (Yamal peninsula), are located. From there, natural gas can be transported to the European markets via Russia’s Unified Gas Supply System (UGSS).

Russia’s UGSS is the world’s largest gas transmission system encompassing gas production, processing, transmission, storage, and distribution facilities. It assures continuous gas supply from the wellhead to the ultimate consumer in Russia and to the export points. Centralised dispatch, considerable redundancy by parallel transmission routes and the world’s largest natural gas storage capacity in one hand provide the UGSS with a substantial reliability margin, as well as the ability to secure uninterrupted natural gas supplies – even under peak-season loads. OAO Gazprom is continuously developing the UGSS, including implementation of new gas transportation projects to deliver gas from new production regions to consumers, as well as the construction of underground gas storage facilities with a total working natural gas volume of about 100 bcm and a peak send-out of 1 bcm per day. OAO Gazprom also ensures sustainable operation of the UGSS through regular state-of-the-art diagnostics, maintenance, upgrade and repair.

EU and Russian natural gas companies have maintained a reliable long-term relationship for almost 40 years. EU companies buy some 60 % of Russian natural gas exports. Natural gas export earnings are significant to Russia's national budget. The European Union speaks of an evident interdependency on the part of the EU and Russia when it comes to energy partnership.

The Nord Stream Pipelines Ensure Reliable Natural Gas Supplies to the EU

To provide robust, reliable, and secure natural gas supplies to meet all contractual supply obligations by Russia vis a vis its EU customers for the coming decades requires supply infrastructure free from technical and non-technical risks. Direct pipeline connections have the advantage of avoiding non-technical risks so that reliability can be ensured by applying state-of-the-art construction and operation.

The existing Nord Stream pipelines and their planned extension meet that requirement. They not only help ensure the fulfilment of existing long-term supply contracts between Russian and EU companies, but offer additional supply options to North West Europe to compensate for its declining domestic gas production.

By contrast the ageing Ukrainian Gas Transit System (UGTS) entails technical risks and non technical risks related to commercial and other disputes. The UGTS, which was largely constructed in the 1970s and 1980s, urgently requires overhaul and modernisation. In March 2009, a memorandum was signed in Brussels between the European Commission, the government of Ukraine, and international financial institutions such as the EBRD and EIB on providing financing for the modernisation of the UGTS based on a restructuring of the Ukrainian gas sector. However, little progress has been made since. Without a credible will to modernise the Ukrainian gas sector and the UGTS the risks for natural gas transit are growing further due to technical and non-technical shortcomings.

The existing Nord Stream Pipeline system and its planned extension with its state-of-the-art technology offer a technically sound solution for decades of Russian gas deliveries to the EU. Offering a direct natural gas connection they are free from non-technical risks and free of interference of a commercial or non- commercial nature by third parties. They offer a much more reliable delivery option for Russian natural gas exports to the EU, contrary to the Ukrainian system with uncertain modernisation prospects for an old system with outdated design unfit for a long term future.

The commitment of OAO Gazprom and major EU energy companies to the building of Nord Stream lines 1 and 2 and now to an extension of the Nord Stream Pipeline system, both involving major private investment, underlines the interest of the natural gas industry to strengthen the long-term supply relationship between Russia and the EU. This will be of considerable benefit to the EU by increasing reliability and security of supply and to its natural gas consumers by providing additional supply options.

The EU recognises the importance of the Nord Stream Pipeline. The Trans-European Energy Network via EU Decision No 1364/2006/EC of 6 September 2006 acknowledges the northern European natural gas pipeline running from Russia to Germany through the Baltic Sea as a project of "European interest".

4 Alternatives

The Project's purpose is to install additional pipeline capacity for transporting natural gas volumes from Russia to the north-western European markets. The pursued route corridor options follow a routing from a landfall in Russia through Finnish, Swedish and Danish waters to a landfall in Germany.

4.1 No-Action Alternative

The description of the no-action (or zero) alternative provides the basis for enabling the comparison of the predicted impacts of Project implementation with the environmental conditions of not implementing the Project. Consequently, the no-action alternative identifies the existing environmental conditions, which will not experience any disturbance from the action taken by the Project developer.

Experience from the construction of the two Nord Stream Pipelines indicates that from an environmental, technical and economic point of view, a subsea natural gas transportation system through the Baltic Sea is an environmentally feasible solution. Environmental and social monitoring of the Nord Stream project has so far verified that the environmental and social impact of the Nord Stream twin pipeline construction has been of minor significance.

The no-action alternative means not implementing the Project at all. All activities connected with Project implementation, i.e. constructing and operating of up to two additional subsea pipelines from Russia to Germany on the seabed of the Baltic Sea, would not take place. Consequently, there would be no environmental or social impact from the Project, neither an adverse one nor a positive one.

Regardless of Project implementation, future environmental and social impacts in the Baltic Sea may, inter alia, arise from increasing ship traffic, harbour and fairway developments, mine clearance activities, other infrastructure projects as wind parks, cables, pipelines and LNG facilities, and change to commercial fishery patterns. According to HELCOM's Baltic Sea Action Plan one of the major environmental challenges is the continuing eutrophication of the Baltic Sea.

However, such future environmental and social developments as well as environmental and social impacts from other projects, which are not within the scope of the Project, cannot be foreseen by the Project developer. Therefore, the assessment of alternatives for the Project cannot consider:

- Potential changes in environmental and social conditions associated with other possible future developments or projects in the Baltic Sea that might be reasonably expected to occur in the foreseeable future;
- Any actions that might be taken in the future by others to provide the required additional transport of natural gas volumes and to increase the security of supply of natural gas from Russia to north-western European markets as described in chapter 3 'Purpose of and Need for the Project', section 'Alternative Sources and Transport Means Prove to Be Insufficient or Too Uncertain'.

In summary, the Project developer considers the environmental and social baseline description as presented in section 7.1 'Environmental and Social Baseline Conditions' and in the national scoping documents as being representative of the environmental and social conditions of the no-action alternative. This description will be further developed during the Project's environmental impact assessment phase, and then presented in the Project's environmental impact reporting.

4.2 Country-Specific Route Alternatives

Environmental and social impact assessments play an important role in the final design and the final detailed routing of the Project. For the time being, there are several areas where routing options and country-specific routing alternatives are still to be investigated in detail. Such investigations will be based on new reconnaissance and detailed level surveys, environmental surveys, basic engineering, risk assessments, environmental and social impact assessments and stakeholder feedback. All this additional information will lead to a final route proposal with alternatives in each legislation which will then be described in the Project's EIA Reporting and the country-specific permit applications for pipeline construction and operation.

5 Project Description

5.1 Project Infrastructure

The Project's pipeline system will provide the linkage between an upstream operator's compressor station near the landfall in Russia and a downstream operator's receiving terminal in Germany.

The Project's pipeline system will include the Baltic Sea offshore pipelines themselves and the related facilities, which are:

- Landfall Facilities in Russia (LFFR)
- Landfall Facilities in Germany (LFFG)
- Main Control Centre in Zug, Switzerland (MCC)
- Back-up Control Centre in Zug, Switzerland (BUCC)

This configuration replicates that of the existing Nord Stream infrastructure, but will utilise different landfall sites and different pipeline route corridors. Route corridor investigations, basic engineering, stakeholder consultation, results of the environmental and social impact assessment and regulatory review will influence the Project's design and planning. Therefore, specific project details, e.g. pipeline design, routing, landfall sites, construction methods, may change from those described in this PID.

5.2 Route Corridor Options

Based on existing knowledge Nord Stream AG evaluated several main route corridor options, including a routing through Estonian EEZ waters. Subsequently Nord Stream AG applied for survey permits in the corresponding countries to commence as soon as possible with the further investigations for an optimised pipeline routing. The Estonian government decided in December 2012 not to grant Nord Stream AG a permit to perform a reconnaissance survey in Estonian EEZ waters. Thus the originally identified route corridor options had to be reduced. All remaining route corridor options now follow a routing from a landfall in Russia through Finnish, Swedish and Danish waters to a landfall in Germany (Figure 1).

The overall length of the pipeline corridors is around 1,250 km depending on the location of landfall sites and detailed routing options.

Route Corridor Selection Criteria

In order to plan a sustainable route corridor for the new pipelines, specific selection criteria in the categories environment, social and technical have to be considered.

Environmental criteria relate to the potential effects of the pipelines installation and operation on the environment of the Baltic Sea, including protected or environmentally sensitive areas hosting ecologically sensitive species of animal or plant life to the extent possible. Furthermore, any Project-associated work that might disrupt the seabed's natural composition has to be minimised. With regard to the saline water influx into the Baltic Sea, as one of the key concerns, the effect of pipeline presence on the seabed in the Bornholm Basin was monitored during the Nord Stream Line 1 and Line 2 project and assessed to have no measurable impact.

The presence of both conventional and chemical munitions on the seabed continues to represent a hazard in the Baltic Sea region. In preparation for the construction of Nord Stream lines 1 and 2 Nord Stream AG fostered an exchange of information within various fields of munitions expertise. Munitions screening surveys were performed to establish the locations of potentially unexploded munitions and/or chemical warfare agents that could constitute a danger for the pipeline or the environment during pipeline installation works. The Project developer is fully aware of the risks posed to humans and the environment through the potential presence of both conventional and chemical munitions in the pipelines route corridors and plans to arrange for equivalent surveys and activities to manage associated risks. Possible construction activities in the vicinity of areas where anchoring is discouraged because of the potential presence of chemical warfare agents were proven to be manageable without significant risk to the environment and to third parties.

Considering social criteria the key is minimising restrictions on marine spatial planning concepts and marine users – those working in shipping, fishing, offshore industry, the military or tourism or recreation – and paying attention to existing offshore installations, such as cables or wind turbines. As a consequence the Project developer's goal is to minimize the cumulative footprint of the Nord Stream pipelines by assessing the minimum required distance (separation) between Nord Stream Lines 1 and 2 and the Project's pipeline system where practically possible. Such area-specific assessment takes into consideration the risks and constraints during the construction and operation of the pipelines. Actual pipeline separation distances will accommodate the various seabed constraints and other constraints that may dictate a closer or wider separation.

Maritime cultural heritage is protected by legislation and national authorities have developed procedures to avoid impacts on cultural heritage from construction projects. Specific surveys will allow the Project developer to exactly locate cultural heritage sites and to implement protection strategies in close consultation with national authorities.

Technical considerations relate to pipeline design, component manufacture, installation method, operation, integrity, and risk assessment results. These include water depth for pipeline stability, installation, maintenance and repair, minimum pipeline bend radii, criteria for cable and pipeline crossings, distance to and crossing of shipping lanes and seabed roughness. Here, it is also important to consider how to reduce construction time while minimising the operation's technical complexity, minimising impacts and use of resources.

Drawing on the company's experience, available data from the existing pipelines, and taking the selection criteria described above into account, Nord Stream AG performed a thorough desk study corridor assessment that identified a number of feasible route corridor and landfall options as a basis for further planning during the next project phase. In order to evaluate the feasibility of the route corridors they have been divided into geographical sections: Russian Landfall, Gulf of Finland, Baltic Proper, and German Landfall.

Route Corridor Options

In this PID the term "route corridor" means a spread on the seabed of in general 2 km in width, which in the next project phase may be further investigated by reconnaissance and detailed level surveys to establish seabed topography and to provide the required data for the technical basic design of pipeline routes.

The route corridor options were developed based on a routing assessment, in which numerous environmental constraints in the potential project area were considered.

Russian Landfall

A screening of the Russian south coast of the Gulf of Finland for the identification of potential pipeline landfall locations was performed based on requirements derived from connecting Russian upstream natural gas transport systems. Two locations along the south coast of the Russian part of the Gulf of Finland were identified as being potentially suitable for the pipelines landfall site:

- Kolganpya at the Soikinsky peninsula
- Kurgalsky peninsula near the Estonian border.

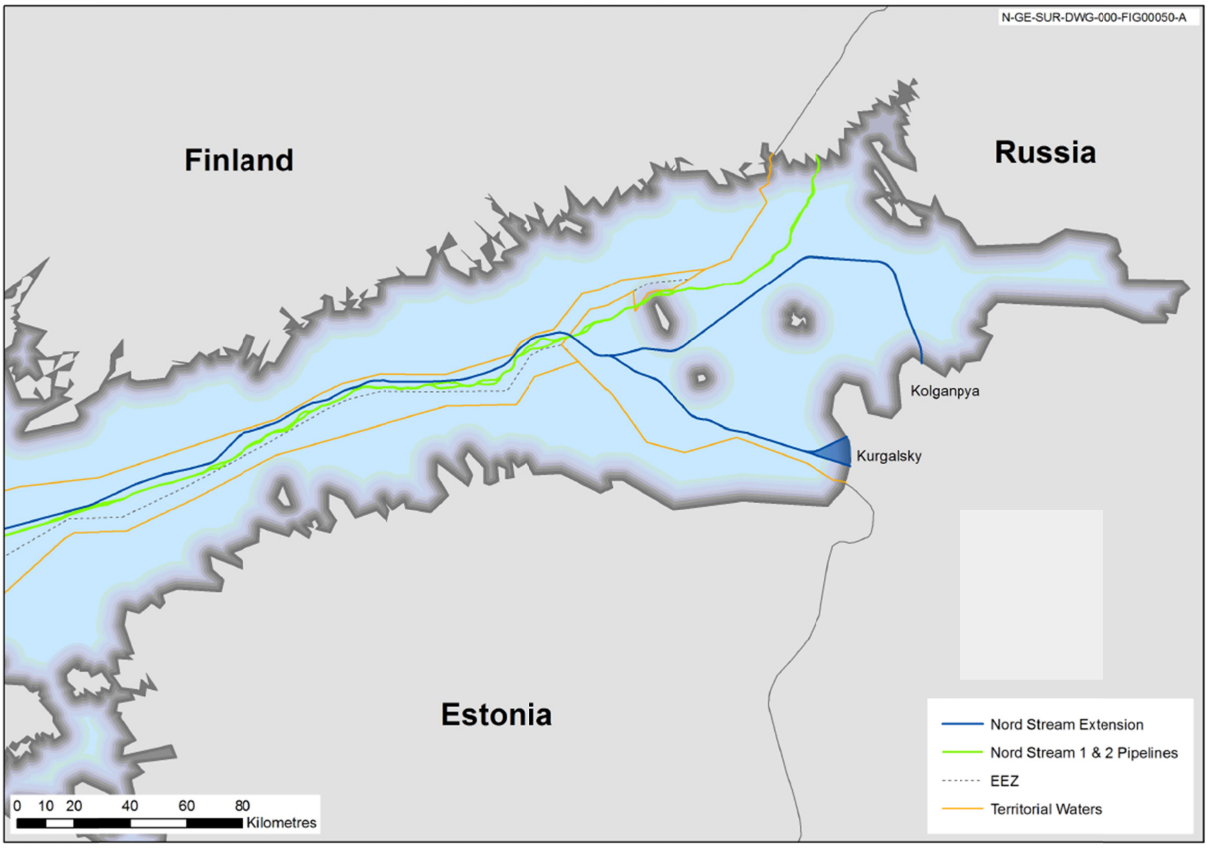

Figure 3: Landfall options Kolganpya and Kurgalsky

The Kolganpya coastline is approximately 5 km long and is deemed potentially suitable for the landfall in its entire length.

The Kurgalsky coastline is approximately 10 km long. Any location within these limits is potentially feasible. There are variations in offshore dredging requirements and onshore routing requirements. Among other advantages, the Kurgalsky landfall option significantly reduces onshore and offshore pipeline route length.

Route corridor in the Gulf of Finland

The routing assessment for the Gulf of Finland concluded that a route corridor entirely through Finnish waters is environmentally and technically feasible, if adequate mitigation measures will be adopted. The route corridor runs north of the existing Nord Stream pipelines and to the south of the limit of Finnish territorial waters within Finnish EEZ, extending from the Russian/Finnish EEZ border to the Finnish/Swedish EEZ border.

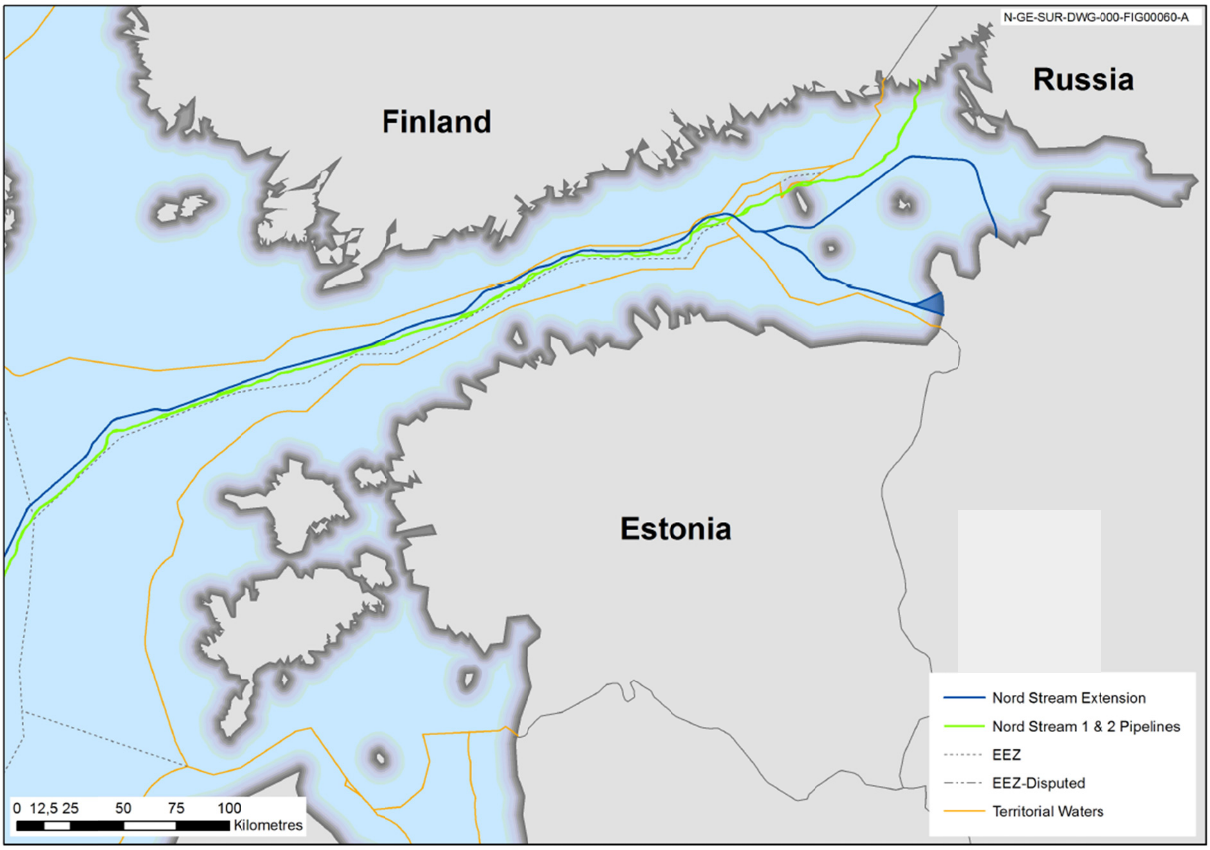

Figure 4: Gulf of Finland route corridor options

Route corridors in the Baltic Proper

The routing assessment concluded for the Baltic Proper that in connection with the Gulf of Finland routing three routing options are feasible.

The route corridors options enter Sweden in the northern part of the Baltic Proper. They follow the existing Nord Stream pipelines on either side through Sweden and allow for a total of three options to cross Danish waters before merging into one German landfall approach (see Figure 5).

- Routing option north and west of the existing Nord Stream pipelines: The route corridor enters Sweden in the northern part of the Baltic Proper to the north and west of the existing Nord Stream pipelines. The corridor is almost parallel to the existing Nord Stream route on the north-western side. From the northern part of the Baltic Proper the route corridor turns south running between the island of Gotland and the existing Nord Stream pipelines until south of Hoburgs Bank. The corridor then turns west south-west, remaining north of the existing pipelines and crossing the main deep-water shipping lane parallel to the existing pipelines until it is north of a chemical munitions dumping site . At this point it turns south south-west heading along the east side of the island of Bornholm before turning westwards towards Germany.
- Routing option south and east of the existing Nord Stream pipelines: The route corridor enters Sweden in the northern part of the Baltic Proper to the west of the existing Nord Stream pipelines. Not far from the Finnish border the routing foresees a crossing of the existing Nord Stream pipelines to the eastern side of them. From this point the corridor is more or less parallel to the existing Nord Stream route on their south-eastern side. Once the route has passed the Hoburgs Bank nature reserve it remains to the east of the Nord Stream pipelines as it turns south west heading towards Bornholm. It crosses the deep-water shipping lane south of the island of Gotland. As it crosses the southern part of the Baltic Proper it runs parallel to the existing Nord Stream Pipelines, running between them and the munitions dumping zone as it passes Bornholm, before turning west towards Germany. As the route corridor approaches German waters it crosses the existing Nord Stream pipelines from the east to the west, entering Germany to the north of them.

- Routing option south and east of the existing Nord Stream pipelines with a routing further east of Bornholm: The route corridor follows the routing option south and east of the existing Nord Stream pipelines before it enters Danish waters a bit further southeast than the above mentioned route. It offers a more direct route through Danish waters than the two other route options and crosses the area where bottom trawling, anchoring and seabed works are discouraged northeast of Bornholm, before entering Danish territorial waters. There it turns southwest and re-joins the route option south and east of the existing Nord Stream pipelines for the remainder of the route towards Germany.

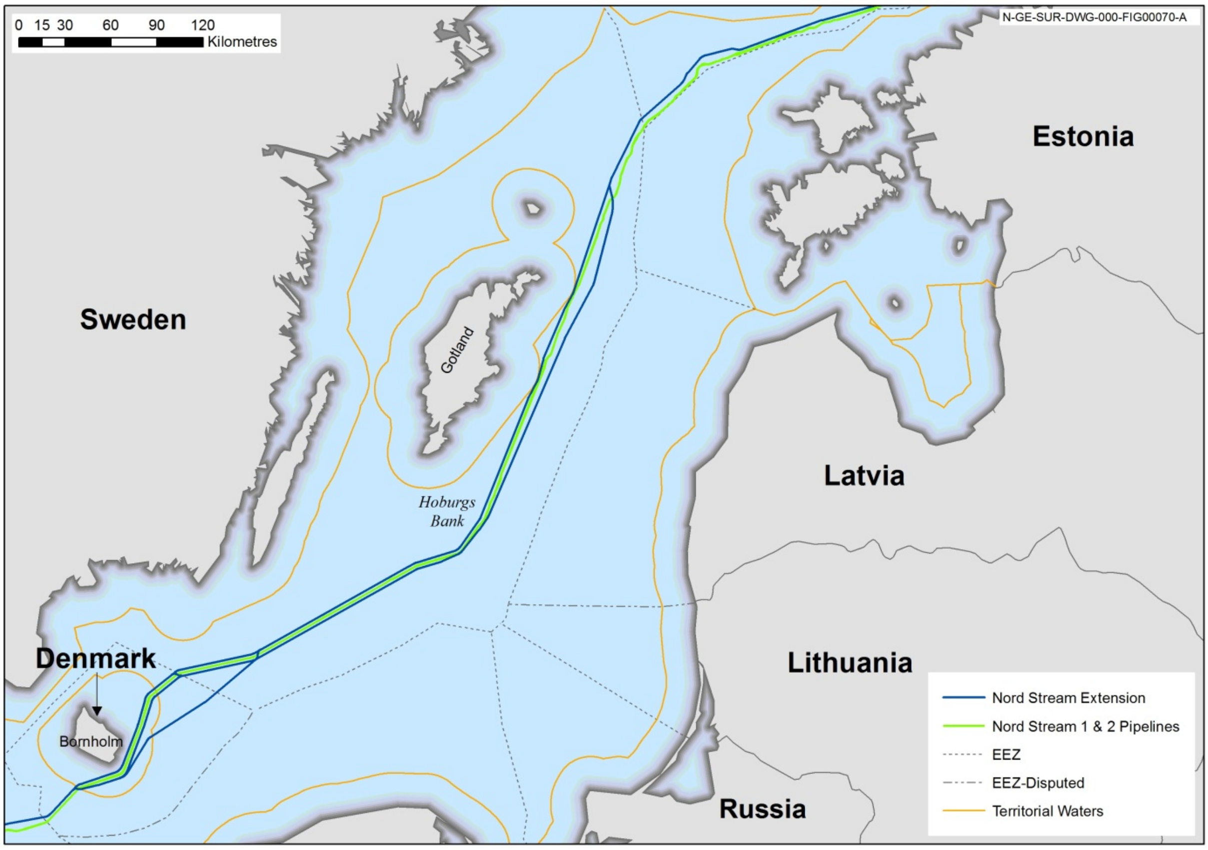

Figure 5: Baltic Proper route corridor options

German Landfall

The German coastline has been screened for feasible landfall locations. Various locations have been assessed to determine whether they provide for sufficient space for gas receiving facilities and good connections to offshore and onshore routing. The Greifswalder Bodden has been identified as a preferred region for a possible landfall location in view of its proximity to the existing Nord Stream infrastructure at Lubmin. However, it has been established that the Nord Stream terminal at Lubmin is too constrained to accommodate further pipelines. Consequently other locations within the Greifswalder Bodden are under investigation and a decision on these landfalls will be made following completion of preliminary design.

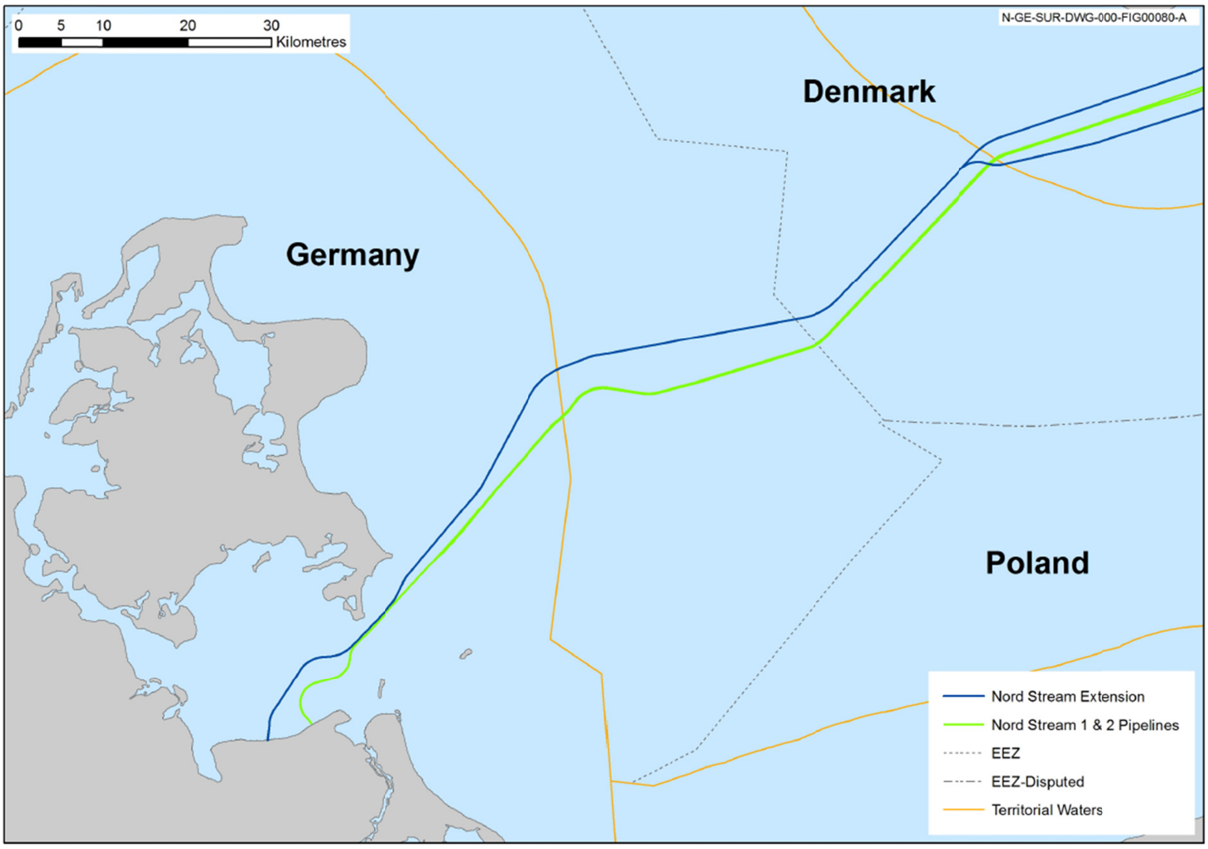

Figure 6: Greifswalder Bodden as preferred region for the German landfall

5.3 Technical design

Over the past years, Nord Stream AG has acquired extensive knowledge through the design and construction of a natural gas pipeline system in the Baltic Sea. As the design and construction of the existing Nord Stream pipelines was successful the Project can draw on its principles and maximise synergies allowing for efficient planning and re-use of gained knowledge and experience. Ongoing investigations of the new route corridors, basic engineering, stakeholder consultation, results of the environmental and social impact assessments and regulatory review will influence the Project's design and planning. Therefore, specific details, e.g. pipeline design, routing, landfall sites, and construction methods, may change from those described in this PID but will be subject to the relevant national permitting procedures.

Key parameters and components

The following key parameters and pipeline components have been confirmed as being viable and will be used as a basis for the extension pipelines:

- the envisaged flow rate in the order of 27.5 bcm/year can (depending on the length of the pipeline) be achieved using 48 inch pipes with the constant inner pipe diameter of 1,153 mm and the design pressures in the range of 220 bar, 200 bar, 177.5 bar
- wall thicknesses of 34.6 mm, 30.9 mm, and 26.8 mm (relating to the different pressure ranges)
- buckle arrestor thickness of 41.0 mm
- internal flow coating: low solvent epoxy, roughness R_Z = 5 µm, thickness 90 µm to 150 µm
- external corrosion coating: three-layer polyethylene of 4.2 mm
- concrete coating thickness and density: 60 mm to 120 mm, 2,400 kg/m^3 to 3,200 kg/m^3
- corrosion protection anodes: zinc based anodes in low-salinity water, aluminium anodes in other areas.

Again drawing on the experience gained from the first two Nord Stream pipelines, there is confidence in selecting:

- gravel berms for rectifying free spans, mitigating against in-service buckling, securing on-bottom stability, hyperbaric tie-in embankments
- concrete mattresses for crossing cables
- crossing of the existing Nord Stream pipelines and possible future pipelines using gravel berms (if the existing pipelines are exposed) or mattresses (if they are buried)
- post-lay trenching for pipeline stability and protection
- pre-lay dredging for pipeline stability and protection.

Standards, verification and certification

As for the Nord Stream pipelines, the Project's pipelines will be designed, constructed and operated in accordance and in compliance with the international offshore standard DNV OS-F101, Submarine Pipeline Systems, along with its associated Recommended Practices, issued by Det Norske Veritas (DNV).

Independent third-party experts from international certification bodies will be assigned to witness, audit and participate in all aspects of the project design and implementation, and to provide final certificates according to country-specific regulations prior to commissioning and start of operations.

5.4 Materials

Line pipes

The Project's pipelines will be constructed of individual steel line pipes with a length in the order of 12 m that will be welded together in a continuous laying process.

The line pipes will be internally coated with an epoxy-based material (Figure 7). The purpose of the internal coating is to reduce hydraulic friction, thereby improving the natural gas flow conditions.

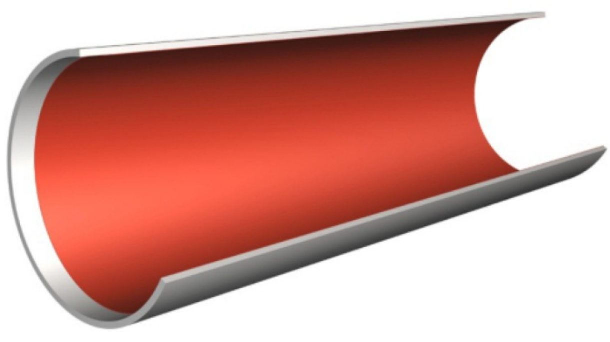

Figure 7: Internal pipeline coating will be an antifriction, epoxy-based coating

An external three-layer polyethylene coating will be applied over the line pipes to prevent corrosion. Further corrosion protection will be achieved by incorporating sacrificial anodes of aluminium and zinc (see section below describing anodes for cathodic protection). The sacrificial anodes are a dedicated and independent protection system in addition to the anticorrosion coating.

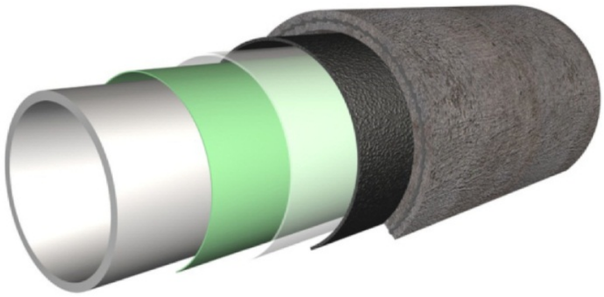

Figure 8: Concrete coating (grey) on top of the three-layer anticorrosion coating. The three-layer polyethylene external anticorrosion coating consists of an inner layer of fusion-bonded epoxy (dark green), a middle adhesive layer (light green) and a top layer of polyethylene (black)

A concrete weight-coating containing iron ore will be applied over the line pipe's external anti-corrosion coating (Figure 8). While the primary purpose of the concrete coating will be to provide on-bottom stability, the coating will also provide additional external protection against external impacts.

Buckle arrestors

To minimise the consequence of pipe collapse during installation, buckle arrestors (pipe reinforcement) will be installed at specific intervals in susceptible areas. Risk of collapse is during installation only. Buckle arrestors are full length pipe joints with over-thickness which are installed in deep water sections with typically 1,000 m separation. The buckle arrestors are machined at each end down to the wall thickness of the adjacent pipes to allow welding offshore. The material requirements and properties for the buckle arrestors are generally the same as for line pipe.

Anodes for cathodic protection

To ensure the integrity of the pipelines over their design operational life, in addition to the three-layer polyethylene external anticorrosion pipe coating a secondary anticorrosion protection will be provided by sacrificial anodes of a galvanic material. This secondary protection will be an independent system that will protect the pipelines in case of damage to the external anticorrosion coating.

The performance and durability of different sacrificial anode alloys in Baltic Sea environmental conditions has been evaluated with dedicated tests for the construction of Nord Stream line 1 and line 2. The tests showed that the salinity of seawater has a major effect on the electrochemical behaviour of aluminium alloys. In the light of the test results zinc alloy is foreseen for such sections of the pipeline route with very low average salinity. For all other sections indium-activated aluminium will be used.

Valves

The selection of 48 ” in-line valves for isolation and emergency shut-down service, which are located onshore at both ends of the pipelines at LFFG and LFFR, was during the Nord Stream line 1 and line 2 project done with special attention to achieve high levels of safety, reliability and availability. The functional, technical and safety requirements to 48 ” in-line valves for the Project are hence the same as they were for line 1 and line 2. Other smaller valves include upstream and downstream pipe work.

5.5 Offshore Logistics

On 25 April 2012 Nord Stream AG announced the successful completion of its complex international logistics programme for the construction of line 1 and line 2. The award-winning logistics concept (2010 Logistics Award of the German Logistics Association) enabled the most efficient and environmentally sound way of supplying the around 200,000 segments of 24 tons concrete weight coated steel pipes to the pipe lay vessels in the Baltic Sea (Figure 9).

A key feature of Nord Stream's impact-minimised logistics concept was the creation and use of a network of five strategically located logistics sites in Germany, Sweden and Finland. The deployment of these strategically located sites reduced the maximum distance between the marshalling yards and the pipeline route to 100 nautical miles. This would enable the pipe carrier vessels to make their trips to and from the lay vessels always within one day.

In order to achieve a safe and smooth supply chain the Project plans on using two concrete weight coating (CWC) plants and five marshalling yards.

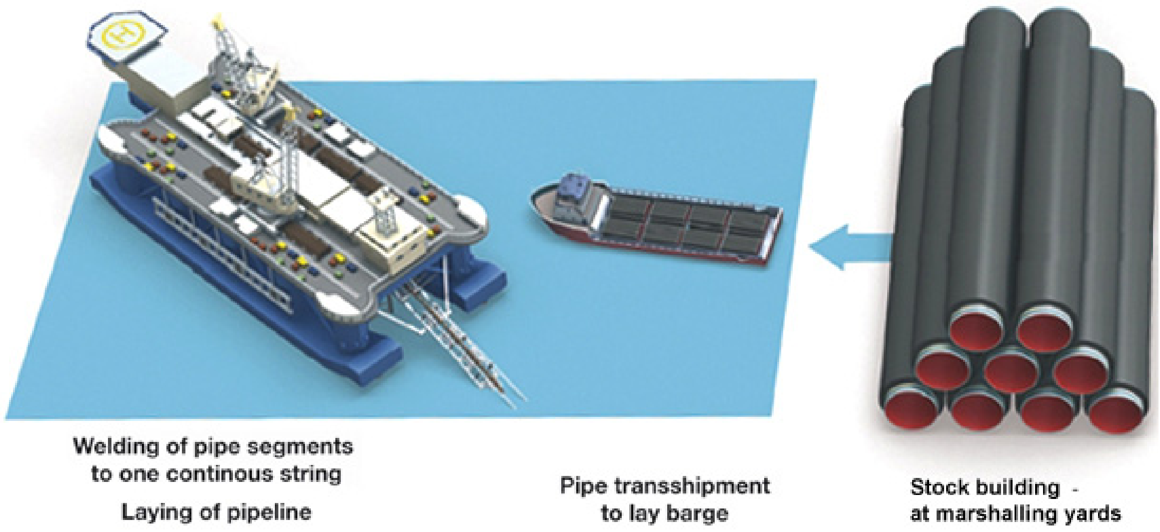

Figure 9: Pipe transshipment to lay barge

5.6 Construction activities

Construction methods and construction philosophy will generally be similar to those of the Nord Stream line 1 and line 2. Project pipeline scenarios were defined and have been analysed for typical offshore pipe lay vessels. The different route options all have a water depth of less than 200 m (see Figure 10) and the Project's pipelines can be safely laid in these water depths.

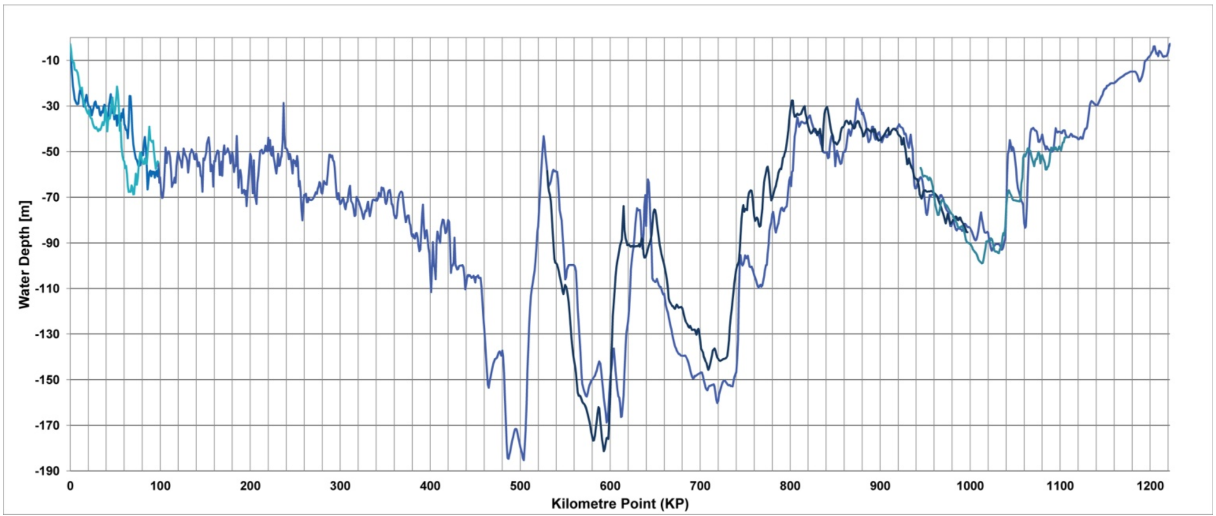

Figure 10: Water depths (WD) per Kilometre Point (KP) along the main route corridor options

Pre-laying activities, rock placement

A total of around 2,500 km of pipeline (around 1,250 km for each of the new twin pipelines) will be laid on the seabed during the construction phase.

In order to prepare the seabed for pipelaying, the entire route will be surveyed beforehand, and then gravel berms will be strategically placed in order to support the line in areas of high seabed relief, to serve as basement structures at tie-in areas and to fix the pipelines for stability reasons after pipe-laying. Rock placement activities include gravel works in which coarse gravel are placed by a fall-pipe (see Figure 11). It is aimed to minimise required gravel volumes by reducing the amount of gravel placed before pipe lay in order to maximise rock placement efficiency after pipe lay and based on actual pipeline survey information.

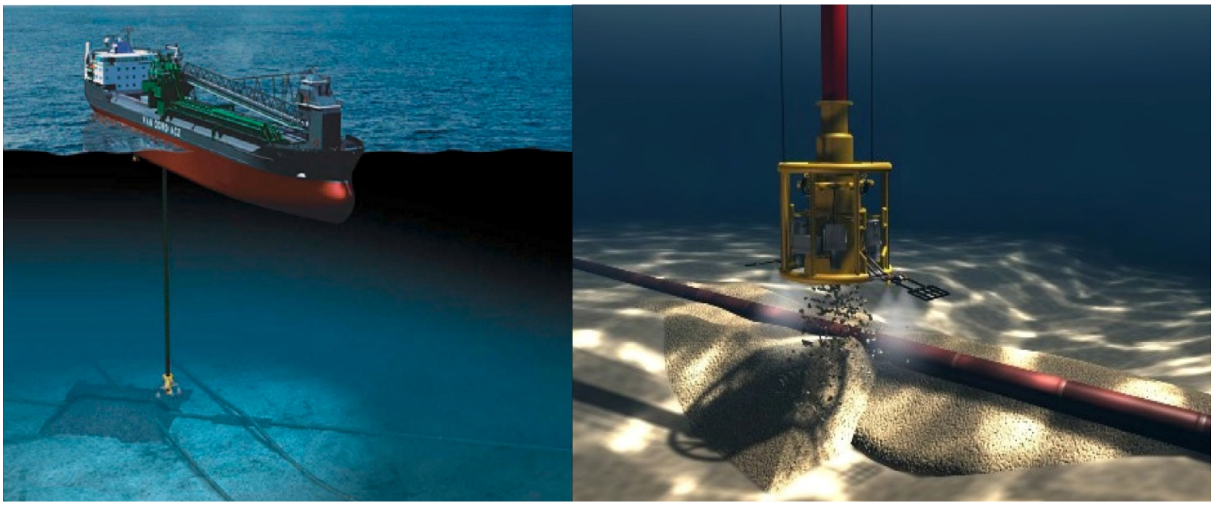

Figure 11: Rock placement on the seabed through a fall-pipe

Pipelay

Pipeline installation will be carried out by lay vessels adopting the conventional S-laying technique. This method is named after the profile of the pipe as it moves across the bow or stern of the lay vessel and onto the sea floor, which forms an elongated 'S' (see Figure 12). The individual line pipes will be delivered to the pipe lay vessel, where they will be assembled into a continuous pipeline and lowered to the seabed.

The process onboard the lay vessel comprises the following general steps, which take place in a continuous cycle: welding of pipe, non-destructive testing of welds, field joint protection against corrosion, laying on sea floor.

Both pipelines will be constructed in specific sections for subsequent interconnection. Abandonment and recovery operations involve the leaving and later retrieval of the pipeline somewhere along its route. Abandonment of the pipeline might become necessary, if weather conditions make positioning difficult or cause too much movement within the system.

The average lay rate is expected to be in the order of 2 km to 3 km per day, depending on weather conditions, water depth, and pipe wall thickness. It is considered to install the new pipelines using two vessel types, a dynamically positioned lay vessel for use in areas with the highest concentration of munitions on the seabed and anchored lay vessels (shallow water and deep water vessels). Whereas the standard anchored lay vessel is positioned and moved forward by a number of anchors placed at safe positions on the seabed, the dynamically positioned lay vessel is kept in position by propellers and thrusters that constantly counteract forces acting on the vessel from the pipeline, waves, currents and wind.

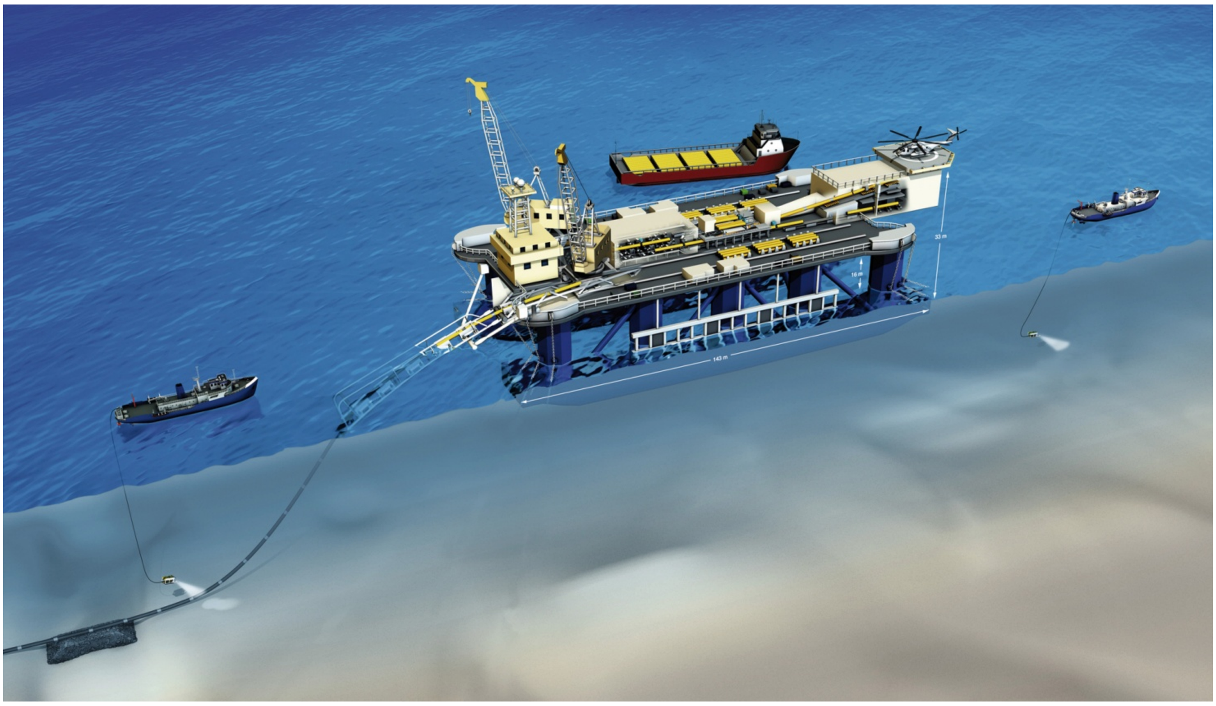

Figure 12: The S-lay pipe laying vessel and survey support vessels

Trenching

In certain shallow water areas it may be required to carry out pre-lay trenching activities and/or post-lay trenching activities in order to embed sections of the pipelines into the seabed. Where pre-lay trenching is required it is planned to be carried out by dredging (underwater excavation). For dredging activities various types of dredgers (mechanical equipment) can be deployed to remove marine sediments, such as backhoe dredgers, trailing suction hopper dredgers, bucket ladder dredgers and grab dredgers. Post-lay trenching allows the precise embedment of certain sections of the pipeline into the seabed after completion of pipelay. The pipelines are laid on the sea floor and subsequently trenched into the seabed to a required depth, using a plough pulled along by a tug boat and guided by the pipeline. The plough mechanically moves the material on the seabed, creating a V-shaped furrow, with the seabed sediment pushed up on either side of the trench.

Interconnecting the Pipeline Sections

As mentioned earlier, each of the Project's pipelines will be built in three sections with different wall thicknesses. Each section is designed for a different operation pressure due to the pressure drop along the pipeline during natural gas transport and will be laid and pressure-tested separately (see chapter 5.8 Pre-commissioning) before being interconnected. The sections can be connected under water, using so-called hyperbaric tie-ins (see Figure 13), to form the complete 1,250 km pipeline.

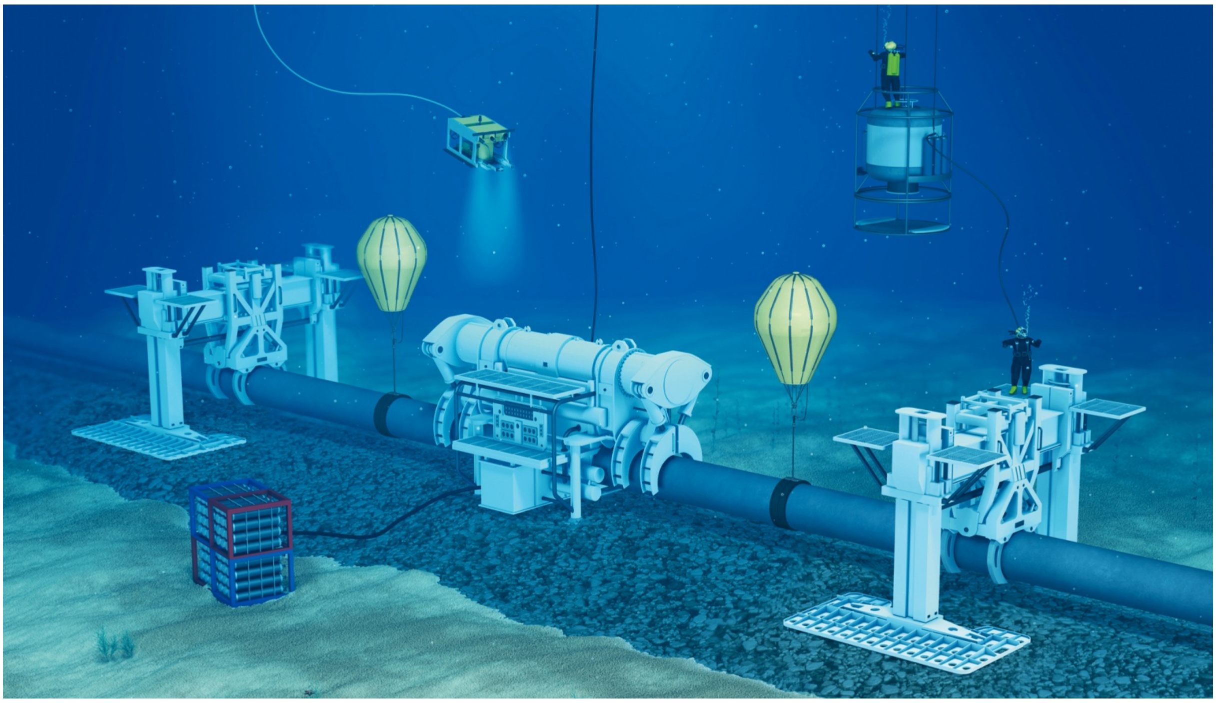

Figure 13: Hyperbaric tie-in setup

Hyperbaric tie-ins will be conducted on the seabed at the two locations where the pipeline wall thicknesses change. At both locations gravel berms will be installed on the seabed to provide stability for the tie-in operations. Once a section of the pipeline is installed, a lay down head is welded to the end of the pipeline before the pipe lay vessel lays it down. This head provides an air and water tight seal. At the tie-in locations the ends of the two respective pipeline sections overlap. Then, for hyperbaric welding they are aligned using large H-frames and cut back. An underwater habitat or "hyperbaric chamber" will be placed over the connection and the pipelines are welded together inside that habitat. The entire operation will be remotely controlled from a support vessel and assisted by divers. Once the tie-ins are finished, the habitat will be removed and a survey will confirm the correct position of the pipeline.

Crossings

The Project's pipeline route corridor options cross power and communication cables (existing and planned), the two existing Nord Stream pipelines and the future Baltic Pipe and Baltic Connector pipelines. As successfully done in the Nord Stream line 1 and line 2 project it is envisaged to develop specific crossing designs for each crossing, typically consisting of concrete mattresses and/or gravel, which will be agreed with the cable/pipeline owners. Since construction of line 1 and 2 the Nord Stream pipelines were already crossed by two new cables. In addition, crossing agreements with two more owners of future cables are already finalised and signed.

5.7 Management of Munitions Risks

To ensure a safe route for the Nord Stream Pipelines over 200,000 seabed targets were located during the side scan sonar surveys, of which over 30,000 were visually inspected by remotely operated vehicles. Over 320 mines and 70 other munitions were identified and over 100 conventional munitions required clearance. A no interaction approach was taken for chemical munitions, consequently the seven potential chemical munitions located in the Danish section were avoided.

The management of the risk posed though the presence of both conventional and chemical munitions on the environment, on safety during installation and the long term integrity of the pipeline(s) will be based on detailed surveys to assess the presence of munitions, expert evaluations of the munitions and modelling of potential impact. The approach will be based on the extensive experience and knowledge gained through the safe implementation of Nord Stream and technical developments in the detection, evaluation and handling of underwater munitions.

Whilst chemical munitions will be avoided, should clearance of conventional munitions be required then clearance methods will be considered in close cooperation with competent authorities during the engineering and the EIA phase to ensure the safe installation and long term integrity of the Project's pipelines.

5.8 Pre-commissioning

Pre-commissioning (pipeline testing) refers to the series of activities carried out before the introduction of natural gas into the pipelines. Pre-commissioning serves to confirm the mechanical integrity of the pipelines, and ensures that they are ready for safe operational use with natural gas. Generally, the main pre-commissioning activities are flooding, cleaning and gauging, pressure testing, dewatering, and drying.

5.9 Commissioning

After pre-commissioning the pipelines contain dry air. Nitrogen gas as inert buffer is then inserted into the pipelines immediately prior to natural gas-filling. This ensures that the inflowing natural gas will not be able to react with the atmospheric air and create unwanted mixtures inside the pipeline since the nitrogen gas is acting as a buffer between the atmospheric air and the natural gas. Commissioning will then proceed by filling the pipelines with natural gas from the connected facilities.

5.10 Operational aspects

The Project's pipelines will be designed for an operating life of at least 50 years analogous to the existing Nord Stream lines 1 and 2.

Operation of the new pipelines encompasses the integrated process of supervision and control of the natural gas transport infrastructure, and of inspection and maintenance of the assets and equipment. All gas transportation process activities involved to achieve reliable and safe operation will be managed and coordinated.

The Project's pipeline system will be remotely monitored and controlled from a Main Control Centre (MCC). The MCC will be equipped with video wall display and operator/engineering workstations and will be manned 24 hours per day, 365 days per year. Normal pipeline system operations are performed via the operator consoles. Additionally available consoles are used to perform technical tasks such as training, gas transportation simulations, data analysis, report generation, software upgrades, and database maintenance.

A Back-Up Control Centre (BUCC) will be installed in a different building than the MCC, to cope with the possibility of loss of the MCC, e.g. in case of a fire. The BUCC monitoring system and control systems are continuously updated in real time and in parallel with the MCC. This will guarantee that the BUCC can immediately take over the function of the MCC, if required.

The landfall facilities in Russia and Germany will have local emergency shutdown systems. The systems will be triggered in the case of facilities fire detection, facilities gas detection or pipeline leak detection.

5.11 Decommissioning (Abandonment)

The service period of the Project's pipelines system is planned to end in a minimum of 50 years after start of operations. Once the pipelines are reaching the end of their design life or economic life, potential shut down and associated activities will be agreed with the national authorities. Decommissioning will take place according to industry standards and national and international legislation at that point in time. The decommissioning programme will be developed in time, since regulations applicable at that time and technical know-how gained over the lifetime of the pipelines must be taken into account.

6 Regulatory context

6.1 The overall regulatory framework for pipelines in the Baltic Sea

The offshore route proposed for the Project passes through the territorial waters or EEZ of five Baltic Sea bordering states with landfalls in Russia and Germany.

The UN Convention on the Law of the Sea (UNCLOS) entitles all states to lay submarine cables and pipelines on the continental shelf of coastal states, the delineation being subject to the consent of such states. Hence, the Project developer is required to submit various national permit applications in order to obtain country-specific permits from the states through whose waters the new pipelines are planned to pass.

A comprehensive assessment of environmental impacts is a key element in the permitting process for the construction and operation of a major natural gas pipeline system. Countries in the EU are bound to follow the EU EIA Directive and the Espoo Convention, if applicable, whereas Russia has its own EIA legislation and has not yet ratified the Espoo Convention. Detailed environmental impact assessment procedures in the territorial waters and the exclusive economic zones of the Baltic Sea differ among the countries concerned, therefore the Project's environmental impact assessments have to follow the country-specific standards and respect the territorial boundaries. All Project activities and ancillary (or associated) activities shall be assessed in the national EIAs as required by the respective legislation. If any transboundary impacts are found in the assessments within the national EIAs, they will be summarised in the Espoo documentation.

In addition to presenting a state-of-the-art technical pipeline design, the Project developer has to demonstrate to the national authorities, the non-governmental organisations, and the public in all countries around the Baltic Sea that he is competent in the sustainable management of environmental and social aspects and risks which are associated with the implementation of the Project. All pipeline construction work and the future pipeline operation have to be carried out in an environmentally and socially responsible manner aiming at protecting the unique eco-system of the Baltic Sea. The environmental monitoring requirements for the Project vary geographically and temporally and have to be agreed with the national authorities.

Consent of the coastal states through whose territorial waters or EEZ the Project's pipelines will pass is based on various national laws, such as EIA Procedure Acts, Water Acts, EEZ Acts, Continental Shelf Acts and Energy Acts, which are specific for each individual country.

6.2 Proposed roadmap for the consultations under the Espoo Convention

The UNECE Convention on Environmental Impact Assessment in a Transboundary Context was adopted at Espoo in Finland on 25 February 1991 and entered into force on 10 September 1997. It is commonly called the Espoo Convention. In 2001, the Parties adopted an amendment to the Convention allowing non-UNECE member States to become Parties as well.

The Espoo Convention promotes international cooperation and participation of the public when the environmental impact of a planned activity is expected to cross a border. It sets out the rights and duties of countries in assessing the likely environmental impact of a proposed activity. It applies to activities that are likely to cause a significant adverse cross-border (transboundary) environmental impact, and it is aimed at preventing, mitigating and monitoring such potential impact. The Espoo Convention defines the country in which the proposed activity takes place as the "Party of origin" and the countries that are impacted as each an "affected Party".

The Espoo Convention has been incorporated into the EU EIA Directive 85/337/EEC (later Directive 2011/92/EU), which has been implemented into the national legislation of the EU Member States.

EIA in accordance with the national legislations as well as with the EU EIA Directive and the Espoo Convention is an interactive process during the permitting phase of the Project. A well harmonised national EIA and international Espoo procedure will be favourable to allow all stakeholders around the Baltic Sea to be involved and able to deliver their comments in a clear time period.

Therefore the Espoo procedure for the Project is proposed to run almost in parallel to all the national EIA procedures. A preliminary cross-check of country-specific EIA procedure timelines supplied evidence that a parallel Espoo procedure with synchronised public participation phases might be feasible.

Nord Stream proposes to prepare the documentation for the consultations under the Espoo Convention in English and to arrange for translation into the nine local languages of the Baltic Sea countries. The contents of the Espoo documentation and the entire timeline of the Espoo procedure will be agreed in detail with the national permitting authorities and the national Espoo focal points.

In accordance with the Espoo Convention, the proposed content of the documentation for the consultations under the Espoo Convention shall comprise:

- Description of the whole project and its purpose
- Non-technical summary and thematic maps
- Description of alternatives and the no-action alternative
- Description of environmental and social key issues covering the whole project area, such as sediment dispersion, munitions, fish and fishery, maritime safety and Natura 2000 areas
- Description of the cross-border environment likely to be significantly affected
- Description of the assessment of potential transboundary environmental impacts
- Description of mitigation measures to minimise possible transboundary and cumulative impacts
- Outline of transboundary monitoring and environmental management programme.

Transparency with focus on dialogue in the country specific language is key to Nord Stream's communication policy. During the public participation phases of the national EIA and permitting processes and in the Espoo consultations, the Project's Permitting Team offers to participate in optional public hearings in each Baltic Sea country. Project information for the public will be supported by materials in the nine languages of the Baltic Sea bordering countries.

An indicative timeline for the EIA and Espoo Consultation procedures, which will finally depend on the development of the Project and on authorities' decisions, is as follows:

- Joint notification of all affected Parties: end March 2013
- First public participation phase: April 2013 - May 2013
- Preparation of EIA and Espoo documentation: May 2013 - December 2014
- Second public participation phase: January 2015 - March 2015

7 Approach to the Environmental Impact Assessment (EIA)

Onshore and offshore environmental and social components associated with the Project are

- the physical and chemical environment comprising water column, seabed sediment, seabed morphology and atmosphere
- the biological environment comprising terrestrial and marine fauna and flora and nature conservation areas
- the social environment comprising fisheries, shipping and navigation, tourism and recreation, offshore industry, existing infrastructure, military operations, and dumped conventional and chemical munitions.

The types of planned Project activities with potential impact on these environments include seabed intervention works, munitions clearance, all other construction activities, vessel movements and anchoring, test water discharges, operation, and pipeline decommissioning. Unplanned events, though highly improbable, include fuel spills during construction, disturbance of dumped conventional and chemical munitions, and pipeline failure. Ancillary activities which could be assessed are pipe shipments from coating plants to marshalling yards, and rock transport from quarries to harbours and rock storage areas.

7.1 Environmental and Social Baseline Conditions

The Baltic Sea is divided into five main sub-regions: Baltic Proper, Gulf of Bothnia, Gulf of Finland, Gulf of Riga and the Belt Sea - Kattegat. The extension of the Nord Stream pipeline system concerns two of these sub-regions, the Gulf of Finland and the Baltic Proper.

The following baseline description of the existing situation provides information about the environmental, social and economic conditions in the project area. It focuses on relevant aspects that may be significantly affected by the construction and operation of an extension of the Nord Stream pipeline system. The aspects that were identified to be particularly sensitive to disturbance and/or may be subject to economic or protective value will be further investigated in the national EIAs for the proposed Project.

The description of the existing situation is based on:

- knowledge gained during the planning and construction of Nord Stream lines 1 and 2, including results from the geophysical and environmental surveys that have been carried out for lines 1 and 2
- environmental monitoring results derived from the environmental monitoring campaigns conducted before, during and after the construction of Nord Stream lines 1 and 2
- stakeholder information, contact with authorities, institutions, organisations and experts
- literature research and desk studies

7.1.1 Natural Environment

Seabed Geology, Sediments and Contaminants

During the planning of Nord Stream Lines 1 and 2, geological data was collated and evaluated. The results show that Southern Finland, the Baltic Sea, and surrounding regions (i.e., northern Germany, Poland, Lithuania, Latvia and Estonia) are almost aseismic.

The geology of the northern part of the Baltic Sea and the Gulf of Finland consists of numerous outcrops of crystalline bedrock. Sedimentary deposits between the outcrops typically consist of a top layer of very soft organic clay (gyttja) underlain by very soft clay. The Russian south coast of the Gulf of Finland is characterised by shallow waters, outcrops of rocks and sand banks.

South of the southern limit of crystalline bedrock, the seabed appears in general more regular. The typical sediments at the seabed in the deeper parts of the surveyed routes consist of very soft organic clay underlain by very soft clay with occasional outcrops of hard till. Exposed till becomes more common south of Gotland. In the more shallow parts, typically found in the German, Swedish and Danish waters of the southern Baltic, the seabed is dominated by sand deposits overlying hard till. Outcropping till is also encountered in these parts.

The seabed at the German landfall approach generally consists of sand deposits overlaying hard till that locally outcrops. The prevailing sandy sediments are generally several metres thick, otherwise till and a complex unit of coarse sediments is common at or near the surface.

Glacial deposits, dominated by glacial till, are found in the entire Baltic Sea area. When tills crop out on the sea floor or are covered by only a thin veneer of marine sediments, boulders and stones are often spread over the sea floor. In addition to the tills, sorted glacial deposits are also found, comprising mainly sand/gravel deposits. In the Eastern Gulf of Finland a special type of sediment in this region is represented by ferromanganese concretions.

The recent marine sediments typically consist of clay and mud with a high organic content. They retain a loose texture and are transported into deeper or sheltered areas. The distribution of sediments is governed by a number of factors, such as water depth, wave size, current pattern, position of halocline and supply and type of material.

Zones of erosion or non-deposition are found in areas exposed to wave- or current-induced water motion, whereas zones of sedimentation cover areas such as deep basins or sheltered areas. In the shallow areas along open coasts, currents and wave movements prevent suspended particles in the water mass from settling to the bottom. In these erosion zones the bedrock of the sea floor is mainly covered by coarser material such as sand, gravel, till or boulders, where it is not scoured entirely clean.

At somewhat greater depths fine-grained material will settle to the bottom. Severe storms may result in such powerful wave actions that material (down to 70 to 80 meter depths) are once again stirred up from the seabed. In such areas the sediment therefore moves repeatedly from place to place.

At greater depths, or at shallow water areas that are protected from powerful water movements, fine-grained material settles on the sea floor. In these accumulation zones the bottom has been covered by thick layers of clay and other fine-grained material. In the central basins of the Baltic Sea, the sediment layer is growing roughly 1 mm per year.

Every year large amounts of heavy metals, nutrients and other inorganic and organic chemical contaminants enter the Baltic Sea. Most of the contaminants have an anthropogenic origin and enter the marine environment via rivers, surface runoff, direct waste water discharges as well as atmospheric precipitation. The general distribution patterns of contaminants in the Baltic Sea are complex. Many of the contaminants are hydrophobic; i.e. they tend to adsorb to non-polar particulate matter and settle on the seabed. This is especially the case for fine-grained sediments rich in organic matter and clay minerals.

The concentrations of heavy metals (e.g. copper and mercury), organic contaminants (e.g. PCBs and DDT) and nutrients (nitrogen and phosphorous) vary markedly, depending on the local conditions, the sediment composition, the oxic-anoxic conditions etc.

Settled sediments and adsorbed contaminants may be subject to re-suspension caused by natural processes such as currents, waves and bio-perturbation or anthropogenic activities such as trawling. When sediments are re-suspended to the water column as a result of seabed intervention works and other construction activities, the majority of the contaminants adsorbed to the sediments will remain adsorbed, while a minor part might be released to the water column. Likewise, small amounts of contaminants dissolved in the water might be adsorbed to the suspended sediments and settle to the seabed together with these sediments.

Bathymetry, Hydrography and Water Quality

The Baltic Sea is a rather shallow inland sea divided by several sub-basins or deeps, which are separated by shallow areas. The mean depth of the Baltic Sea is approximately 56 m, and the total volume is approximately 20,900 km^3. The deepest parts, up to 459 m, are found in the Landsort Deep in Swedish waters. The deepest part of the Latvian EEZ is the Gotland Deep, with a maximum depth of 249 m.

Baltic Sea water is almost always stratified due to temperature and/or salinity. Saline inflows from the Kattegat to the Baltic Sea produce a distinct horizontal salinity gradient from high salinity to low salinity. The salinity of the surface water decreases from 15 to 25 practical salinity units (psu) in the Kattegat to almost 0 psu in the innermost Gulf of Finland. In general, salinity levels increase with depth. The boundary between these two water masses, known as the halocline, is a layer of water where salinity levels change rapidly. Salt water flowing in through the Öresund and the Belt Sea tends to flow close to the bottom into the Baltic Sea and therefore produces a permanent halocline, separating the surface water from the deep water in the basins.

Monitoring activities for line 1 of the Nord Stream pipeline system revealed for the first time that there are strong interleaved currents of saline water in the halocline in the Bornholm Basin (35 m – 55 m above the seabed) that might be due to inflow of new deep water. At the same time, the less saline surface water flows out of the Baltic. The formation of a strong halocline in the Baltic Sea prevents the mixing of surface and bottom waters. If substances like nutrients and pollutants are dissolved, they are likely to re-circulate to the bottom sediments.

A seasonal thermocline is common for the Baltic Proper, with an upper edge at 10 m – 30 m depending on location and time. During spring and summer, solar warming from above produces a warm layer of approximately 10 m – 25 m thickness, which is mixed by the wind and identical in temperature throughout its depth. Beneath this mixed surface layer, a thermocline develops. The thermocline can be very distinguished, and temperatures can drop 10 °C within a few metres. Because of the effect of temperature on density, this thermocline is very stable and effectively suppresses vertical exchange between the surface layer and the deeper layer.

Stratification prevents vertical mixing of water and thereby the transport of oxygen from the surface to the bottom. The basins of the Baltic Sea frequently experience anoxic events, and oxygenation is only possible through major saline inflows from the North Sea. Anoxic conditions lead to anaerobic processes. When bacteria degrade organic matter in anoxic conditions, hydrogen sulphide is formed.

The content of heavy metals and organic pollutants in the water column is in general low, as they normally attach to particles and organic matter in the bottom sediments.

Eutrophication is now a big threat to the Baltic Sea, especially in the Gulf of Finland. High nutrient concentrations stimulate algae growth, which increases the amount of organic matter that sinks to the sea bottom. This causes an increase in oxygen consumption and may subsequently cause oxygen deficits, which in severe cases leads to the death of benthic organisms.

Meteorology

Meteorological processes have a strong influence on the environmental conditions of the Baltic Sea. These processes influence the water temperature and ice conditions, the regional river runoff and the atmospheric deposition of pollutants on the sea surface. Moreover, they govern water exchange with the North Sea and the transport and mixing of water within the Baltic Sea.

The Baltic Sea is located within the west-wind zone, where low-pressure weather systems coming from the west or south-west dominate the weather scene. Winds of storm force, i.e. at least 25 m/s, occur mainly from September to March.

The ice conditions in the Baltic Sea show a high degree of variance in time and space and are strongly related to the severity of the winters. During the 1980s the ice coverage varied between 13 % - 98 %. In the northern regions the ice cover usually lasts for five to six months. In the southern part of the Baltic Sea, ice appears normally as drift ice that moves along with the currents and winds. Drift ice and deformed ice can easily get packed against each other or other obstacles, which can result in pack ice or in vast ice ridges. In particular in the eastern Gulf of Finland coastal sections are subjected to ice impact and abrasion.

Benthic Flora and Fauna

The specific hydrographic, chemical and physical conditions and the geological history of the Baltic Sea largely determine the composition of species in the sea. Because the Baltic Sea is geologically very young, a very limited brackish-water flora and fauna has developed.

Oxygen concentrations in the bottom water are of primary importance to invertebrates close to or in the seabed. Oxygen concentration below 2 mg/l is critical for most benthic fauna and may lead to anoxic conditions. Under anoxic conditions the seabed may become lifeless, as decomposition can release hydrogen sulphide, which is toxic to almost every life form. In the western Baltic Sea and in the Gulf of Finland, oxygen depletion is a seasonal phenomenon, while in the deeper basins of the Baltic Proper it is of a permanent nature. Consequently, large parts of the seabed are without benthic fauna.

Macrobenthic communities are severely degraded throughout the open sea areas of the Baltic Proper and the Gulf of Finland at present as a result of oxygen deficits, in places even anoxia, in the sediment-water interface. In an unstable environment, where living conditions may change rapidly and without any concise pattern, macrozoobenthos species have a big challenge to colonise the seabed. Under such circumstances, it is difficult for consistent communities to develop and therefore benthic flora and fauna are characterised by a small number of species, dominating the substratum. Several species living in the Baltic Sea are at the periphery of their range, and where species exist close to the limits of what they can tolerate, e.g. with respect to salinity, they may be particularly sensitive to other stress factors and disturbances.

Because the survival of benthic flora depends on light, the maximum depth where benthic flora can be found in the Baltic Sea is approximately 35 m; beyond this depth, microalgae are completely absent. This means that potential impacts on benthic flora are limited to the landfall areas and offshore banks with shallow water depths, all in all less than 20 % of the planned pipeline route.

Fish

The Baltic Sea hosts approximately 70 species of saltwater fish and another 30 to 40 species of brackish or freshwater fish, all of which inhabit the central regions of the Baltic Sea and the coastal areas. Cod (*Gadus morhua*), herring (*Clupea harengus*) and sprat (*Sprattus sprattus*) dominate the fish community both in term of numbers and biomass. These three species are also most important from a commercial perspective, accounting for approximately 95 % of the fish catch in the Baltic Sea.

Birds

In the Baltic Marine Area there are many highly important staging areas for sea birds, and more than 30 species breed along the shores. The shallower areas (< 30 m) are particularly important, as the birds feed on benthic organisms. The deeper offshore parts of the Baltic Sea are generally used by a pelagic group of species, such as razorbill (*Alca torda*), guillemot (*Uria aalge*), herring gull (*Larus argentatus*), mew gull (*Larus canus*) and great black-backed gull (*Larus marinus*).

The Baltic Sea is important for wintering birds,for breeding sea birds and sea ducks. Of special importance are the wintering birds at Hoburgs Bank, Norra Midsjöbanken and Södra Midsjöbanken, which constitute some of the largest offshore bank systems in the Baltic Sea. The banks are also important to black guillemots (*Cepphus grylle*) during winter. Common eider (*Somateria mollissima)* are also present at Hoburgs Bank but occur closer to the coast. Another important wintering area in the Baltic is located on the German coast outside the Oder delta, but other staging areas can be found in Kattegat, southern Gotland and Bay of Riga.

The Baltic Sea is an important migration route, especially for waterfowl, geese and waders nesting in the Arctic tundra. Every spring, immense numbers of birds move northwards along the Baltic Sea coastline to their nesting grounds. The archipelago of the eastern Gulf of Finland is very rich in breeding and migrating seabird species. Some 200 bird species (migrants and breeders) can be frequently observed along the shores of the Gulf of Finland. There are about 30 to 40 species of seabirds (ducks, geese, waders, gulls and divers) that are common breeders or migrants.

Marine Mammals

Four marine mammal species – the harbour porpoise (*Phocoena phocoena*), the harbour seal (*Phoca vitulina*), the grey seal *(Halichoerus grypus macrorynchus*) and the ringed seal (*Phoca hispida*) – are native to the Baltic Sea and are all protected species. Harbour porpoises and harbour seals are found primarily in the southernmost parts of the Baltic Sea. Grey seals occur all year throughout the Baltic Sea, but only in small numbers in the southern region. Ringed seals are found in areas that typically have ice cover during winter, mostly in the Gulf of Bothnia and the Gulf of Riga; small populations are also observed in the Archipelago Sea and the eastern (Russian) parts of the Gulf of Finland.

The harbour porpoise is the only cetacean species resident in the Baltic Sea. The Baltic population of harbour porpoise is listed as critically endangered on the World Conservation Union (IUCN) Red List of Threatened Animals. The largest threat to the species is commercial fishing, as harbour porpoises tend to get caught in trawling nets, especially bottom and drift nets. Other threats include pollution, shipping traffic and loss of suitable habitat.

The Baltic Sea population of ringed seal is listed on the IUCN Red List of Threatened Animals. Reproductive failure caused by high levels of organochlorine (that is DDT, PCBs and HCB) and eutrophication are threats facing the ringed seal in the Baltic Sea.

The harbour seal is also listed on the IUCN Red List of Threatened Animals. Harbour seals tend to stay within 25 kilometres off the shore, but individuals are occasionally found 100 kilometres or more offshore. They primarily dwell on undisturbed islets and sandy beaches.

The Baltic population of the grey seal is listed on the IUCN Red List of Threatened Animals. Grey seals live in packs. Most of the grey seals are distributed throughout the Baltic Sea between May and June when mating takes place. Birthing mostly takes place on pack ice between February and March. During the breeding season they tend to leave their shoreline haul outs for drift ice.

Protected Areas

As one of the worlds' largest areas of brackish water, the Baltic Sea holds a unique combination of marine and freshwater habitats and species adapted to brackish conditions. A network of nature conservation areas for both marine and coastal biotopes has been established in order to contribute to the protection of the many sensitive habitats and species of the Baltic Sea ecosystem . In 2004 the Baltic Sea as a whole was classified as a Particularly Sensitive Sea Area (PSSA) by the UN International Maritime Organisation (IMO).

Natura 2000 areas have been designated by the countries around the Baltic Sea that are members of the European Union. Natura 2000 is a network of protected areas in the European Union covering fragile and valuable natural habitats and species of particular importance for the conservation of biological diversity. The network includes Special Areas of Conservation (SAC) based on the EU Habitats Directive (1992) and Special Protection Areas (SPA) under the EU Birds Directive (1979). Sites of Community Interest (SCI) are areas proposed by a member state to the European Commission to be included in the Natura 2000 network.

Other areas under special protection are Baltic Sea Protected Areas (BSPA) defined by HELCOM (Helsinki Commission, Baltic Marine Environment Protection Commission) in 1994, national parks aimed to protect the most valuable areas, UNESCO (United Nations Educational, Scientific and Cultural Organisation's) areas, Ramsar sites for the conservation and wise use of wetlands and their resources, Important Bird Areas (IBAs) and sanctuaries (see Figure 14). Due to the importance of the Baltic Sea for breeding birds and wintering birds, the selection of Important Bird Areas (IBAs) has been an effective way of identifying conservation priorities. IBAs are key sites for conservation – small enough to be conserved in their entirety and often already part of a protected area network.

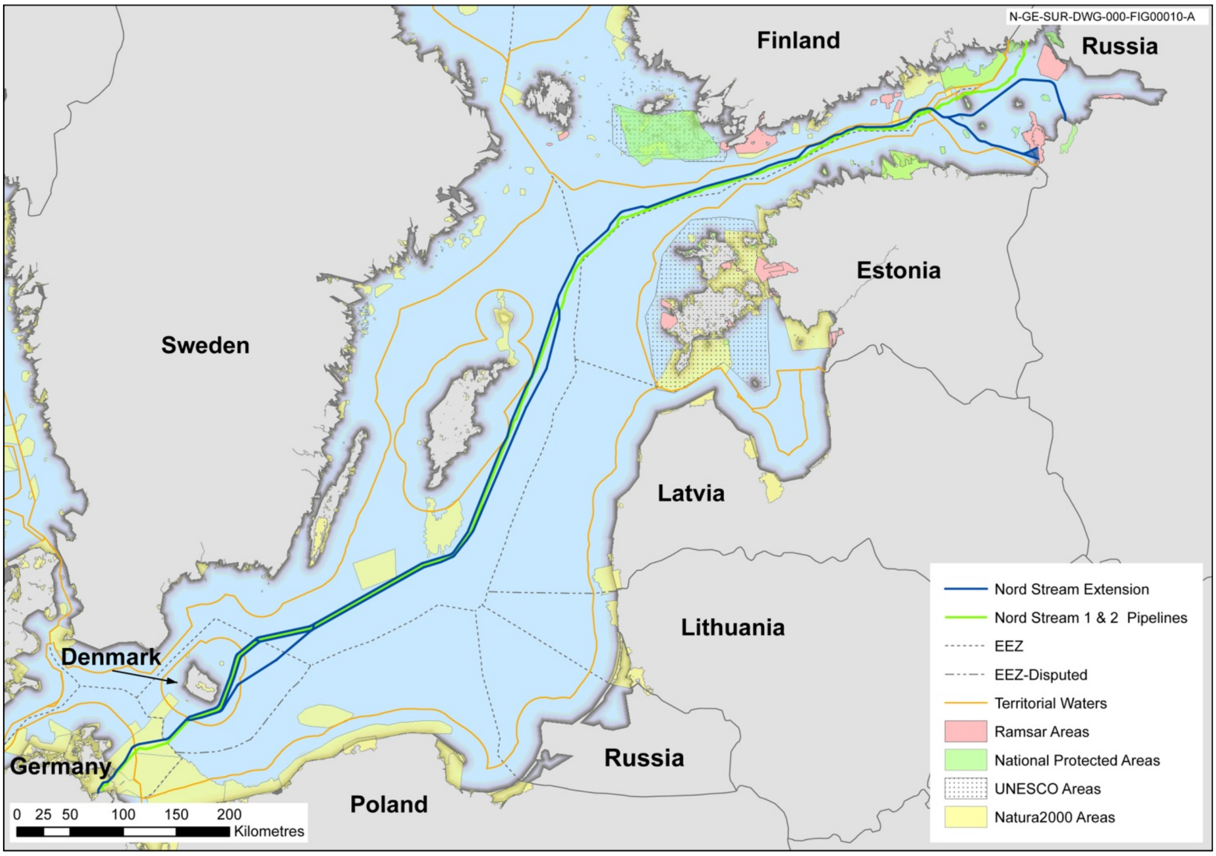

Figure 14: Overview on protected areas in the Baltic Sea (areas indicated as Ramsar may also be Natura 2000 areas or national protected areas)

The majority of the protected areas are located in coastal waters and usually form a natural seaward extension of the land site, while the number of offshore protected areas is very small.

The Gulf of Finland is a unique water ecosystem and has distinctive features such as shallow waters, low salinity and abundance of islands. The habitats of the Gulf of Finland host many vulnerable species that are in the IUCN Red List and valuable habitats. Several protected areas are located in the Gulf of Finland and the Archipelago Sea. The protection status of the areas varies: some of them are established by national legislation, some by international conventions or directives and some by international or national programmes.

Several route corridor options are located in the vicinity of protected areas. Corridor options in German waters and in Russian waters might cross protected areas. The compatibility of the Project with the conservation objectives of the respective protected areas will be thoroughly assessed by the Project developer.

7.1.2 Social and Economic Environment

Dumping Sites for Conventional and Chemical Munitions

Munitions continue to represent a hazard in the Baltic Sea region. In particular, mine-laying in the Baltic Sea area was extensive during World War II. The estimated number of mines laid in the Baltic Sea varies between 100,000 and 150,000. Of these, 35,000 to 50,000 mines were swept and have been accounted for. The largest quantity of mines is located in the Gulf of Finland, but there are also several mine threat areas in Sweden and Latvia (see Figure 15). One recent finding is the Wartburg minefields, which were established to block ship traffic from the southern part of Öland to the Latvian and Lithuanian coast.

After World War II, the allied forces dumped chemical munitions found in Germany in the Baltic Marine Area. HELCOM concluded that approximately 40,000 tonnes of chemical munitions, containing approximately 13,000 tonnes of chemical warfare agents (CWA), were dumped in the Baltic Sea. It is estimated that 1,000 tonnes of the total chemical warfare agents were dumped at the dumping site south-east of Gotland.

In preparation for the construction and operation of Nord Stream lines 1 and 2 Nord Stream AG fostered an exchange of information about munitions within various fields of expertise. Munitions screening surveys had been performed to establish the locations of potentially unexploded munitions and or chemical warfare agents (CWA) that could constitute a danger for the pipeline or the environment during the installation works and the operational life of the pipeline system. The Project plans to arrange for equivalent surveys to identify the pipeline routing that would avoid munitions wherever possible or to prepare for alternative methods for dealing with any finds.

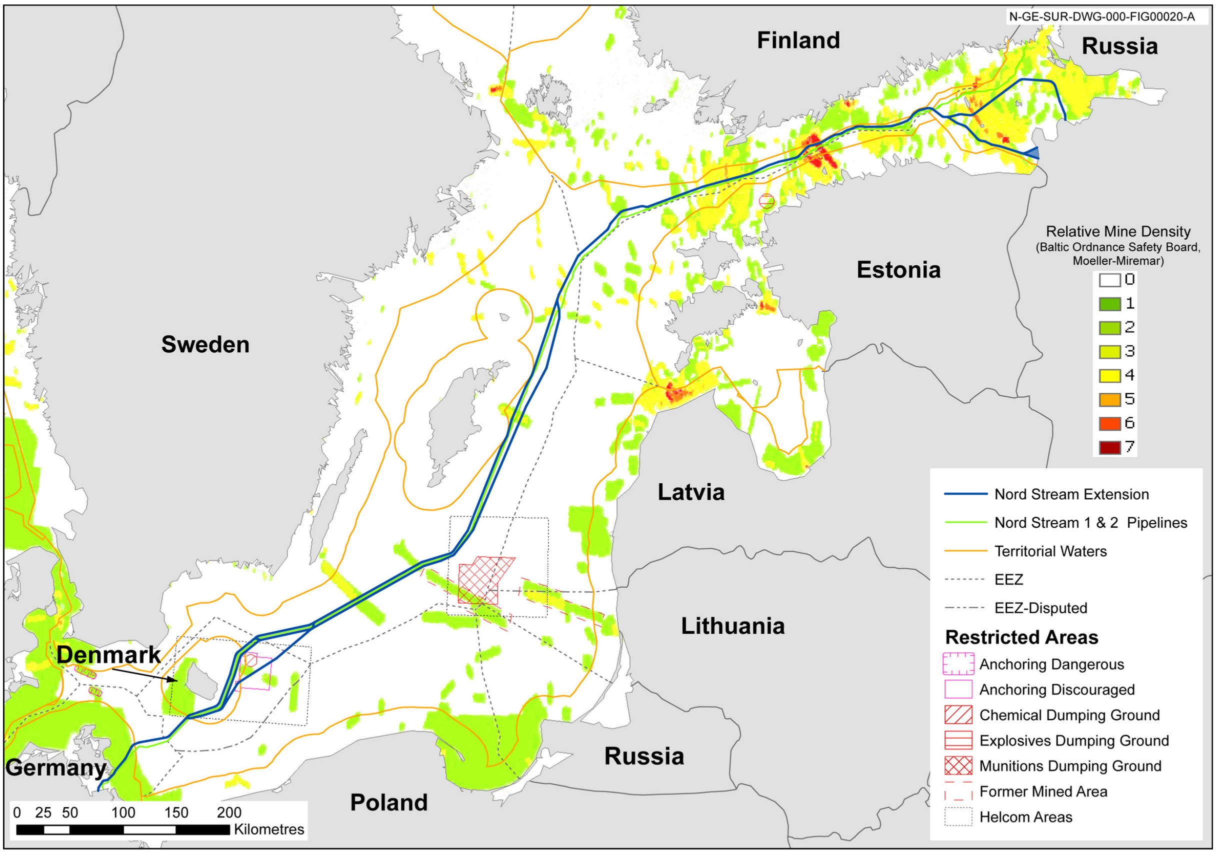

Figure 15: Chemical and conventional munitions areas in the Baltic Sea

Shipping and Shipping Routes

The Baltic Sea is one of the busiest seas in the world, connecting surrounding nations through the constant movement of commercial vessels, passenger ferries and leisure boats. Cargo vessels tend to dominate the ship traffic, followed by tankers and passenger ferries. There is little variation in intensity of commercial shipping traffic throughout the year, although passenger ferries are known to be more frequent during the summer months of late May to September.

The main international shipping route in the Baltic Sea runs the length of the Baltic Sea from the Arkona Basin to the Gulf of Finland. Traffic numbers and composition vary along the route, with annual total movements of 53,000 ships north of Bornholm and 17,000 ships in the east of the Gulf of Finland (see Figure 16).

Ship traffic in the middle of the Gulf of Finland is dominated by the main shipping routes where various cargo and oil are transported to/from Russian ports. The smaller ships travel along the coastal and near shore routes.

The main east / west shipping route is crossed by a north/south shipping route between Helsinki and Tallinn. This north-south route is mainly used by passenger ferries.

In January 2011 the traffic separation schemes in the Gulf of Finland were modified, and a new traffic flow arrangement was brought into force to accommodate traffic joining east/west shipping routes in the area between Helsinki and Tallinn.

The major deep water international shipping route off Gotland is mainly used by tankers and passes through the exclusive economic zones (EEZ) of Denmark, Sweden, Latvia, Finland and Estonia. This route is recommended for all vessels with a draught exceeding 12 m passing east and south of Gotland on their way to or from the north-eastern Baltic Sea.

The intense shipping activities represent a growing navigational safety risk and result in environmental effects such as pollution of the air (e.g. nitrogen oxides (NOx) emissions), discharges of oils and other hazardous substances, discharge of wastes and sewage, introduction of hazardous substances into the sea with serious toxic effects on marine life as well as the introduction of invasive alien species via ships' ballast water or hulls.

To improve the safety of navigation, various measures have been adopted: the launch of the HELCOM Automatic Identification System (AIS) in 2005, implementation of traffic separation schemes and ship reporting systems. These have had a positive effect on the safety of navigation and may have contributed to the reduced number of collisions over the recent years, especially in the Gulf of Finland.

Estonia, Finland and Russia have implemented the mandatory Gulf of Finland Reporting system (GOFREP) to improve navigational safety thereby increasing the protection of the marine environment and to monitor compliance with the International Regulations for Preventing Collisions at Sea (COLREGs).

Experience from Nord Stream lines 1 and 2 demonstrates that construction of pipelines in the vicinity of shipping lanes can be undertaken safely and without significant disruption to third party shipping through authority consultation and the application of appropriate mitigation measures in line with international and regional protocols.

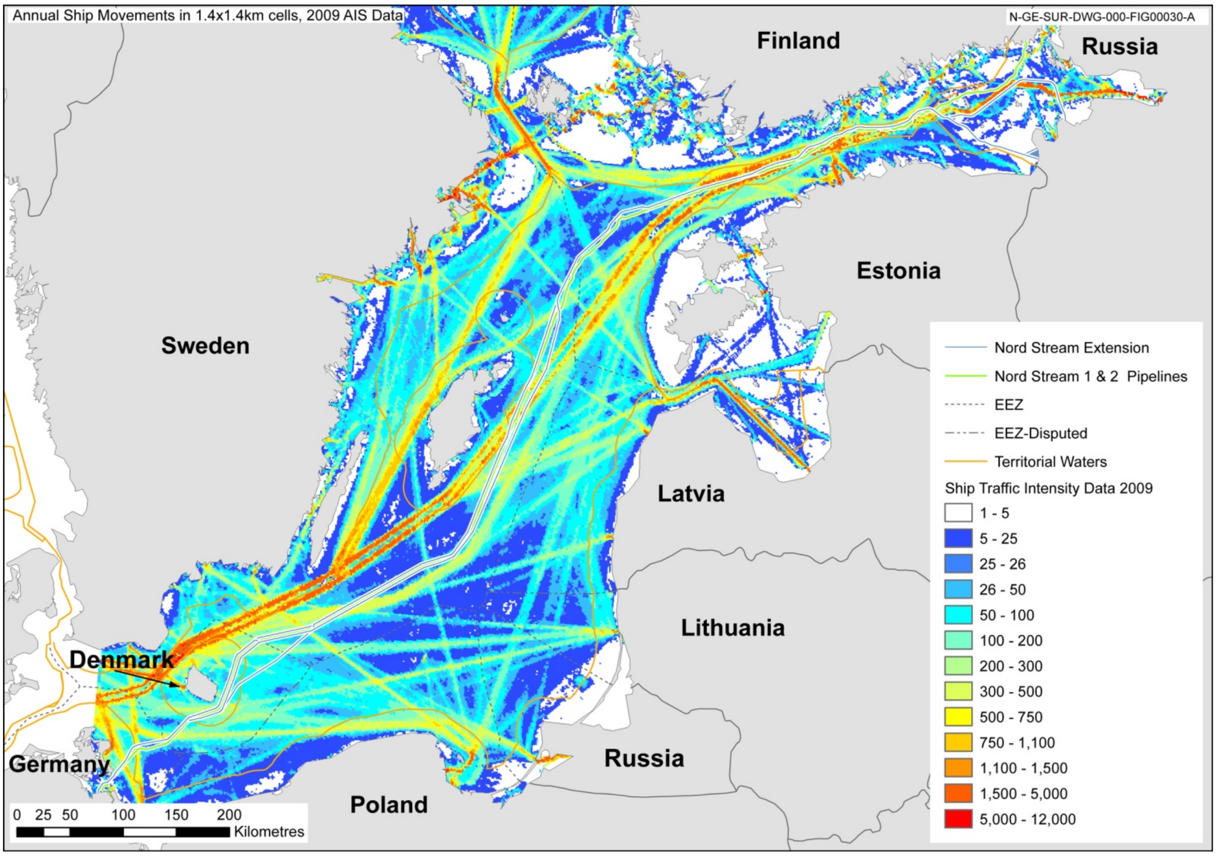

Figure 16: Primary ship travel routes

Fisheries

The fishery industry is shaped by a number of factors including the species caught, fluctuations in stock size, seabed morphology, demographic patterns, technological innovations and the management regime.

Due to the brackish environment, the fish fauna is characterised by low species diversity with the dominant species being Cod (*Gadus morhua*), Herring (*Clupea harengus*), Sprat (*Sprattus sprattus*) and Salmon (*Salmo salar*). Other commercially exploited species, mainly in the coastal areas are Eel (*Anguilla Anguilla*), Sea trout (*Salmo trutta*), flounder (*Plathichthys flesus*), Pike (*Esox lucius*), Pike-perch (*Stizostedion lucioperca*), Perch (*Perca fluviatilis*), Smelt (*Osmerus eperlanus*), Blue mussels (*Mytilus edulis*), Whitefish (*Coregonus lavaretus*) and shrimp (*Crangon crangon*).

Different types of fishing gear are used in the Baltic. The main types of gear deployed are demersal and pelagic trawls, gill nets, pound nets and to a lesser extent Danish seine and long line fishing.

Pelagic trawls are used mainly to capture herring and sprat, and bottom trawls are used for cod and flatfish. The intensity of trawling varies from area to area. The area around Bornholm is by far the most important bottom trawling area attracting fishermen from nearly all of the countries around the Baltic. During the Nord Stream permitting process for lines 1 and 2 Danish fishermen listed a number of hotspots – in particular on the ridges around Bornholm – of special importance for fisheries. This area is particularly important in terms of cod. Other important areas comprise the area southeast of Gotland and to a lesser extent the area at the mouth of the Gulf of Finland, although this area tends to be fished by pelagic trawlers targeting herring and sprat.

Fishing in most parts of the Baltic Sea is subject to an international management regime that aims to secure sustainable utilisation of fish and other aquatic species. In order to protect the Baltic fish stocks, specific additional management measures have been taken such as closing of certain areas to all fishing between 1 May and 31 October.

Experience from numerous offshore pipelines in the North Sea and with the Nord Stream lines 1 and 2 demonstrate that fishery and offshore pipelines can co-exist safely. Nord Stream AG supported the development of a special trawl board that facilitates trawling across pipelines on the seabed. Feedback from commercial fisheries documents that the presence of the Nord Stream pipelines does not impact their work. During construction, however, fishing activity was temporarily suspended in a safety zone around the pipe-lay barge and support vessels.

Cultural Heritage

Cultural heritage can be defined as the record of past and present human activity – in the context of this Project with a focus on maritime cultural environments and of historically important sites. The maritime cultural heritage in the Baltic Sea primarily consists of two broad categories of underwater sites: shipwrecks and submerged settlements/landscapes.

Shipwreck sites reflect a diverse group of vessels that vary in age, size and type. Due to physical conditions in the Baltic Sea (low salt content, low species diversity, relatively low temperatures, low oxygen content, etc.) the decomposition of organic materials progresses slowly. Consequently the preservation of organic materials is exceptional, even on an international scale. The preservation value and scientific potential of underwater cultural remains are therefore great. A large number of ship wrecks in the Baltic Sea are registered in wreck databases. Route survey information along the pipeline route corridor options will be compared with desk studies of all accessible wreck databases in order to get a total overview of ship wrecks near the pipeline.

In particular the area around the Russian landfall options has many military monuments and “places of memory” related to World War II.

Since the last glaciation, the Baltic Sea has undergone major environmental changes. Global warming at the end of the last glacial period led to rising sea levels, which, combined with isostatic upheaval of land masses, caused significant changes in the coastline of the Baltic.

The changes were neither uniform nor constant. Changing sea levels caused some former land areas to be submerged (particularly in the southern part of the Baltic Sea), also submerging human settlements, monuments and the landscapes around them. Within the Baltic Sea it is not likely that submerged settlements are present at latitudes north of approximately 55.5 °N – 56 °N as the Littorina Sea, a marine basin that existed in the Post-Ice Age (about 7,000–7,500 years ago), covered the area of what is now the Baltic Sea.

Long-Term Environmental Monitoring Sites

The Helsinki Commission (HELCOM) works to protect the marine environment of the Baltic Sea from all sources of pollution through intergovernmental cooperation. HELCOM promotes marine environment monitoring as an effective way to assess the present situation and future trends, identify threats to the marine environment and to control the effectiveness of adopted measures.

Monitoring is a well established function of the Helsinki Convention. Monitoring of inputs of nutrients and hazardous substances started in 1998. Monitoring of physical, chemical and biological variables of the open sea started in 1979, and monitoring of radioactive substances in the Baltic Sea started in 1984. Long-term sampling sites are installed throughout the Baltic Sea and represent as such important scientific heritage.

The COMBINE programme quantifies the impacts of nutrients and hazardous substances in the marine environment, also examining trends in the various compartments of the marine environment (water, biota, sediment). COMBINE monitoring data can be downloaded from ICES Oceanographic database.

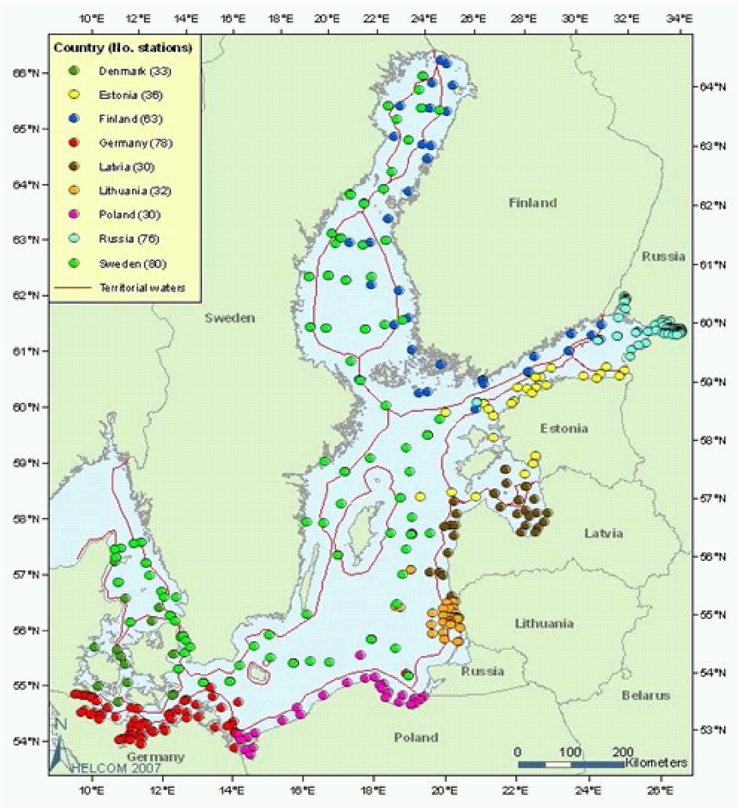

Figure 17: HELCOM COMBINE monitoring sites in the Baltic Sea

Tourism, Recreation and People

Along the Baltic coast tourism is one of the most important economic factors. Tourism in the Baltic Sea Region has expanded rapidly and the desire to experience nature and the cultural heritage means that tourism will experience further growth in years to come.

The last Vision and Strategies around the Baltic Sea 2010 report, VASAB2010 Plus, recognises that it is of great importance to tourism that development and protection are closely linked together. Coastal areas play an important role in the Baltic Sea Region, with a concentration of human activities – cities, ports, industry, agriculture, tourism – and of sensitive natural features – wetlands, erosive shores, archipelagos. Seaside activities have an influence on coastal zones, including shipping, mining, bathing, fishing and military use. Coastal areas are mentioned to face the challenge of

- Balancing ecological, social and economical goals for development of the coastal zones, including areas of different nature sensitivity and of intensive human activities; and

- Achieving integration between land and sea-side developments.

Tourists in the region are domestic or from neighbouring countries. Tourism is highly concentrated, e.g. on the German coast or on Bornholm. Leisure tourism is highly seasonal, concentrated to the holiday season during summer and comprises sailing, bathing, visiting historical and archaeological sites etc. In summer, the islands and archipelagos attract many sailing boats.

The southern coast of the Gulf of Finland has recreational potential; however the development of tourism and the recreation industry in particular in the rural areas of the Leningrad region is limited by the lack of infrastructure.

In recent years, most countries around the Baltic Sea have reported a significant improvement in hygienic conditions along their coasts. However, in many sheltered, nutrient-enriched coastal waters which are plentiful in the Baltic Sea, intensive phytoplankton blooms and floating algae mats decomposing at the beaches might affect bathing water quality.

Construction of Nord Stream lines 1 and 2 influenced the human environment only temporarily and in particular in the landfall areas. Limited influence was primarily attributable to construction-related visual factors, noise and additional work force in the region.

Existing and Planned Infrastructure and Areas Used by Military

In the process of planning and construction of lines 1 and 2 Nord Stream AG gained valuable knowledge concerning existing and planned infrastructure (such as cables, pipelines, material extraction sites) in the Baltic Sea as well as on restricted areas (military practice areas and exclusion zones).

The countries at the Baltic Sea have various types of offshore military practice areas at sea and they are classified according to their use:

- Firing danger areas, i.e. permanent or temporary ranges, including bombing, torpedo and missile ranges
- Mine laying practice (and counter-measures) areas
- Submarine exercise areas
- Air force exercise
- Other exercise areas (unclassified).

Military practice areas may be restricted with regards to navigation and other rights. Permanent restriction of access to areas used for military purposes may be applied by countries within their territorial waters

7.2 Results and Conclusions from the Monitoring Activities for Nord Stream Lines 1 and 2

Nord Stream's comprehensive environmental and social monitoring established for Nord Stream Pipelines 1 and 2 includes monitoring before, during and after construction of the Nord Stream Pipelines. The five tailored national monitoring programmes were prepared in agreement with relevant national authorities. They are focused on environmentally sensitive areas and receptors that potentially could be affected by the construction and operation of the Nord Stream pipeline system. Because these sensitive areas and receptors differ geographically, not all parameters are monitored in all countries. In summary, certain investigations are carried out at selected sites, depending on environmental variations and the nature of the construction works.

The results of the various monitoring campaigns undertaken during the preparatory activities, during construction activities of the two pipelines and during their early operation phase were regularly issued to and approved by the respective national authorities.

The monitoring results reflect the effectiveness of the impact minimisation measures implemented into project design and project implementation. The following sections summarise the monitoring findings as of around mid 2012, highlighting the subjects that would be of transboundary concern (see Table 1).

It can be concluded that Nord Stream's pipeline construction activities did not cause any unforeseen environmental impact in the Baltic Sea. Based on the monitoring results after completion of construction and one year of operation, construction of Nord Stream Pipelines 1 and 2 resulted in insignificant, at maximum minor transboundary impacts.

Table 1: Overview of monitoring activities for subjects of transboundary concern

Subject	Russia	Finland	Sweden	Denmark	Germany
Physical and chemical environment					
Water quality	○	○	○	○	○
Seabed sediment	○	○	○	○	○
Hydrography and seabed topography	○	○	○	○	○
Noise and pressure waves	○	○	○		○
Biological environment					
Fish	○		○	○	○
Birds	○	○	○		○
Marine mammals	○	○	○		○
Benthic flora and fauna	○	○	○	○	○
Socioeconomic environment					
Cultural heritage	○	○	○	○	○
Fisheries	○	○	○	○	○

Monitoring-based impact assessment: ○ insignificant to minor

Water Quality – Monitoring Results

Natural variability

Monitoring of natural variability of the water quality was conducted in Finland. Monitoring of long-term water quality was carried out at two monitoring stations situated close to a Natura 2000 area.

Monitoring at these stations was performed with ADCPs (Acoustic Doppler Current Profilers) with turbidity sensor, water sampling (for analysis of turbidity, suspended solids, oxygen concentration, metals, total phosphorous and phosphate phosphorus as well as nitrate/nitrite and ammonium nitrogen) and CTD (conductivity, temperature, depth) profilers.

Monitoring commenced in autumn 2009, before the start of munitions clearance activities, and continued until the end of the construction period in 2012.

Measures of temperature, salinity and oxygen values only showed natural caused variation within and between the two sites and over the years 2010 and 2011. In general, the turbidity remained low at both stations. Notably, some turbidity peaks in the lowermost water layer related to natural causes (strong winds) were higher than the turbidity peaks measured at one berm construction site during rock placement in spring 2011.

Dredging

Monitoring of water quality in Germany and Russia was carried out to ensure compliance with turbidity thresholds during seabed intervention works and to verify the predicted low impact of construction activities.

Monitoring in Germany included continuous measurements of turbidity around the project area in the Greifswalder Bodden and in the western Pomeranian Bight during dredging. Turbidity values expressed as suspended solids per litre (mg SS/l) that exceeded the 24-hour threshold value of 50 mg SS/l above the background (level at a distance of 500 m to the construction site) were only recorded twice throughout the monitoring period. Peak turbidity values were in the order of 60 mg SS/l, which was well below the three-hour threshold value of 100 mg SS/l. The increased turbidity values as a result of seabed intervention works corresponded well with the results of the numerical modelling for the German EIA, and it was concluded that no impacts on the pelagic environment occurred.

Monitoring in Russian waters during dredging showed no negative effect on water quality from Nord Stream's construction activities. All water samples from Portovaya Bay and from the deep-water area showed that levels of suspended solids were well below the maximum allowable concentrations (MAC). Satellite imagery revealed that levels of re-suspended sediment in the Russian section of the pipeline route did not exceed the thresholds. It was also discovered that the spatial scales of regions with waters of higher turbidity due to natural processes can exceed tenfold to a hundredfold the scales of distribution of areas with suspended materials caused by the construction of the Russian segment of the Nord Stream Pipelines.

Monitoring of water quality in Finland in relation to dredging in Russia was carried out from May to September 2010 at one station. The recorded turbidity values remained at background level during the entire monitoring period. According to the turbidity values recorded, there was no sign of any effects in Finnish waters caused by dredging activities at the Russian landfall and near shore area.

Rock placement

The monitoring of rock placement in Russian waters showed that the highest measured concentration of suspended solids was 20 mg SS/l. This maximum concentration was significantly lower that the estimated levels obtained through numerical modelling and was well below the MAC.

The monitoring of rock placement in Finnish waters confirmed that increased turbidity was limited to the lowermost 10 m of the water column. Results also verified that the impacted distance from the rock placement site, taken as the 10 mg SS/l contour, was less than 1 km. In 2010, the measured duration of increased turbidity was less than that predicted by numerical modelling. The total duration of suspended solids over 10 mg SS/l measured in 2011 was 6.5 hours. Taking into consideration the uncertainties involved in both modelling and monitoring, the modelled concentrations of suspended solids correlated well with the monitored values. The results prove that the assessments made in the Finnish EIA were conservative, i.e. on the safe side.

Post-lay trenching

Monitoring of turbidity in Swedish waters took place during post-lay trenching of Pipelines 1 and 2 at the two Natura 2000 areas Hoburgs Bank and Norra Midsjöbanken. The monitoring showed that the measured turbidity values at the borders of the two Natura 2000 areas were below the threshold value of 15 mg/l above background level defined in the Swedish permit. In general, no systematic change in turbidity levels before, during or after the trenching operations was found. The monitoring showed that the assumptions and results of the sediment spill modelling in the Swedish Environmental Study were conservative: the actual sediment spill rate and the increase in turbidity were lower than assumed, and sediment spreading did not reach the nearby Natura 2000 areas. The spill rates were in the range of 3 kg/s to 25 kg/s and the highest sediment concentration was 7.3 mg SS/l measured a few hundred meters from the plough. The results prove that the assessments made in the Swedish Environmental Study were conservative.

Monitoring of ecotoxicological effects on blue mussels (*Mytilus edulis*) during post-lay trenching was also carried out at Hoburgs Bank and Norra Midsjöbanken. Mussels from an uncontaminated site were placed in cages on the banks and left there in periods of 6-8 weeks before, during and after construction. Results of chemical and physical analyses showed no elevated levels of organotin compounds detected in tissue from mussels that could be related to post-lay trenching activity in the area. The monitoring showed that sediment spreading from post-lay trenching of the pipeline into the seabed in the vicinity of the Natura 2000 areas did not lead to an increased content of contaminants in mussel tissue, and it was concluded that mussels were not affected by post-lay trenching activity in the area.

Monitoring of turbidity in Danish waters took place during post-lay trenching of Pipelines 1 and 2 east of Dueodde and at "Pladen" ridge northeast of Bornholm. The highest sediment concentration measured was 22 mg SS/l resulting in a corresponding spill rate of approximately 7 kg SS/s. This is significantly less than the rate of 16 kg SS/s that was used in the modelling for the Danish EIA. The results prove that the assessments made in the Danish Environmental Impact Assessment (EIA) were conservative.

Pre-Commissioning

Results and conclusions from the monitoring of the discharge of the pre-commissioning water in Russian waters documented that the pre-commissioning activities did not result in any pollution of the marine environment. Based on these results, a specialist from the Baltvodhkhoz (the Russian Federal State Water Management Institute) concluded that the pre-commissioning process did not have any significant effect on water quality or on the marine environment.

Munitions clearance

Monitoring of water quality in Finland in relation to munitions clearance was carried out from November 2009 to July 2010 by fixed sensors at five stations and by vessel-based monitoring. The highest measured turbidity levels were approximately 10 mg SS/l, and the maximum duration of these levels was 18 hours. The extent of the turbidity plumes, if any, reached 200 m to 300 m from the detonation point. The total amount of released sediment was about 10 % of the volume assumed. Metal and nutrient concentrations in sea water did not increase compared with the background values in the vertical sampling profiles.

Seabed Sediment – Monitoring Results

Monitoring of seabed sediment includes seabed sampling at selected locations along the pipeline route, including both single stations along the route and transects perpendicular to the route. Samples are analysed for a wide range of organic and inorganic contaminants. Sampling was carried out before and after construction to document any changes in the physical and chemical properties of the seabed sediment resulting from construction activities.

Dredging

In Germany and Russia seabed sediment monitoring was carried out with the purpose of measuring the level of contaminants in the seabed sediment in order to evaluate potential impacts from construction works.

In German waters the results of the analysis of structural sediment parameters, together with the seabed morphology surveys, revealed that the technical reinstatement proceeded as planned. More than 95 % of the backfilled trenches contained surface sediments, which did not differ physically from the undisturbed natural baseline situation. No concentrations of contaminants throughout the sampling periods (the baseline investigation and the post-construction investigation) exceeded the relevant threshold value of the German regulations for dredging and dumping.

A comparison of results from the 2009 baseline survey and those of the 2012 impact survey in Russian waters showed that after completion of the construction works in the Russian Portovaya Bay seabed sediments could be classified as class 0 according to the regional regulations of Saint Petersburg. Class 0 is defined as the cleanest class, having a concentration of pollutants in seabed sediments below threshold level.

Rock placement

In Finland the results of the third round of sediment sampling in 2011, about 17 months after the pre-lay rock berm construction activity, revealed a surface sediment quality similar to that found in 2009 and in 2010.

Disturbance of chemical warfare agents (CWA)

The seabed sediment monitoring programme in Denmark included seabed sampling with subsequent analyses of CWA levels in the seabed sediment. The purpose was to document potential disturbance and spreading of contamination originating from chemical munitions dumped in the Baltic Sea after World War II. A comparison of the sampling rounds (2008, 2010, 2011 and 2012) suggests that the detection frequencies and levels of CWA residues are comparable and that the potential CWA-related risks to fish and benthic communities are also comparable and low.

Seabed sampling along the pipeline route did not detect intact CWAs; degradation products were detected in only approximately 10 % of the samples. It was concluded that the increase in CWA in the water column from sediment disturbance during construction work on the seabed, and thereby the risk of impacts on the fish community from CWA, was insignificant.

Munitions clearance

Sediment quality monitoring has been performed in Finland prior to and after detonation of four munitions to observe the impacts from munitions clearance. The analysis of sediment samples did not show statistically significant changes in the concentration of contaminants in sediment that could be attributed to the munitions clearance operations. The measured variations are due to natural variations in the composition of the seabed.

Hydrography and Seabed Topography – Monitoring results

Pipeline presence

The monitoring in Finland includes measurements of currents in the direct vicinity of Pipeline 1 to assess the impact of the pipeline on the near-seabed currents. All measured velocity changes were within the expected order of magnitude. The instruments located 5 m to either side of the pipeline recorded changes in current velocities just above the seabed. This indicates the development of small eddies (or vortices) due to turbulence caused by the presence of the pipeline. The instruments located 50 m away from the pipeline did not record any changes that could be attributed to the presence of the pipeline. On the soft seabed areas, the pipelines were in general embedded more deeply into the sediments than anticipated in the design, and the minor impact from the current regime close to the pipeline was too small to cause any significant scouring.

Hydrographical monitoring took place in Swedish and Danish waters in 2010 to establish documentation for the theoretical analysis of the possible blocking and mixing effects of the water inflow to the Baltic Sea caused by the presence of the Nord Stream Pipeline. The monitoring findings suggest that the mixing caused by the pipelines in the Bornholm Basin would be maximum 20 % of the worst-case estimations which were already considerably below any level of effect. The estimate was reduced partly because the height of the pipeline at the seabed was lower than predicted (0.7 m versus 1 m, respectively) and partly because new observations suggest that up to half of the water inflow into the Baltic Sea is transported in temporary, band-like currents in the western Bornholm Basin, without contact with the seabed. Previously, it was assumed that inflows were transported in currents near the seabed across the floor of the Bornholm Basin.

Dredging

In Russia and Germany, seabed topography is monitored for changes due to the seabed intervention works.

Results from monitoring of the seabed in Russian waters showed that the burial of the pipeline below seabed level had only a small impact on the seabed topography. Results confirmed that the characteristics of the seabed neared their initial levels following autumn, winter and spring storms.

The surveys in German waters showed that in general, reinstatement of seabed topography in the trenched areas was within the range of ± 30 cm compared to the planned design. The spatial footprint analysis revealed a total impact area of 3.1 km^2, and only approximately 0.4 km^2 was located beyond the expected impact zone of ± 25 m on either side of the trench.

Munitions clearance

In Finland and Sweden, seabed topography was surveyed prior to and after the clearance of all munitions objects to quantify the amount of sediment release.

Monitoring in Finland was carried out in order to avoid munitions clearance during strong currents that potentially could result in transboundary impacts due to sediment spreading. Results showed that the average current speed throughout the monitoring period was lower than 0.2 m/s.

Noise and pressure waves – Monitoring Results

Seabed intervention activities

The noise monitoring programme in Germany included also underwater noise level measurements during construction. In addition, vibrations during cofferdam installation were measured. Measurements revealed that construction-related noise emissions were unlikely to cause physical injury to the hearing organs of marine mammals. In addition, results of marine mammal monitoring indicated that underwater noise emissions from the Nord Stream construction activities did not cause detectable effects in the number of grey seals in Greifswalder Bodden or in the presence of harbour porpoises (*Phocoena phocoena*) in Pomeranian Bight.

Acoustic measurements of Nord Stream's construction activities in Swedish waters were performed by the Swedish research institute Totalförsvarets Forskningsinstitut (FOI) near the Natura 2000 area Norra Midsjöbanken. Pipeline 2 passes approximately 4 km south of this protected area. The aim of this study was to measure and quantify the noise during Nord Stream's construction and trenching activities as well as the ambient noise including commercial shipping noise. Based on the analysis of the acoustic measurements FOI came to the conclusion that the source level of the construction vessel Far Samson during trenching was not greater than that of a commercial vessel.

Munitions clearance

Underwater noise/pressure wave monitoring was carried out in Finland during munitions clearance. The purpose was to measure the pressure waves caused by munitions clearance and their potential impact on objects on the seabed, such as cables, wrecks and barrels, or on marine mammals and fish, if they were present in clearance areas. Results showed that there was no negative impact on wrecks, cables or barrels in the clearance areas.

Also in Sweden underwater pressure wave monitoring was carried out to measure the pressure waves caused by munitions clearance and their potential to cause an impact on marine mammals and fish if they were present in clearance areas. Pressure waves of each clearance operation were measured to range from 100 kPA to 400 kPA with one clearance operation peaking at 900 kPA.

Fish – Monitoring Results

The objective of the monitoring activities is to document potential impacts or changes in fish communities and fish stocks close to the Nord Stream pipelines during their construction and operation. Results from the water quality monitoring programme will generally be used as a basis for the evaluation of potential impacts on fish.

Results from the Russian monitoring programme for fish showed an increase in diversity between 2010 and 2011. Results confirmed the presence of spawning grounds and nurseries of coastal species and Atlantic herring (*Clupea harengus*) in the Portovaya Bay area. The toxicological conditions in the survey area of the eastern Gulf of Finland can be characterised as fairly favourable, and none of the contaminants (heavy metals, benzo(a)pyrene and PCBs) in fish samples exceeded the MAC. Spring surveys in 2011-2012 confirmed the presence of spawning grounds and nursery grounds for juveniles of coastal species and Baltic herring in Portovaya Bay.

In Swedish waters monitoring of fish has taken place in the Natura 2000 areas Hoburgs bank and Norra Midsjöbanken close to the pipeline route. A comparison of results from the 2011 and 2012 post-construction surveys and baseline results from 2006-2010 shows that the areas are characterised by relatively large, natural, inter-annual differences in number per unit effort (NPUE) and weight per unit effort (WPUE) for the most common species (cod, flounder, shorthorn sculpin and turbot). Results also showed that there was no significant difference between the 2011 and 2012 post-construction data and the baseline data. A comparison of results from baseline monitoring in 2010 and post-construction monitoring results from 2011 and 2012 showed no effects that could be connected to Nord Stream construction activities. This was as expected due to the minimal spreading of sediment from post-lay trenching.

In Swedish and Danish waters monitoring of fish along the pipelines to detect whether they create a reef effect showed that the structure of demersal fish assemblage between 2010, 2011 and 2012 was similar. In the southern part of Danish waters, an increase in flat fish (flounder and plaice) was observed in 2011. This increase was not found again in 2012.

Monitoring in German waters showed that impacts from construction activities on fish were minor, and results obtained in 2011 were similar to those obtained during the baseline investigation in 2008.

Birds – Monitoring Results

Construction activities

The objective of bird monitoring in Russia and Germany is to document the impact on birds from the seabed intervention works in the near shore areas and from the presence of large construction vessels close to land.

Monitoring results in Russia show that construction activities in the deep-water section did not affect rare and protected species and that there wasn't any noticeable impact on the nature of migrations above open waters of the Gulf of Finland. Since 2010 species diversity increased, including the number of red-listed species.

German bird monitoring documented that displacement effects due to Nord Stream construction activities were minor compared with effects due to the commercial ship traffic. The proportion of the area disturbed by the construction fleet ranged from 6 % to 11 % of the total disturbance area, whereas the proportion of disturbance due to other commercial ship traffic ranged from 86 % to 94 %, and the overlapping areas accounted for approximately 0.6 % to 3.1 %. The total number of staging seabirds in midwinter and spring was comparable to the number found during the baseline study in 2006-2008. However, the results are difficult to analyse, because frequent turnover / passage of migrating seabirds causes a greater day-to-day variation in the number of staging birds in spring compared to winter. In summary, compared with commercial ship traffic, disturbance from Nord Stream construction activities was minor. The construction activities were performed when the number of resting birds in the Pomeranian Bight was low and at a relative large distance from the main resting areas. No negative influence of Nord Stream activities on bird distribution was found.

Munitions clearance

The purpose of the bird monitoring as part of the munitions clearance monitoring programme in Finland and Sweden was to mitigate impacts on birds during munitions clearance and to register any impacts on birds after clearance. No seabirds were registered as injured or killed during the clearance operations carried out in Finland and Sweden.

Marine Mammals – Monitoring Results

The objective of the monitoring programme is to document the size and distribution of the marine mammal population in the landfall areas, and to document the potential impacts on marine mammals from the construction of the Nord Stream Pipeline.

Construction activities

In Finnish waters no impact on marine mammals during rock placement was detected. The only marine mammal species observed during rock placement was the grey seal (*Halichoerus grypus*), with 258 recordings. The majority of observed animals were older individuals, whereas 22 were young seals.

The purpose of the marine mammal monitoring programme in Germany was to document effects of increased turbidity and disturbance and to document disturbances of marine mammals by underwater noise. No negative effect from Nord Stream construction activities on the marine mammals (harbour porpoise (*Phocoena phocoena*) and grey seal (*Halichoerus grypus*) could be identified.

Munitions clearance

Monitoring of marine mammals in Finland and Sweden was carried out in relation to munitions clearance. Prior to all detonations, marine mammals were monitored in the clearance area by two marine mammal observers. In addition, passive acoustic monitoring was carried out at the sites. Prior to each detonation, seal scrammers were applied to cause any marine mammals present to flee the area. In Finland only one mammal was observed, and efforts to cause it to leave the area were successful. During munitions clearance, no impacts on marine mammals were reported.

Benthic Flora and Fauna – Monitoring Results

Monitoring includes baseline surveys prior to construction, surveys of the status upon completion of construction and monitoring of recovery in the years following construction. The purpose is to document changes in the benthic flora and fauna communities caused by sediment dispersion and other impacts from construction and by changes in geomorphology and seabed substrate caused by the presence of the pipelines on the seabed.

Monitoring results in Russian waters document that during the 2012 monitoring campaign quantity and biomass of macrozoobenthos had on average slightly increased compared to the 2010-2011 baseline. Data obtained during the surveys in Russia indicate that the offshore construction in Russian waters did not negatively affect macrozoobenthos in the construction area.

Monitoring results in Finland confirmed that living conditions in the deep sea areas change rapidly. In general, the abundance of macrozoobenthos species was low, and no evidence of negative impact from the pipeline was detected. However, due to unstable conditions in the deep-water area, presently no conclusion can be drawn with regard to the overall significance of the impact from the pipeline on the benthic community.

The Swedish monitoring of benthic fauna at two sites in the area between the pipeline and Hoburgs Bank and Norra Midsjöbanken did not reveal any significant difference in species composition between the baseline survey in 2010 and the post-construction surveys in 2011 and 2012. However, there were significant temporal and spatial differences between the baseline study in 2010 and the subsequent surveys in 2011 and 2012 due to a general increase in abundance and biomass of the dominant species as a result of natural variation.

In Danish waters monitoring of benthic fauna was carried out along transects perpendicular to the pipelines on sections with trenching. The monitoring showed an increase in average abundance and biomass of benthic fauna since 2010. Structural differences in species composition between individual transects were found, but it was concluded that these differences were a result of natural changes since 2010 and not caused by construction activities.

In Swedish and Danish waters monitoring of establishment of hard-bottom fauna was carried out on selected sections of the pipeline. Still photos and video recordings did not reveal the establishment of sessile epifauna on the pipeline in the first survey after Pipeline 1 was laid. The second survey in 2012 revealed a minor degree of establishment of different algae and mussels on some sections of the pipeline. However, in general it should be noted that it may take several years for a hard-bottom community to establish itself on a new substrate such as the pipeline. The monitoring of hard-bottom fauna is planned to continue until 2014.

In German waters the overall macrophyte cover in the surroundings of the former cofferdam construction area was higher in 2011 than in 2010, whereas the species numbers were similar between 2007 (the baseline investigation) and 2011. Compared with the unaffected areas nearby, however, the macrophyte cover as well as the species number in the vicinity of the former cofferdam construction area (30 m width) and its surroundings (± 50 m) was significantly reduced. With regard to the recovery process of the trenched sections, observations in the western Pomeranian Bight mirrored the findings in Greifswalder Bodden and included a 50 % reduction in abundance and biomass of the species. However, no differences between the anchoring zone and the reference area were detected.

Cultural Heritage – Monitoring Results

Monitoring of cultural heritage in Russian waters showed that the construction activities and the presence of the pipeline on the seabed did not have any effects on the position and condition of the monitored wrecks.

Pipeline construction activities and the presence of the pipeline on the seabed had no negative effect on the monitored wrecks in Finnish waters. Minor changes in two of the wrecks were observed in 2011. A study of the cause of these changes concluded that they were not caused by the anchoring of the lay barge.

In Swedish and Danish waters monitoring of cultural heritage covered a survey of wrecks or shattered wreck pieces before and after installation of Pipeline 1 and 2. The monitoring showed that there was no damage to cultural heritage locations from construction activities, apart from one event in Sweden where an anchor chain impacted a wreck due to an unintentional loss of tension on the chain.

Chemical munitions – Monitoring Results

In Danish waters monitoring of the five identified chemical munitions was carried out by visual inspection using a remotely operated vehicle (ROV) before and after pipeline installation. The inspections served to enable an evaluation of any disturbance, which may have occurred to the chemical munitions objects during pipeline installation.

Monitoring showed that construction activities resulted in no disturbance of the chemical munitions objects.

Fisheries – Monitoring Results

Ongoing monitoring will describe and evaluate possible changes in commercial fishery patterns and fish catches after installation of the pipelines. At the current stage no founded analysis can be given, but feedback from commercial fisheries directly to Nord Stream documents that the presence of the Nord Stream pipelines does not impact them in their work.

7.3 EIA – General Approach and Methodology

7.3.1 General Approach

As the first phase of every EIA procedure, an assessment programme is prepared that outlines the scope and planning for the required studies and the implementation of the assessment procedure. It will indicate what kind of environmental impacts will be assessed, how the EIA procedure will be organised and what kind of studies and surveys are still necessary for achieving the knowledge level required for the impact assessment. On the basis of the assessment programme and the stakeholder statements and opinions received on it, an assessment report will be prepared.

The identification of the environmental and social impacts will be guided by a Project activity/environmental interaction matrix that will serve to identify the impacts and the relevant aspects expected during the planning, construction, operation and decommissioning phase. The Project's design defines the range of environmental and social components that will be studied in the context of an impact assessment.

The Project can accommodate the lessons learnt and utilize the information derived from the extensive monitoring of the construction activities of Nord Stream's lines 1 and 2. The monitoring results will contribute empirical data for the environmental impact assessment of the Project for the Baltic Sea region. The identification of environmental and social impacts will focus on those impacts that are considered to have significance based on information and experience gained previously. It will also take into account the latest regulatory developments and environmental trends.

7.3.2 Identification of Project-Specific Impact Parameters and Impacted Area

Project parameters that are likely to have an effect on the environment will be identified from the description of the activities associated with the Project and potential unplanned events. Specific parameters are identified qualitatively and quantitatively via the description of activities and machinery and equipment applied.

All baseline parameters (that together constitute the environmental basis), are subject to identification via desk study, including review of literature and charts, consultation of relevant authorities and institutions, results from the geotechnical, geophysical and environmental studies/investigations along the pipeline route and experience from Nord Stream lines 1 and 2.

Based on the EIA programme, field investigations will be applied, where required, to describe the relevant environmental situation onshore and offshore including, inter alia, objects on the seabed, seabed bathymetry and composition, marine flora and fauna, marine mammals and birds. As such surveys will be performed to:

- facilitate detailed mapping of seabed geomorphology and character (i.e. rock outcrop, sand or clay)
- determine the water depths within the defined corridors

- map and determine the engineering properties of the surficial soils above the first hard layer (i.e. till, marl, rock) beneath the seabed
- map the location of seabed features such as cultural heritage, munitions, boulders, debris, existing infrastructure (pipelines and cables) and other man-made items that may influence the routing or safe installation and operation of the pipeline
- determine the environmental baseline conditions in the project area.

The identification of Project-specific potential impacts will also enable mitigation measures to be confirmed to reduce the significance of specific impacts.

Table 2 gives an overview of exemplary offshore construction activities related to the Project and their potential effect on, and consequences for, the marine environment. A brief overview of suggested mitigation measures related to specific construction activities is provided, together with the potential affected receptor organisms.

Table 2: Overview of potential effects from construction activities

Construction activity (offshore)	Potential effect on the environment	Consequence	Mitigation measures	Receptor
Pipe-laying	Seabed sediment dispersion and turbidity; Noise and physical disturbance; Changes in bathymetry	Temporary and localised impact on water quality; Disturbance of cultural heritage	Route optimisation. Avoiding cultural heritage sites and environmentally sensitive areas; Avoiding found CWA; Timing	Fish; Birds; Marine mammals; Benthic flora and fauna; Cultural heritage
Rock placement	Seabed sediment dispersion; Noise and physical disturbance; Changes in bathymetry	Temporary and localised impact on water quality; Disturbance of cultural heritage	Route optimisation; Avoiding cultural heritage sites; Use of fall pipe, providing for precise placement of gravel and minimising turbidity; Timing	Fish; Birds; Marine mammals; Benthic flora and fauna; Cultural heritage
Trenching	Seabed sediment dispersion; Noise and physical disturbance; Changes in bathymetry	Temporary and localised impact on water quality ; Disturbance of cultural heritage	Timing (e.g., avoiding fish spawning periods) and route selection; Avoiding cultural heritage sites	Fish; Birds; Marine mammals; Benthic flora and fauna; Cultural heritage
Dredging	Sediment dispersion; Dispersion of organic and inorganic nutrients and contaminants; Sedimentation; Noise	Temporary impact on water quality; Disturbance of cultural heritage	Building of a cofferdam; installation of silt screens, route and landfall selection; Timing; Avoiding cultural heritage sites;	Fish; Birds; Marine mammals; Benthic flora and fauna; Cultural heritage
Anchor-handling	Seabed sediment dispersion and disturbance of seabed.	Temporary and localised impact on water quality; Seabed disturbance; Disturbance of cultural heritage	Optimised anchor corridor; Avoiding cultural heritage sites and chemical munitions zones; use of dynamically positioned lay barge for sections	Fish; Birds; Marine mammals; Benthic flora and fauna; Cultural heritage
Cleaning and hydro-testing of pipeline	Sediment dispersion; Introduction of additives to marine environment. Dispersion of organic and inorganic nutrients and contaminants.	Temporary and localised impact on water quality; Disturbance of cultural heritage	Route optimisation. Avoiding cultural heritage sites and environmentally sensitive areas; Avoiding found CWA; Timing	Fish; Birds; Marine mammals; Benthic flora and fauna; Cultural heritage

7.3.3 Environmental and Social Impact Assessment (ESIA) Methodology

The impact assessment methodology takes impacts, mitigation measures and the degree of uncertainty in the prediction of the magnitude and significance of impacts into consideration.

The impact methodology will be designed to meet relevant national and international ESIA standards and practises.

Taking into account the experience of Nord Stream line 1 and 2, impacts that result from planned activities and unplanned or non-routine events will be assessed specifically for the extension project. The impact assessment methodology for planned activities will take into consideration activity type, environmental receptors, magnitude, duration, geographical extent and degree of reversibility of impact, to determine overall significance. The probability and consequence of impacts will be assessed for unplanned events. Impacts will also be assessed following the implementation of mitigation measures.

The EIAs addressing the offshore sections will be based on the regional environmental constraints with regards to the alternative pipeline corridors. The geographical extent of potentially significant environmental impacts will be assessed. Definition and delineation of the impacted areas will be established through the assessment work and will include an assessment of potential transboundary impacts.

The potential for cumulative impacts arising from third party activities and impacts resulting from non-routine scenarios are considered by the Project developer. During the EIA phase the Project developer will determine whether any significant cumulative effects could arise. Known cumulative impacts include

- cumulative impacts from third party static infrastructure and developments
- cumulative impacts on shipping and navigation
- cumulative impacts with Nord Stream lines 1 and 2

7.4 EIA Reporting of Potential National and Transboundary Impacts

The Project will involve permit applications in the national jurisdictions of Germany, Denmark, Sweden, Finland and Russia. For each of these countries the results of the environmental and social impact assessment will be collated in respective environmental reporting covering both national and transboundary aspects.

The national Reporting will address the following physical environmental baseline conditions:

- physical processes including currents
- water quality
- seabed geology and sediments
- atmosphere
- noise.

With respect to the biological environment the following assessments will be documented:

- pelagic environment (water quality and plankton)
- benthic environment (benthic flora and fauna)
- fish
- sea birds
- marine mammals
- nature conservation areas
- onshore fauna and flora for the Russian landfall area and the German landfall area.

With reference to the social environment the following assessment results will be documented:

- cultural heritage (in particular wrecks)
- fisheries
- marine traffic
- tourism and recreation
- existing and planned installations (pipelines, cable, wind farms, etc.)
- existing and planned extraction sites
- military operations
- dumping sites (dredged spoils, chemicals and munitions dumps)
- HELCOM and other long term monitoring stations.

Based on the findings of Nord Stream line 1 and 2 monitoring there is no evidence that the Project might result in significant transboundary impact. Nevertheless, the following activities and events will receive special attention when assessing the possible transboundary impact of the construction activities and the operation of additional pipelines in the Baltic Sea:

- seabed sediment dispersion due to pipelay, trenching, and rock placement
- disturbance of dumped chemical warfare agents
- effect of pipeline presence on the seabed in the Bornholm Basin with regard to saline water influx
- sediment dispersion, noise, and pressure waves due to munitions clearance
- water discharge during pre-commissioning
- maritime safety during construction work and operation
- impact on commercial fishery
- present and future installations (cables, wind turbines, pipelines, etc.)
- potential unplanned events, including spills, and pipeline failure.

8 Environmental and Social Management

All activities of the Project are governed by Nord Stream's Health, Safety, Environmental and Social Policy. In addition to presenting a state-of-the-art technical design, Nord Stream AG demonstrated that it is competent in the sustainable management of environmental and social impacts and risks associated with the implementation of a pipeline project in the Baltic Sea region. All construction work for the first two pipelines of the Nord Stream pipeline system was carried out in an environmentally and socially responsible manner, successfully protecting the unique eco-system of the Baltic Sea.

8.1 Environmental and social management framework

Nord Stream AG's existing Health, Safety, Environmental and Social Management System (HSES-MS) provides the framework for developing the standards, planning, and procedures for each stage of the Project, for the transparent management of these multi-faceted challenges. The overall structure of the HSES-MS is aligned to the international standards OHSAS 18001:2007 and ISO 14001:2004. The HSES MS enables Nord Stream AG to demonstrate to shareholders, employees, governments, lenders, non-governmental organisations and to the public its commitment to effective HSES management through alignment with internationally accepted standards. All contractors are also required to recognise and implement these standards during the construction and operations phases of the project. This ensures that those engaged in the project have a consistent approach towards health, safety, environmental standards and requirements as well as social matters.

For all environmental and social related issues of the Project the Environmental and Social Management System (ESMS), as an important component of the HSES-MS, is the overarching control structure for the Project. It addresses relevant legal requirements, standards, and permit obligations.

As an important component of the ESMS, a grievance management system will be in place to ensure that any grievances, such as complaints, raised during the development of the Project are properly tracked and dealt with.

8.2 Risk management

One of the main objectives is to design, build and operate the Project safely, such that the benefits are delivered whilst ensuring that the associated risks remain broadly acceptable. Based on the knowledge gained during the planning, implementation and operation of Nord Stream lines 1 and 2 there are two key phases for which the risks to people and the environment need to be assessed, namely:

- construction of the pipeline infrastructure system, including pre-commissioning
- operation of the pipeline infrastructure.

The results from the detailed surveys will be used as input in a risk assessment, addressing risk resulting from construction of the Project and during the operational lifetime of the new pipelines. The risk assessment findings will serve as important basis for further consultations with the respective national authorities and provide recommendations on mitigation measures that can significantly reduce environmental and social impact that could potentially be caused by unplanned events. A number of risk scenarios will be identified and assessed, and possible mitigation measures will be described. Certain risks will already be mitigated through the pipelines design and pipeline routing.

All construction/installation related activities can be broken down into a number of sub-activities for which risks can be assessed. Risk management uses the results of the risk assessment to consider whether enough precautions have been taken or whether more should be done to prevent risks to the public, the environment and workers on the project.

For example, collision risks will be managed by the implementation of offshore oil and gas industry good risk reduction practice, such as the enforcement of a safety (exclusion) zone during construction (which would be in addition to the normal navigational measures used by merchant shipping).

Risks during operation arise as a result of damage to the pipelines, and the potential for gas release and ignition, caused by potential interactions, including dropped objects (e.g., containers from cargo vessels), dropped anchors, dragged anchors, sinking ships, and grounding ships (close to the landfalls). The pipeline system will be designed and operated according to DNV OS-F101, Submarine

Pipeline Systems. The use of DNV design codes has been an established best practice in the offshore industry for several decades and reduces risk levels in particular, due to the stringent design requirements and associated verification of the pipeline.

8.3 Mitigation Measures

Nord Stream AG recognises that the construction and operation might require the implementation of special measures to minimise potential impact caused by the Project. Hence special measures will be devised to mitigate anticipated environmental and social impacts during project implementation and operation.

The approach to any project-related activities that might have an environmental and social impact follows the five basic principles:

Avoidance: The Project planning avoids to the extent reasonably possible any locations, construction techniques or construction times with inherent risk for adverse impact.

Minimisation: If an impact cannot be avoided, the Project developer strives for identifying ways in which the Project can be modified to minimise the impact.

Mitigation: If an impact can neither be avoided nor sufficiently minimised and if the impact assessment should identify further need for impact reduction, the Project developer assesses further measures to mitigate the impact to the extent reasonably possible.

Verification: Assessed potential impacts are monitored and the assessments are verified against the measurements. If a discrepancy towards a greater impact than assessed should arise, the Project developer is committed to taking measures to counter the impact.

Offset/Compensation: Where impacts cannot be avoided or sufficiently minimised, or where legal requirements call for an offset, the Project developer will investigate an appropriate offset and obtain approval from the respective authorities. Where no adequate offset measure is viable, the Project developer will consider compensation payments as means of mitigation.

Examples of mitigation measures that were effectively deployed during the construction of Nord Stream lines 1 and 2 are, inter alia, related to maritime traffic, emergency preparedness, compliance with standards and established procedures, construction site safety, and environmental and social considerations, demonstrated by the following examples:

- chance finds procedure in place to adequately deal with any munitions discovered during construction; specialists will be utilised as required
- emergency response plans onboard all construction vessels and in the onshore sites in Russia and Germany
- emergency oil spill procedures and equipment on board all construction vessels
- compliance with MARPOL requirements including the HELCOM “Clean Seas Guide” for the Baltic Sea related to discharge of oil and waste products and ballast water contamination
- use of bunds and/or double wall tanks for onshore fuel storage
- use of designed support to safely cross subsea assets (cables/pipelines)
- avoidance of dragged anchors of the pipe lay vessel to minimize re-suspension of sediment
- scheduling of activities to avoid the sensitive periods of fauna such as the breeding periods of sea birds and spawning periods of fish
- avoidance of sensitive sites
- use of control measures, including cofferdams, to manage the re-suspension and dispersion of sediments, in particular near Natura 2000 areas, in shallow waters, during dredging and backfilling or dumping of dredged material
- adoption of noise suppression technology for equipment used at the landfall construction sites and near important bird areas

- avoidance of risk of contact with conventional/chemical ammunition (dedicated surveys will identify ammunition along the route corridors and optimised routing will avoid these hazards).

Additional mitigation and safety measures that relate to ensuring maritime safety were successfully implemented during the construction of lines 1 and 2 of the Nord Stream project. Nord Stream AG proposes to deploy once again the following measures in close cooperation with maritime authorities:

- notice to mariners warnings well in advance of construction and use of regular NAVTEX (navigational text messages) warnings and broadcasts on marine VHF radios
- visual and radar watch during construction
- automatic Radar Plotting Aid Systems to detect passing vessels
- pipeline marked on nautical charts.

8.4 Environmental and Social Management Plan (ESMP)

Prior to each major Project stage, a dedicated Environmental and Social Management Plan (ESMP) will be created as an integral part of the ESMS. On the basis of the findings of the EIAs, Nord Stream AG proposes to develop an ESMP to manage environmental and social impacts and risks of the Project in accordance with laws and regulations applicable to the various countries and in accordance with relevant international standards.

The management arrangements for the ESMP will be set out in an ESMS for construction and operation for the Project, which will be designed to comply with the requirements of ISO14001 provisions and prescriptive lender requirements.

Elements within the ESMP will include a suite of topic- and activity-specific management plans, the Projects Standards document, Nord Stream AG's Commitment Register, a Legal Register and an Aspect & Impacts Register as key control documents.

The Project's ESMP will serve to:

- establish a framework for implementing mitigation and management measures and for monitoring the effectiveness of those measures
- provide assurance to regulators and stakeholders that their requirements with respect to environmental and social performance will be met
- provide for the implementation of corrective measures where required
- establish a framework for performance monitoring to ensure that Project commitments and policies with respect to environmental and social performance are being met.

The ESMP draws on the commitments and impact mitigation strategies documented in the national EIAs. It addresses the avoidance, mitigation and management of environmental and social impacts associated with the various Project phases. The ESMP also provides the basis for an audit trail demonstrating compliance with the Project's minimum standards and allows both the company and its contractors, to continually improve processes and performance.

9 Active Dialogue on The Project

Nord Stream AG is dedicated to transparent communication of the Project and active consultation with relevant stakeholders: regulatory bodies, non-governmental organisations, experts, affected communities, and other interested and affected parties. The aim of active stakeholder engagement is to disseminate information about the Project and to give stakeholders an opportunity to express their views on the project. Stakeholder concerns and comments can then be taken into account in developing the project and in assessing and mitigating potential impacts. Consultation is also invaluable in identifying useful information regarding baseline conditions and concerning vulnerable resources and receptors in the study area.

Nord Stream AG has already engaged with various stakeholder groups to inform them about the envisaged Project and to understand their views towards the Project.

For the realisation of its existing pipelines Nord Stream AG has been following an extensive and transparent communications strategy using various communications channels to disseminate information about the Project. It is Nord Stream AG's aim to continue with its proven and active stakeholder engagement approach through regular, genuine dialogue with relevant regulatory bodies, designated experts, affected communities and other stakeholders of the Project.

Nord Stream AG plans to set up a Stakeholder Engagement Plan to assist the Project in establishing its long-term consultation and engagement processes. This is in line with international best practice for major infrastructure projects.

The Project's stakeholder engagement programme is aimed at including the following:

- distribution of public information via media, print media (leaflets, brochures) and via the Project's website as well as upon individual request
- arranging for public information tours in Baltic Sea bordering countries to inform locally and in person about the Project
- providing electronic copies of various Project-related documents on the project website.

10 Monitoring

The Project developer plans to develop and implement a focussed, fit-for-purpose Environmental Monitoring Programme for the Project with the following objectives:

- meet the requirements of the national permits
- verify the broad findings of the modeling used to predict impacts
- ensure that the construction and operation of the Project is not causing impacts not previously identified in the EIA
- ensure that the construction and operation of the Project is not causing known impacts to a greater significance than predicted
- verify the effectiveness of mitigation measures
- identify at an early stage unforeseen adverse effects, and to take remedial action
- monitor the rehabilitation of the environment post construction.

Monitoring will be directed at those areas of environmental sensitivity that are predicted to experience potentially significant impacts from the Project or where there is significant uncertainty regarding the reliability of the impact assessment. The Environmental Monitoring Programme is planned to be a direct response to the assessed environmental and social impacts and issues, specifically those requiring mitigating measures and monitoring, and addressing particular reporting requirements at national and international levels.

11 Preliminary Timeline

The main activities during the different phases of the lifetime of the Project's pipelines include:

- feasibility study and conceptual design (completed, results presented in this PID)
- engineering surveys and munitions screening
- detailed pipeline design
- environmental study, risk assessments
- permitting
- setting up infrastructure and logistics
- surveying of the pipeline installation corridor
- seabed intervention works prior pipe lay
- construction activities at the landfalls in Germany and Russia
- preparation of crossings of existing offshore cables and pipelines
- offshore pipe lay and environmental monitoring
- pre-commissioning of the pipelines (flooding, cleaning, gauging, pressure-testing, dewatering, drying)
- hyperbaric tie-in of the different offshore pipeline sections
- commissioning (filling the pipelines with gas)
- operation, including inspection, maintenance, and repair
- decommissioning (abandonment) of the pipelines.

The preliminary timeline for the permitting and construction phase of the Project can be seen in Figure 18. The Project's pipelines will be designed for an operating life of at least 50 years.

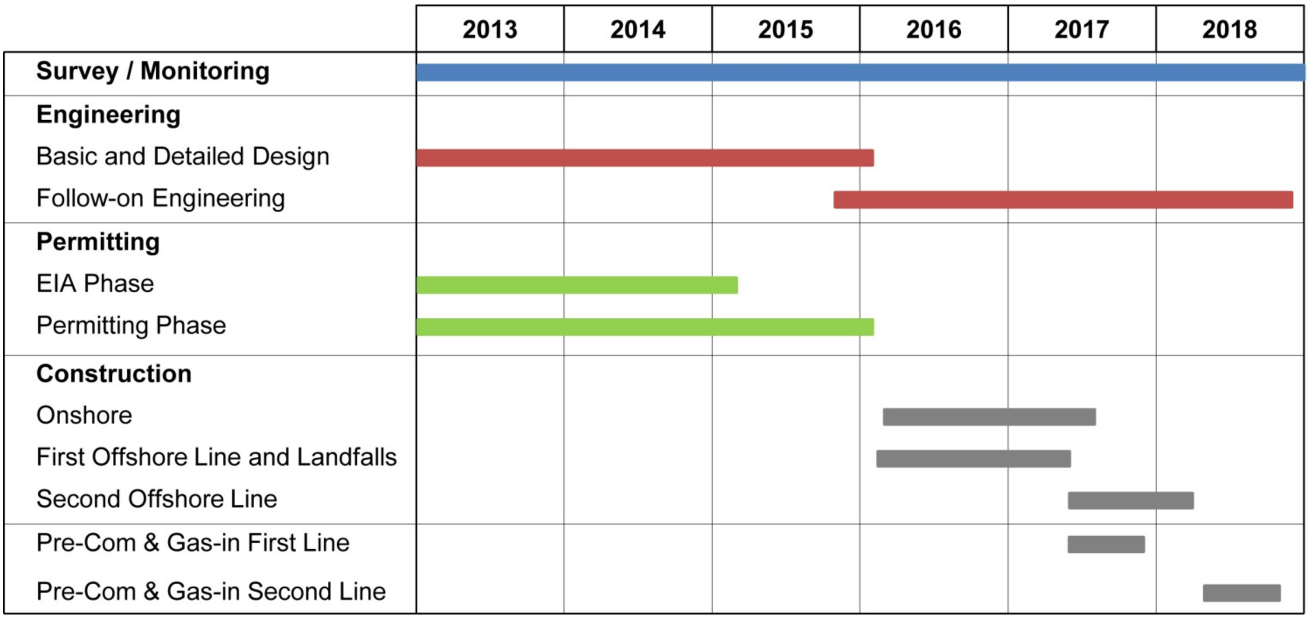

Figure 18: Preliminary timeline for the permitting and construction phase