



Nord Stream AG

## **PROJECT INFORMATION**

### **Status of the Nord Stream pipeline route in the Baltic Sea**

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## Abbreviations and definitions

bcm	Billion Cubic Meter (standard cubic metre – a cubic metre of gas under a standard condition, defined as an atmospheric pressure of 1atm and a temperature of 15°C.)
DHI	DHI Water, Environment, Health ( <a href="http://www.dhi.dk">http://www.dhi.dk</a> )
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessment
Espoo Convention	Convention on Environmental Impact Assessment in a Transboundary Context
EU	European Union
FIMR	Finnish Institute of Marine Research ( <a href="http://www.fimr.fi/en.html">http://www.fimr.fi/en.html</a> )
KP	Kilometre Post – reckoned from Russian landfall
Natura 2000	Network of areas designated to conserve natural habitats and species of wildlife in the European Community
NTG	North Transgas Oy
ROV	Remotely Operated vehicle
SGU	Sveriges Geologiska Undersökning ( <a href="http://www.sgu.se/sgu/sv/index.html">http://www.sgu.se/sgu/sv/index.html</a> )
SoW	Scope of Work
SPF	Snamprogetti in Fano, Italy ( <a href="http://www.snamprogetti.it">http://www.snamprogetti.it</a> )
SSS	Sides Scan Sonar
TW	Territorial Waters

## 1. Introduction

### 1.1 The Nord Stream Project

Nord Stream is an approximately 1200-kilometre-long offshore natural gas pipeline system extending from Vyborg, Russia, through the Baltic Sea, to Lubmin in Greifwalder Bodden in Germany. The transmission system will be built and operated by Nord Stream AG<sup>1</sup>, which is a company with shareholding by OAO Gazprom (51 %), Wintershall (24.5 %) and E.ON Ruhrgas (24.5 %).

The Nord Stream pipeline system consists of two 48 inch pipelines, which together will be able to transport 55 billions bcm/year of natural gas from the Russian to the European gas grid. The two pipelines run almost parallel along the Baltic Sea. Each of them has a total offshore length of about 1,200 km and dry parts at either ends of approximately 0.5 km in Germany, up to the Lubmin receiving facilities, and approximately 3 km in Russia, up to the Vyborg compressor station. At midline, at approximately Kilometre Post (KP) 543, the pipelines are connected to a service platform, which is exclusively made to support the Nord Stream pipeline operation and maintenance. The pipeline transmission system passes, apart from Russia and Germany, also through the Exclusive Economic Zones (EEZ) of Finland, Sweden and Denmark, in the latter also through the territorial waters (TW) north-west of Bornholm.

The project falls under the UNECE Convention regarding Assessment of Environmental Impacts in a Transboundary Context. The parties of origin (Finland, Sweden, Denmark and Germany) and Russia have in April 2006 decided that the project shall be notified according to the Conventions art. 2 (§ 4); and that all countries around the Baltic Sea are regarded as Affected Parties.

Therefore, a joint notification of the project was made on 16 November 2006, and a comprehensive Project Information Document was open for public display in the period from 16 November 2006 to 16 February 2007. A total of 129 comments were received at the Parties of Origin and Russia, and these were handed over to Nord Stream for further consideration.

Based on a review of the comments – in particular the comments related to the pipeline route - Nord Stream decided to enter into additional studies in selected sections of the pipeline route, see *Table 1-1 below*:

Route Section	Base route	Proposal	Status Outcome
Russia – western part	N of Gogland	S of Gogland	To be determined
Gulf of Finland – middle part	In Finnish EEZ	More south in Gulf of Finland	Route remains in Finnish EEZ (optimised base route)

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<sup>1</sup> The name Nord Stream is herein used interchangeably as a definition of the Developer, Nord Stream AG, or as one or both offshore pipelines.

Route Section	Base route	Proposal	Status Outcome
SE of Gotland	In between Natura 2000 and recommended shipping lane	Further away from Natura 2000 and thereby closer to shipping lane	To be determined
Around Bornholm	S of Bornholm	N of Bornholm and consequently new route in German EEZ	New route N of Bornholm and in German EEZ
German Section	From S of Bornholm	From N of Bornholm passing in between planned wind parks and Natura 2000	New route in the German EEZ

*Table 1-1: Overview of revisited Route Sections*

This paper describes the background and current status for the ongoing route studies. It builds on the Project Information Document from November 2006 and shall hence be seen as a supplement hereto. The enclosed Appendix is an update of tables 8.2-7 shown in this document.

## **2. Background**

### **2.1 Feasibility Study and early Project Development**

A feasibility study was performed by North Transgas Oy (NTG)<sup>2</sup> in 1998 and complemented by a reconnaissance level survey. Various route options were considered including different combinations of onshore and offshore segments. The survey mainly consisted of a single line survey and provided an overall indication of expected seabed conditions along the corridors considered. This study concluded that the NTG offshore project was the most feasible, environmentally friendly and economic option.

The project was subsequently taken over by Gazprom, who in 2004 contracted PeterGaz to produce conceptual design for a system of two parallel offshore pipelines in the Baltic Sea connecting Russia to Germany, and further to the Netherlands and the United Kingdom. The route through the Baltic Sea was similar to the route sections previously surveyed by NTG.

Late 2005, an agreement was signed between OAO Gazprom, BASF AG and E.ON AG to form Nord Stream AG, which has now taken over to further develop and implement the offshore project in the Baltic Sea.

### **2.2 Present Status of Nord Stream**

The detailed design of the Nord Stream offshore pipeline system was awarded by Nord Stream in the spring of 2007 to the engineering design company Snamprogetti (SPF) in Fano, Italy.

One of the initial activities of SPF was to review the survey documentation that had been compiled in the past in order to analyse the intervention required to stabilise and protect the pipelines on the seabed. The intervention<sup>3</sup> considered would generally consist of rock-dumping or lowering the pipelines into the seabed using special trenching equipment.

Also, Nord Stream mapped all relevant areas that may be of importance to the public and environment, like nature protection areas, shipping lanes, areas valuable to tourism, spoil grounds, munitions dump sites, and fishing grounds. These considerations are used to further optimise the pipeline route.

Presently, i.e. October 2007, Nord Stream is undertaking a major geophysical offshore survey to confirm new optimised routes, and meticulously screen the entire routes from Russia to Germany for possible dumped munitions and other objects that could be of danger to pipeline installation. Similar, an environmental sampling programme<sup>4</sup> is launched to investigate the

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<sup>2</sup> North Transgas Oy was established by OAO Gazprom and Fortum Oil and Gas Oy in the summer of 1997. The shares were equally divided by the two companies.

<sup>3</sup> Seabed intervention is normally required to prevent the pipelines from spanning too long, or to either protect or stabilise the pipelines on the sea bottom.

<sup>4</sup> Sediment samples for macro-zoo benthos are taken at locations where seabed intervention may be necessary, at the midline platform location and section close to nature protected areas and banks. The order of magnitude of sampling locations are DK ~20 (carried out by DHI), SE ~30 (carried out by SGU/ Stockholm University), and FI ~30 (carried out by FIMR),

existing conditions in areas where seabed intervention is expected to take place. Results from the geophysical survey (from particularly SSS and video coverage) will provide information on potential marine habitats along the whole route.

### **2.3 Pipeline Route Development**

As mentioned, NTG carried out in 1998 a large single line reconnaissance sea survey of approximately 3,900 km in the Baltic Sea, Gulf of Finland and Gulf of Bothnia with the purpose of identifying one or more preferred pipeline routes. Three basically different route alternatives were investigated together with ten landfall sites. Pipeline routes both east and west of the islands Gotland and Bornholm were surveyed. All route alternatives considered landing the Baltic Sea offshore pipelines at Greifswald/Lubmin as being the base case, although also route alternatives to Lübeck and Rostock were surveyed and evaluated.

The survey data were analysed as base material for pipeline analyses, seabed intervention need and cost estimate. All the surveyed routes were evaluated as being technically feasible.

The work by North Transgas Oy came to a quiet end at the turn of the century, partially due to failing to raise interest with other potential partners, and due to a change of overall company strategy for the shareholder Fortum Oil and Gas Oy. The documentation was later sold to the shareholder Gazprom.

The work by North Transgas Oy was handed over to Gazprom who in 2004 contracted PeterGaz to launch a renewed survey of the offshore section in the Baltic Sea for the project known as North European Gas Pipeline.

The initial task was to perform a detailed review of the NTG, public domain and commercially available data to develop a preferred survey corridor as the basis for the 2005 detailed geophysical, and subsequently to establish a corridor centreline for further evaluation and design activities.

The selected alignment was considered appropriate for the purpose of conceptual engineering tasks and was identified as the Base Case for further development activities. All 2005 survey reporting and conceptual design documentation is referenced to this corridor centreline (named C3.2) and kilometre post (KP) definition. Several opportunities for optimisation have been identified during the Conceptual Study route evaluation to potentially further reduce the level of required intervention.

These locations are considered in the updated route revision C4.0 East and C4.0 West, which form the reference alignments for the 2006 detailed geophysical survey and ROV visual inspection survey. Objects within 25 m of the C4.0 alignment were identified and classified through video recordings. The width of the corridor investigated during the 2006 survey is about 200-250 m. Numerous targets were dived on, recorded and sought classified, but only a handful could be ascribed to be associated with defence systems.

All previously developed documentation was handed over to Nord Stream in the mid 2007.

### **3. Nord Stream Pipeline route surveys 2007**

In the spring of 2007 Nord Stream contracted the Swedish survey company Marin Mätteknik AB (MMT) for investigations of alternative pipeline route options.

The initial scope of work (SoW) of MMT was to investigate alternative routes north and south of Bornholm, and to investigate an alternative route from south of Bornholm to a landfall at the German island of Usedom. Following this successful survey campaign, MMT's scope of services was extended to include a detailed munitions screening of the entire final route corridors<sup>5</sup> extending from the EEZ border Finland-Russia to the German landfall.

Within the Russian sector, PeterGaz has performed a ROV target inspection survey and visual traverses of route C4.0 for munitions screening and to support the route optimisation. Further surveys are planned to highly detailed data in specific locations to support the detailed design of interventions.

Furthermore, Nord Stream requested MMT to carry out a detailed deep geophysical<sup>6</sup> investigation east of Gotland of the areas planned for erecting a midline service platform. Based on these result Nord Stream will select the final location for the platform and a deep geotechnical investigation for the foundation design will be performed by a dedicated geotechnical drilling vessel.

The German survey company Fugro OSAE<sup>7</sup> was contracted to make a detailed survey of the German landfall at Greifswalder Bodden and Usedom. The survey was aimed at providing additional information in a wider corridor centred on the base case landfall location in the vicinity of the Lubmin former nuclear power station and to provide an alternative landfall for the alternatives assessment. In addition to the geophysical campaign Fugro GmbH will also perform nearshore geotechnical campaign to provide site data for various installation options.

As mentioned above Nord Stream has also in 2007 launched a survey to provide the necessary baseline information for the environmental impacts assessment, in particular in areas where seabed intervention is foreseen.

Additional field investigations were contracted to FIMR (Finland) SGU (Sweden) and DHI (Denmark) which comprise investigations of offshore sediment, marine flora and fauna and birds in areas where potential environmental impacts may occur. Investigations of terrestrial environment at land based facilities are nearly conclusion.

In the context of the EIA special emphasis will be given to possible disturbances of the seabed as a result of seabed intervention (trenching, dredging, rock-dumping) and on issues related to chemical and conventional ammunition.

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<sup>5</sup> For this type of investigation all instruments were set at their narrow range in order to provide the highest possible resolution of survey data. Therefore the installation corridor for each pipeline had to be investigated separately.

<sup>6</sup> The instrument used was a Geo-Spark 800 Spread from Geo-Resources Consulting B.V., which was modified for fresh water.

<sup>7</sup> Fugro N.V. acquired the German company OSAE Survey and Engineering in October of 2006.

The status of the various surveys per October 2007 is:

- MMT has completed the route reconnaissance investigations around the north of Bornholm and the route option to Usedom in Germany
- MMT has completed the detailed deep geophysical investigation east of Gotland. The deep geotechnical investigations will be made at a later stage.
- MMT is continuing the munitions screening survey along the optimised route alignments with two vessels: the 'Triad' and the 'Pollux'
- Fugro OSAE has completed the detailed survey of the German landfall at Greifswalder Bodden
- Fugro GmbH is continuing the German nearshore geotechnical investigation.
- PeterGaz have completed the ROV visual inspection survey in the Russian sector.
- PeterGaz are continuing the long term metocean measurement program.
- A seabed mode geotechnical investigation is being planned for the new route alignments and to support specific intervention design.
- SGU has completed the environmental investigations in the Swedish EEZ
- DHI has completed environmental investigations around Bornholm
- FIMR has completed environmental investigations in the Finnish EEZ

## **4. Route optimisation – Gulf of Finland**

### **4.1 Route within the Finnish and Estonian Sectors**

The reasons for considering a base case route only within Finnish EEZ are historical. In 1998 NTG applied for permission to survey in Estonian EEZ; however, the permission was not granted and a route option traversing the territory was subsequently abandoned. The project philosophy of maintaining the route within the Finnish EEZ rather than exploring options in Estonia was continued through the North European Gas Pipeline phase.

A number of alternatives pipeline route options have consequently been considered because of the considerably undulating seabed in the Gulf of Finland. The investigations are primarily done in order to ensure the overall technical feasibility, but they also entail a request from the Finnish authorities at the time of project notification. Hence the Finnish Ministry of Trade and Industry suggested in their statement of 11 January 2007 investigations of alternatives south of the present route.

In the spring 2007 Nord Stream made a renewed application to obtain permission to survey in the Estonian EEZ. Various route options were identified in a desk study, assessed by Nord Stream and discussed in a joint meeting between Finnish and Estonian authorities and Nord Stream. The more preferable route proposal for an optimised route in the Gulf of Finland was submitted to the Estonian authorities together with the survey application (see *Figure 4-1* below). The Estonian Ministry of Foreign Affairs has with letter of 26 September 2007 rejected Nord Stream's application for permit to survey and further development of the route in Estonia has consequently been abandoned.

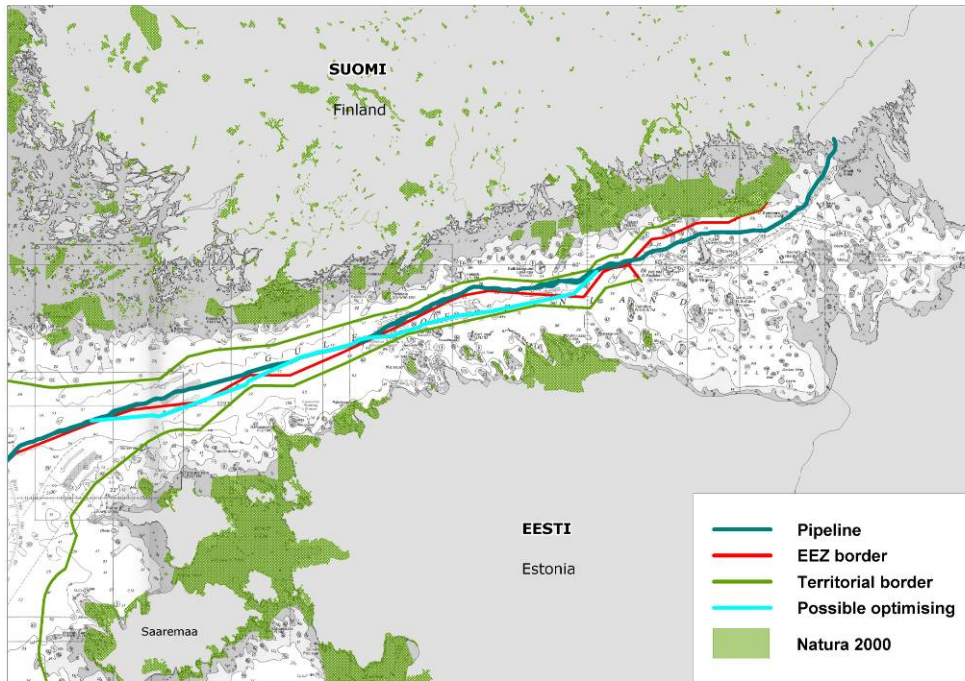


Figure 4-1 Revised pipeline route options in Gulf of Finland  
(Finnish EEZ-route in dark blue and Gulf of Finland route in turquoise).

In parallel to the work on a more southern route, further development of the route in the Finnish EEZ has taken place. Hence, Nord Stream has been optimising the route in the Finnish EEZ in order to significantly reduce the amount of intervention works. This route is referred to as Route C9.

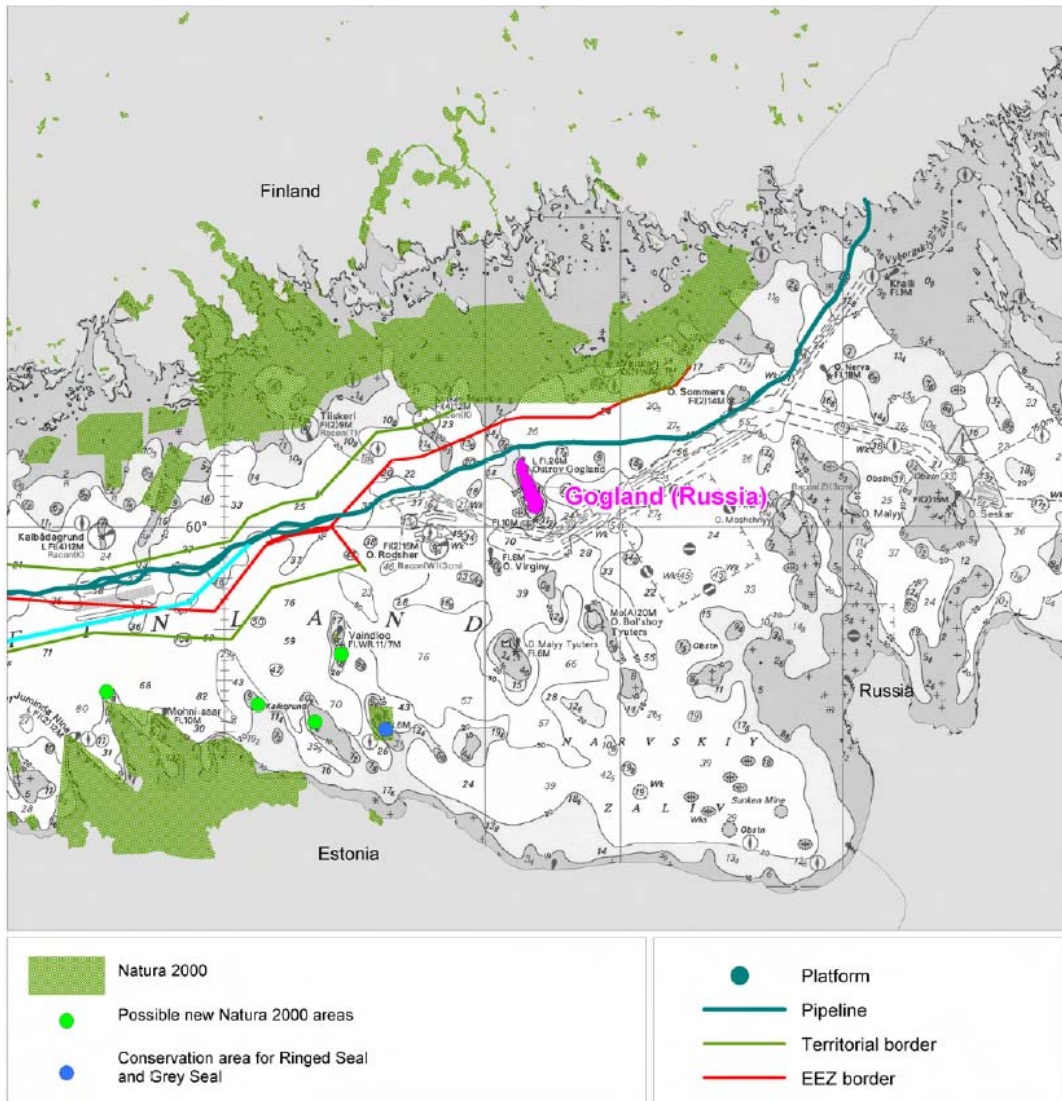
Id	Route	Preliminary environmental assessments
C4.0	Conceptual Study Route in Finnish Sector	Pipeline routing based on shortest route on-bottom pipe-lay. Large number of free spans causing sea bed intervention work at numerous points along the route. Main intervention method is foreseen to be rock-dumping building up rock berms for pipeline support. Needed amount of rock > 1,2 mio. m <sup>3</sup> to be procured (per pipeline) from southern Finland and/or Norway. Environmental impacts from rock dumping are assessed to comprise an average influence area of approx. 1 km each side of the pipelines. Significant adverse environmental impacts from rock dumping are not foreseen.
C9.0	Optimised Route inside <b>Finnish EEZ</b> (avoiding all designated Natura 2000 areas)	Optimised route inside Finnish EEZ in order to reduce number of free spans. Optimised route requires intervention works in the form of rock berms. Needed amount of rock < 0,1 mio. m <sup>3</sup> (per pipeline). Influence

		area the same, but at a smaller number of sites along the route. Significant adverse environmental impacts from rock dumping are not foreseen.
-	Desk Study – Optimised Route in <b>Gulf of Finland</b> (avoiding all designated Natura 2000 areas) – Further investigations pending survey permit.	Previous desk studies have indicated favourable pipe laying conditions (only small intervention works) more south in the Gulf of Finland. Finnish Authorities have requested Nord Stream to investigate a more southern route, which would lead into Estonian waters. Environmental assessments are pending the geophysical and environmental investigations, which cannot be launched until the Estonian survey permit, which has been applied for in March 2007 is granted.

*Table 4-1 Overview of Environmental Considerations for Route Optimisation*

#### 4.2 Route within the Russian Sector of Gulf of Finland

During the national consultation process Finnish authorities have commented on the route within the Russian sector where the alignment passes to the North of Gogland (see *Figure 4-2*). The Finnish Ministry of Environment has contacted the Russian Ministry of Natural Resources for further discussion on the routing issue. Hence, the final route around Gogland awaits these bilateral discussions. The following description provides until then the justification of the present routing North of Gogland. .



*Figure 4-2 Natura 2000 areas and the island of Gogland.*

Routing in the Russian Sector is severely constrained. The selected corridor follows the general alignment adopted by NTG, and key features that influenced the route selection are:

- Vessel traffic separation (VTS) scheme associated with the main Baltic shipping lane. The VTS is located to the south of Gogland and to the north of Virginy Island and Vikalla Shoal. To the East the VTS then extends towards Sommers Island where it divides with one

branch leading toward Vyborg bay and the main route continuing in the direction of Primorsk and St Petersburg.

- There are several regulated areas where entry is prohibited, for routing most importantly the area due east of Gogland and the area south of the main shipping lane, adjacent to Moshchnyy Island. Additional areas are designated for the offshore mining of ferromagnesian nodules.
- The proposed Ingermanlandsky Strict Nature Reserve (Ingermanlandsky Zapovednik). This reserve will include 9 islands and the surrounding marine areas. This extends to an area of 13,433 hectares, including 12,520 hectares of marine environment. The islands include Virginy, Bolshoy Tyuters and Malyi Tyuters to the south of Gogland.
- At least three cables cross the area in the vicinity of Gogland. Important for pipeline routing are the cables connecting Gogland to Moshchnyy, Denmark-Russia and Kaliningrad-Russia main.
- Four known wrecks are located within the area south of Gogland and to the north of Virginy Island and Vikalla Shoal. These may include a Soviet Torpedo Boat TK174 and a Danish submarine

Detailed survey has been performed over a 2 km wide corridor following the alignment to the North of Gogland. Extensive route optimisation works have been performed to minimise pre-lay and post-lay intervention.

The finalisation of the route optimisation is ongoing at present. This optimisation considers both the seabed terrain i.e. minimising seabed intervention works and avoiding areas with potential sites of cultural interest. Additional survey may be required in discrete sections to support the detailed design. However, despite the extensive survey and engineering design, the seabed morphology is such that it is not feasible to safely install the pipeline without the use of pre-lay and post-lay gravel berms. The position of the intervention works foreseen at this stage are presented on *Figure 4-4, overleaf*.



Figure 4-3 Survey Corridor N of Gogland and Ingermanlandsky Strict Nature Reserve (Islands with red circles)

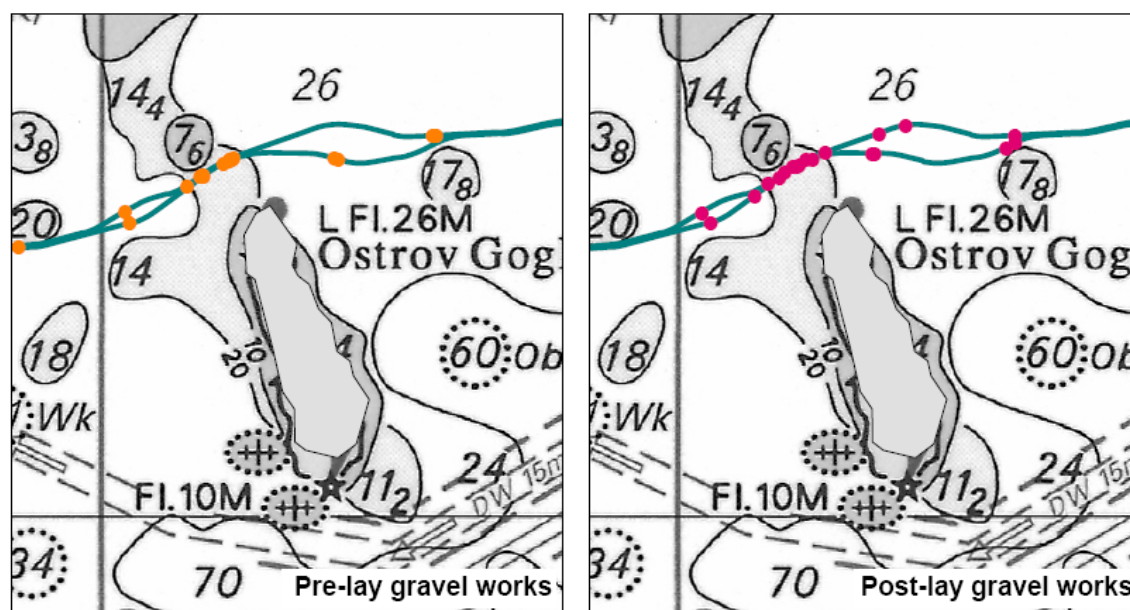


Figure 4-4 Pre-lay and post-lay gravel intervention works at Ostrov Gogland - an example (the dots indicate locations where interventions are required)

A preliminary environmental assessment for the route optimisation is shown in Table 4-2:

Id	Route	Preliminary environmental assessments
C4.0	Conceptual Study Route in Russian Sector	<p>Conventional landfall construction in an open trench including dredging of access channel for laybarge. Amount of dredging at the landfall is estimated to 0,325 mio m<sup>3</sup> (April 2007). Pipeline routing based on shortest route on-bottom pipe-lay. Pre-lay and post-lay intervention at sections along the route. Intervention method not assessed.</p> <p>Environmental impacts – in particular in landfall area - to be assessed in details.</p>
C5	Optimised Route in Russia Sector (ongoing)	<p>Optimisation of route taking into consideration all constraints in the area. Pre-and post-lay intervention works (rock dumping) are estimated to less than 15.000 and 23.000 m<sup>3</sup>, for 'east' and 'west' pipeline respectively:</p> <ul style="list-style-type: none"> <li>• Potential impacts on the Natura 2000 Eastern Gulf of Finland</li> <li>• Ingermanlandsky Strict Nature Reserve</li> <li>• Cultural heritage (wrecks)</li> <li>• Vessel traffic separation areas</li> <li>• Offshore mining areas</li> <li>• Cable crossings</li> </ul> <p>Detailed environmental impact assessment and a decision regarding re-routing are pending updated technical information.</p>

*Table 4-2 Preliminary Environmental Assessment – Russian Sector*

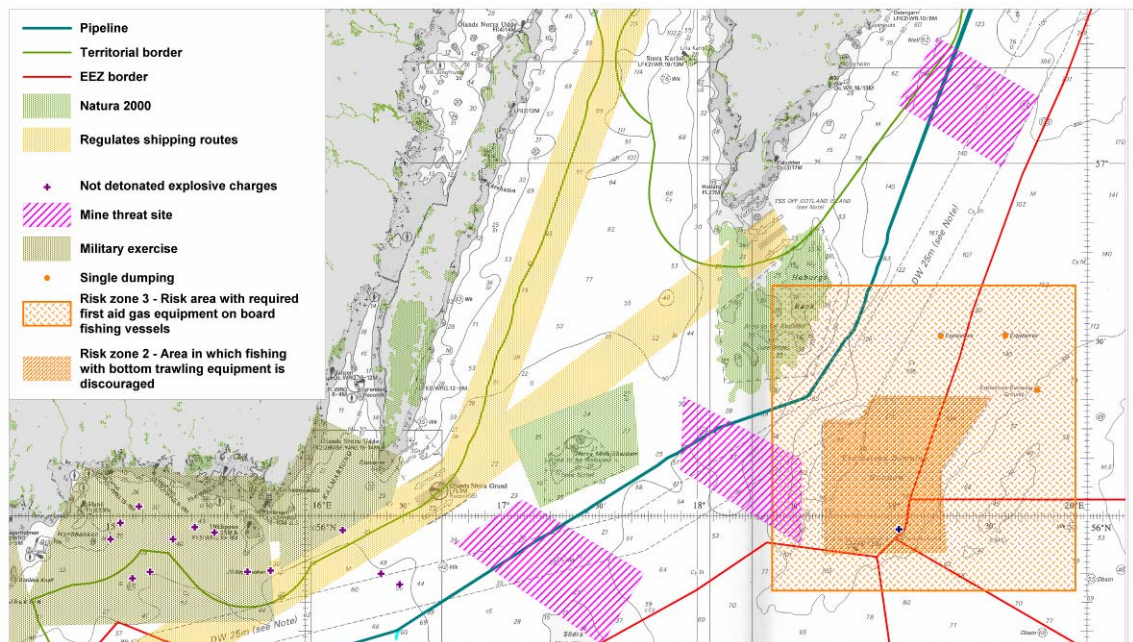
## 5. Route optimisation - Baltic Proper

The pipeline routes through the Baltic Proper – basically through the Swedish EEZ – have predominantly been fixed since the days of the NTG project. However, PeterGaz introduced small adjustments to the section south of the island of Gotland where the pipeline routes pass the relatively shallow waters of Hoburgs Bank and where the earlier NTG route crossed the large DK-RU telecommunication cable.

NTG did not consider the routes west of Gotland relevant for landing the offshore pipelines in Greifswalder Bodden, and this understanding has been adopted. No further development of the route west of Gotland is therefore considered by Nord Stream.

In the context of the Espoo consultation process Swedish authorities commented on the possible closeness of the Nord Stream pipelines to the Hoburgs Bank and the Nörre Midsjöbanken – both south of Gotland.

The pipelines are routed outside the officially announced nature protection areas – with a clearance of minimum 3 km. Nord Stream has in response to the Swedish authorities' request initiated a study to clarify the present location of the pipelines. The study will be based on updated wave and current data as well on the latest progress of the detailed design see *Figure 5-1*, and will be decided after thorough consultation with the various Swedish authorities involved.



*Figure 5-1 Pipeline routing in the vicinity of the Swedish banks south of Gotland.*

An overview of the preliminary environmental assessments is shown in *Table 5-1*.

Id	Route	Preliminary environmental assessments
C4.0	Concept Study Route in Swedish Sector	<p>Pipeline routing based on shortest route on-bottom pipe-lay.                      Pipeline routing taking into consideration all constraints in the area:</p> <ul style="list-style-type: none"> <li>• Natura 2000 areas</li> <li>• Dumping area for chemical munitions</li> <li>• Risk area for chemical munitions</li> <li>• Areas with risk of conventional mines</li> <li>• Regulated shipping lanes</li> <li>• Recommended shipping lanes</li> </ul>
C9	Optimised Route (south of Hoburgs Bank and Ndr. Midtsjö Bank)	<p>Sections with pipeline stabilisation (51 km rock-dumping and/or trenching) and protection against anchors (pending).                      Detailed environmental impact assessment pending updated technical information.                      Final route/re-route decision pending.</p>

*Table 5-1 Preliminary Environmental Assessment - Swedish Sector*

## 6. Route optimisation – Southern part, Denmark and Germany

Nord Stream initiated various investigations into alternative routes around the Danish island Bornholm in response to avoiding possible risks associated with the chemical dump site east of Bornholm and to avoid the possibility of delay due to legal uncertainties with regard to the unsettled sea border line south of Bornholm.

In order to acquire sufficient basis for making final route selection Nord Stream surveyed three alternative route options, e.g. one route south of Bornholm but to the north of the 'Banana' area, and two routes north of Bornholm – the two routes deviating around the northern tip of the island, the David's Bank, which is designated Natura 2000 area. The three alternative routes were identified DK-01/02/03 and were surveyed by MMT in the spring of 2007. The routes are shown in *Figure 6-1*, below.

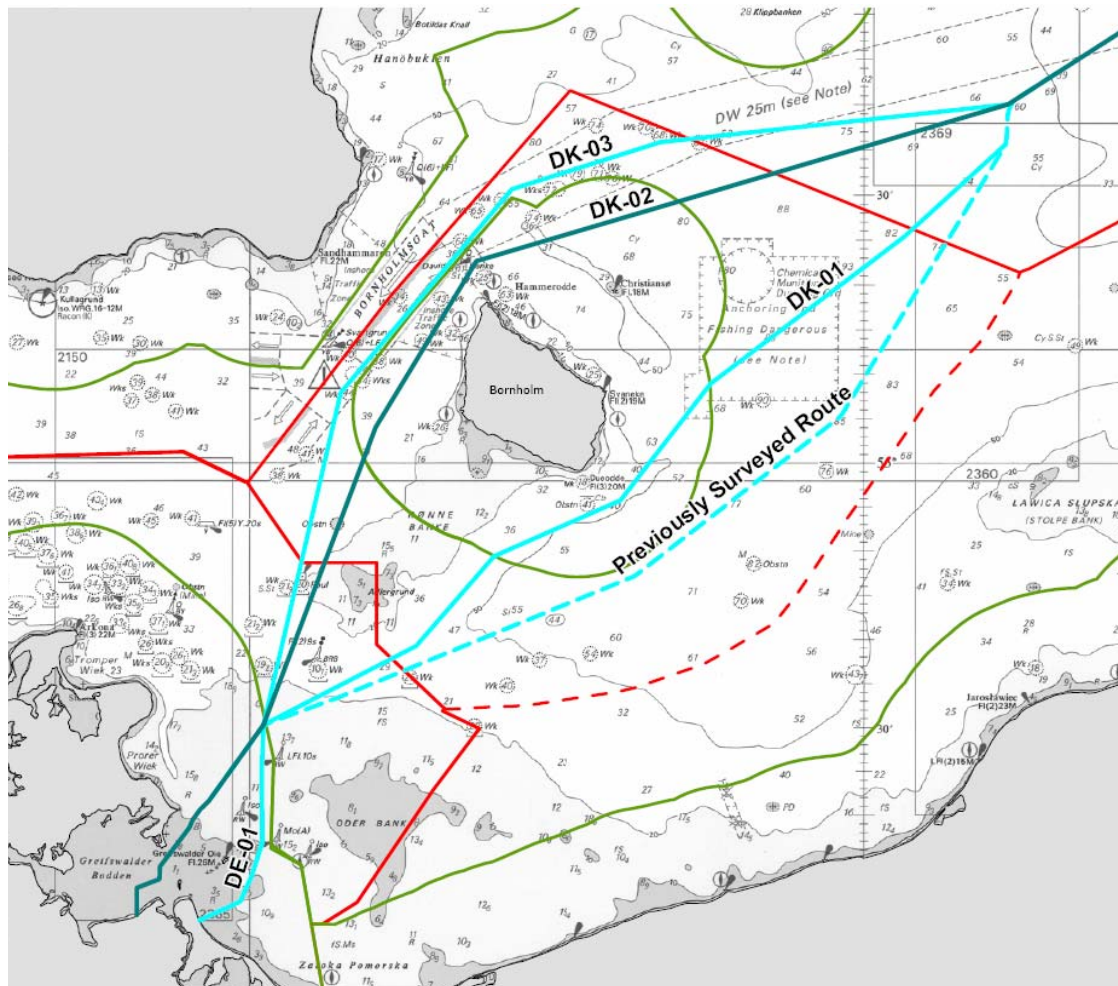


Figure 6-1 Three alternative pipeline routes were investigated around Bornholm

Nord Stream has in consultation with the Danish Authorities come to the conclusion to progress with Alternative DK-02 (north of Bornholm but south of the David's Bank) insofar that the route would bypass the chemical munitions dumpsite and risk zone east of Bornholm in its entirety. This would also accommodate the remarks on safeguarding the tourism trade given by the Bornholm Island Administration. The DK-02 will consequently change the route in Swedish EEZ and German EEZ respectively.

The route north of the island would be within the Danish territorial waters. The Danish legislation and regulatory framework for planning and permitting are identical for both the territorial waters and the EEZ.

### **6.1 Description Route DK-02 - Territorial waters north of Bornholm**

The route is planned to be located in the lee of David's Bank, and thereby protected from the majority of large vessels travelling in and out of the Baltic Sea.

The eastern-most section of the route – of which approximately 50 km are within the Swedish EEZ – is flat and consisting of soft to very soft sandy and silty sediments. The bedrock may in places be detected far below the seabed, but with no relevance to pipeline installation.

Harder ground is detected north of the northern tip of Bornholm, and further to the west. However, the seabed still appears flat and the water depths (> 35 m) are such that the pipelines may not have to be trenched into the seabed. Therefore the presence of harder ground may not be causing any problems for pipe lay. However, at the northern tip of Bornholm the crystalline bedrock forms a subsea ridge to David's Bank having less water depth (resulting in probable trenching of the pipelines). Wrecks are found in that area. Nord Stream has recently completed a more general area survey at this location in order to detail a more exact pipeline route ('snaking' of the pipelines may be required).

Two wrecks of an approximate size of 20 m were detected and will be investigated further, and a risk assessment including ship traffic issues will be part of the EIA documentation.

An overview of the preliminary environmental assessment is found in *Table 6-1, overleaf*.

### **6.2 The German pipeline section**

New studies of the pipeline routing in Germany has been conducted and is presently under way. The German section may be characterised by many environmentally sensitive and therefore protected areas appointed after the routing planned by NTG in 1998. In addition is an area west of Adlergrund set aside for development of two wind farms with associated high voltage cables to land, military practise areas, resource extraction areas, spoil grounds and fairways for ships. The many constraints are illustrated in *Figure 6-2, overleaf*.

Id	Route	Preliminary environmental assessments
C4.0	Concept Study Route in Danish Sector	<p>Pipeline routing based on shortest route on-bottom pipe-lay. Pipeline routing taking into consideration all constraints in the area:</p> <ul style="list-style-type: none"> <li>• Natura 2000 areas</li> <li>• Dumping area for chemical munitions</li> <li>• Risk area for chemical munitions</li> </ul> <p>No intervention works are needed apart from potential rock dumping for protection of the pipeline from anchors. Significant adverse environmental impacts from sea bed intervention are not foreseen.</p>
DK-02	Optimised Route (north of Bornholm)	<p>Sections with pipeline stabilisation and protection against anchors can be foreseen (technical project in process). Pipeline is avoiding chemical munitions dumping area, and areas with increased risk of chemical munitions dumping. Detailed environmental impact assessment pending updated technical information and updated environmental field investigations (sediments and benthos).</p>

*Table 6-1 Preliminary Environmental Assessment - Danish Sector*

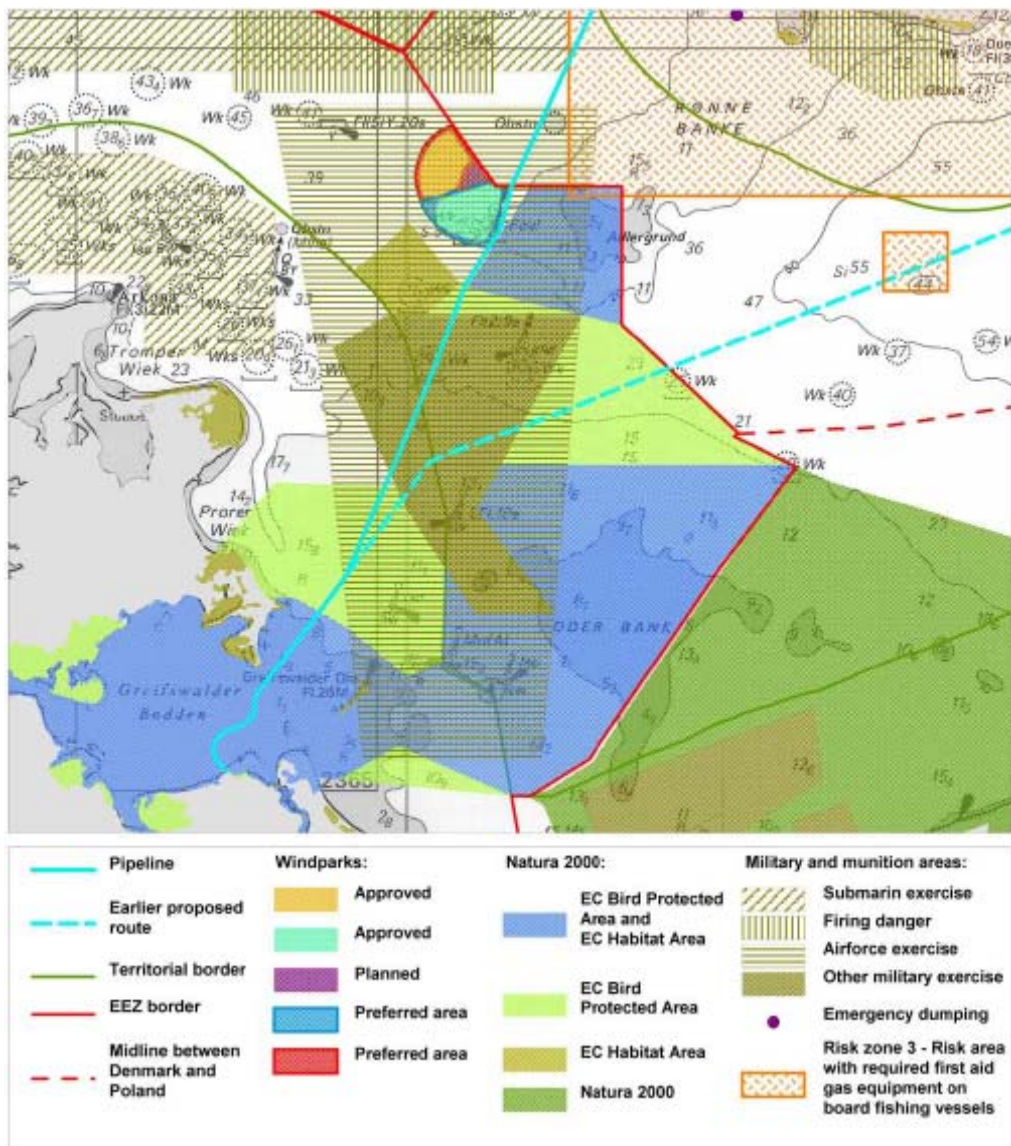


Figure 6-2 Various constraints in the German sector. The recommended pipeline route is shown in dark blue

The pipeline will approach the Greifswalder Bodden south of the fairway through the 'Boddenrandschwelle' (the sand bank at the entrance to the Bodden and take a gentle turn south of the bank Schumacher Grund and will be landed on the beach outside the Lubmin former nuclear power station, ref. Figure 6-3.

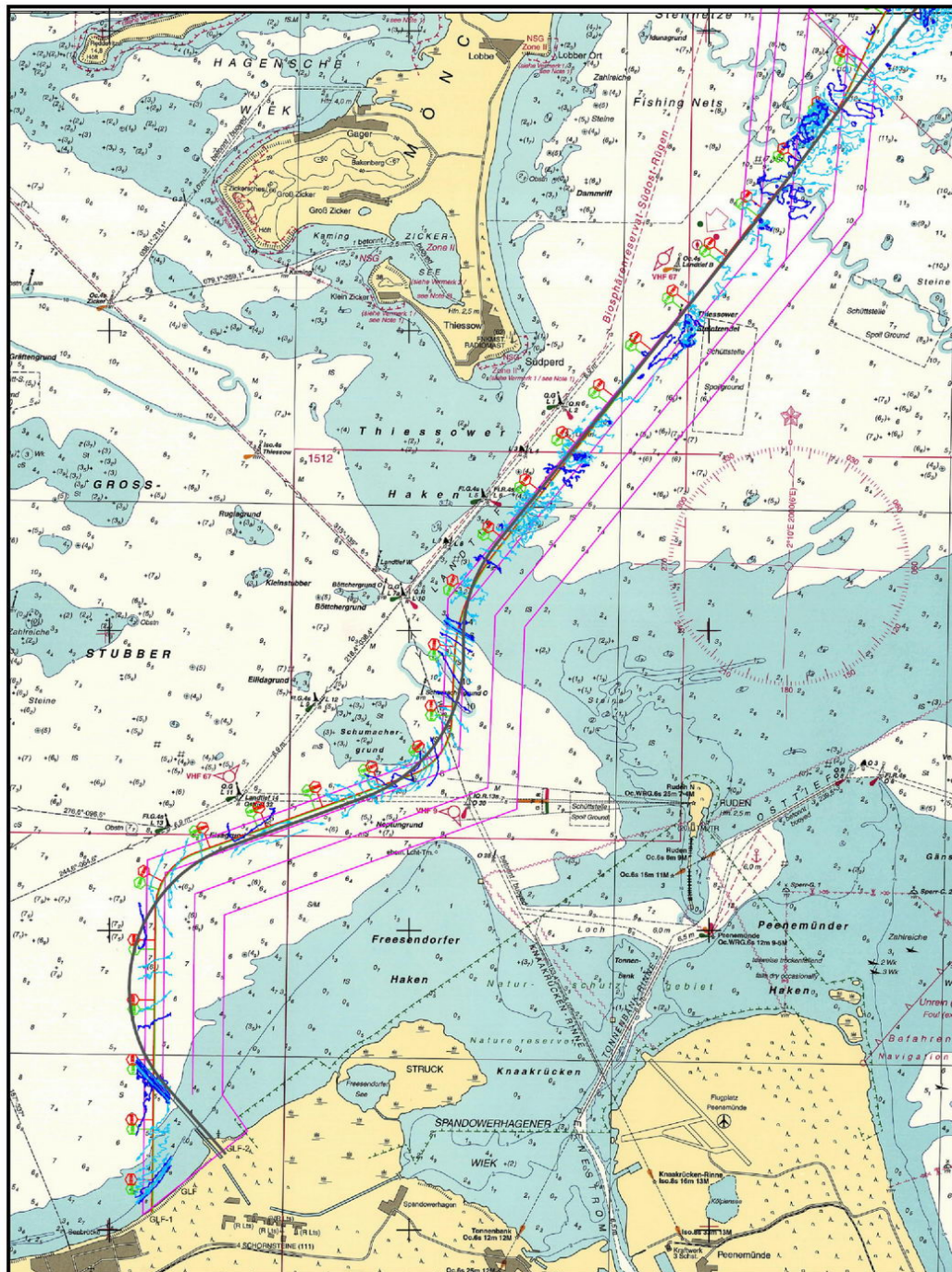


Figure 6-3 German nearshore pipeline alignment.

On their way to the Bodden the pipelines will be located close to the corridor allocated for routing the high-voltage cables from the wind farms at Adlergrund. The Nord Stream offshore pipeline project terminates ('battery limit') at the pig receiver at the landfall.

Nord Stream acknowledge that the Greifswalder Bodden is a protected Natura 2000 area, and consequently Nord Stream currently is investigating alternatives to this route: such as a more eastern route crossing Usedom.

The route through the Greifswalder Bodden and the alternative are fully surveyed and will be covered by the EIA, which is currently in progress.

<b>Id</b>	<b>Route</b>	<b>Preliminary environmental assessments</b>
C4.0	Concept Study Route in German Sector	Pipeline routing based on shortest route on-bottom pipe-lay. Trenching is foreseen at water depth less than 20 m, but will be depending on authority requirements (interference with ships traffic). Landfall in Greifswalder Bodden in a designated corridor.
DK-02/GER	Optimised Route in Germany (new entrance into Germany)	Pipeline route changed according to re-route in Denmark. Alternative landfall outside Greifswalder Bodden is investigated. Detailed assessment is pending the technical development of the project in the German Sector.

*Table 6-2 Preliminary Environmental Assessment - German Sector.*

## **7. Time schedule for Espoo EIA reporting**

Nord Stream has scheduled its EIA preparation phase and would like to inform about the updated timeline as follows:

- December 2007 Submit draft Espoo EIA in English
- January 2008 Feedback from authorities (possibly Espoo meeting early in February 2008)
- April 2008 Complete Espoo EIA document and translations
- Second half of April 2008 Submit Espoo EIA report in all languages

Currently, Nord Stream is finalising surveys and laboratory analyses of re-routed pipeline sections, collecting EIA studies from international expert groups (among others Institut für angewandte Ökologie/Germany, Marin Mätteknik/Sweden, PeterGaz/Russia, Ramboll/Denmark, and Snamprogetti/Italy) and combining all information to a unique picture of the interaction of the two Nord Stream natural gas pipelines and the Baltic Sea environment.

Due to these on-going activities, the draft EIA report to be submitted in December 2007 may not be complete in all national investigations, but it will show a major package of descriptions of environmental factors as well as transboundary effects and investigated alternatives. Further it will describe the EIA methodologies and give a complete list of contents. It will also show an updated project description and justification, and will give a summary of relevant technical details.

**8. Appendix: Potential environmental impacts per country**

## 8.1 EIA issues of special importance inside Russian waters

Possible environmental impacts related to the establishment of the Nord Stream inside RUSSIAN waters		
Activity	Impact parameter	Environmental parameter affected
<b>Planning</b>		
Planning of pipeline route	Crossing protected areas, areas with restrictions, reserved areas	Conflict with existing or planned use of area
<b>Construction</b>		
Pipeline installation	Safety zone of 1,500 m around lay vessel/platform. Area occupied around lay vessel	Fishery Ship traffic
	Physical disturbance/noise from lay vessel and supply vessels	Fish, fishery, mammals, birds, tourism and recreational areas
	Risk of accident with ship collision and related oil spill	Human safety, Water quality, flora, fauna, tourism and recreational areas
	Contact with dumped munitions (chemical and conventional ammunition)	Human safety Fauna
Seabed rectification, dredging, trenching and backfilling	Suspended sediment, sedimentation, release of contaminants, nutrients, oxygen consuming substances	Surface sediment, water quality, plankton production, flora and fauna, fish, fishery, mammals, birds, tourism and recreational areas
Rock dumping	Suspended sediment Occupation of seabed	Benthic flora and fauna
Onshore construction sites – activity from construction to installation sites	Physical disturbance, noise from supply vessels/helicopter etc.	Fauna especially birds, mammals. People in the area.
Fuel consumption	Fuel consumption	Air quality (local, regional, global)
<b>Pre-commissioning</b>		
Pressure testing (?)	Discharge of test water	Water quality Pelagic flora and fauna, fish, fishery, mammals
	Physical disturbance/noise	Fish, mammals, birds, humans
<b>Operation</b>		
Operation of pipeline	Possible safety zone around pipeline with anchoring prohibited	Anchoring of ships
	Occupation and changes of seabed by the pipeline	Oxygen/anoxic conditions in sediment , benthic flora and fauna

Possible environmental impacts related to the establishment of the Nord Stream inside RUSSIAN waters		
Activity	Impact parameter	Environmental parameter affected
Planning		
	Barrier effect from pipeline on the seabed	Water exchange/water quality, sediment transport, flora and fauna
Accident with pipeline	Ship accident with gas release from pipeline, explosion dumped ammunition, break at free span	Human safety, water quality, flora and fauna, air quality
(?): To be investigated in more detail. Discharge sites of test water not decided.		

Table 8.1 (PID Nov. 2006 Table 8.3) Possible environmental impacts related especially to the Nord Stream Pipeline inside Russian waters.

## 8.2 EIA issues of special importance inside Finnish waters

Possible environmental impacts related to the establishment of the Nord Stream inside FINNISH waters		
Activity	Impact parameter	Environmental parameter affected
<b>Planning</b>		
Planning of pipeline route	Crossing protected areas, areas with restrictions, reserved areas	Temporary restriction in normal use of area (VTS – Gulf of Finland Vessel Separation Scheme)
<b>Construction</b>		
Pipeline installation	Safety zone of 1,500 m around lay vessel/platform. Area occupied around lay vessel	Fishery Ship traffic
	Physical disturbance/noise from lay vessel and supply vessels	Fish, fishery, mammals, birds, tourism and recreational areas
	Risk of accident with ship collision and related oil spill	Human safety Water quality, flora, fauna, tourism and recreational areas
	Contact with dumped munitions (chemical and conventional ammunition)	Human safety Fauna
Seabed rectification, dredging, trenching and backfilling	Suspended sediment, sedimentation, release of contaminants, nutrients, oxygen consuming substances	Surface sediment, water quality, plankton production, flora and fauna, fish, fishery, mammals, birds, tourism and recreational areas
Rock dumping	Suspended sediment Occupation of seabed	Benthic flora and fauna
Onshore construction sites – activity from construction to installation sites <sup>1</sup>	Physical disturbance, noise from supply vessels/helicopter etc.	Fauna especially birds, mammals. People in the area.
Fuel consumption	Fuel consumption	Air quality (local, regional, global)
<b>Operation</b>		
Operation of pipeline	Possible safety zone around pipeline with anchoring prohibited	Anchoring of ships
	Occupation and changes of seabed by the pipeline	Oxygen/anoxic conditions in sediment, benthic flora and fauna
	Barrier effect from pipeline on the seabed	Water exchange/water quality, sediment transport, flora and fauna
Accident with pipeline	Ship accident with gas release from pipeline, explosion dumped ammunition, break at free span	Human safety, water quality, flora and fauna, air quality

Possible environmental impacts related to the establishment of the Nord Stream inside FINNISH waters		
Activity	Impact parameter	Environmental parameter affected
Planning		
1: If pipeline storage/coating yard and supply base are established in the south-western part of Finland.		

*Table 8.2 (PID Nov. 2006 Table 8.4) Possible environmental impacts related especially to the Nord Stream pipeline inside Finnish waters.*

### 8.3 EIA issues of special importance inside Swedish waters

Possible environmental impacts related to the establishment of the Nord Stream inside SWEDISH waters		
Activity	Impact parameter	Environmental parameter affected
<b>Planning</b>		
Planning pipeline route	Crossing protected areas, areas with restrictions, reserved areas	Impacts to be avoided in passing Natura 2000 areas of Hoburgs Bank and Ndr. Midtsjö bank. Crossing cod spawning area (timing to be agreed)
<b>Construction</b>		
Pipeline installation	Safety zone of 1,500 m around lay vessel/platform. Area occupied around lay vessel	Fishery Ship traffic
	Physical disturbance/noise from lay vessel and supply vessels	Fish, fishery, mammals, birds, tourism and recreational areas
	Risk of accident with ship collision and related oil spill	Human safety Water quality, flora, fauna, tourism and recreational areas
	Contact with dumped munitions (chemical and conventional ammunition)	Human safety Fauna
Seabed rectification, dredging, trenching and backfilling	Suspended sediment, sedimentation, release of inorganic and organic contaminants, nutrients, oxygen consuming substances	Surface sediment, water quality, plankton production, flora and fauna, fish, fishery, mammals, birds, tourism and recreational areas
Rock dumping	Suspended sediment Occupation of seabed	Benthic flora and fauna
Installation of service platform	Safety zone, physical disturbance, noise, dredging, suspended sediment	Pelagic and benthic environment, fish, fishery, ship traffic, birds, mammals, human safety
Onshore construction sites – activity from onshore construction site to installation sites <sup>1</sup>	Physical disturbance, noise from supply vessels/helicopter etc.	Fauna especially birds, mammals. People in the area.
Fuel consumption	Fuel consumption	Air quality (local, regional, global)

Possible environmental impacts related to the establishment of the Nord Stream inside SWEDISH waters		
Activity	Impact parameter	Environmental parameter affected
<b>Planning</b>		
<b>Pre-commissioning</b>		
Pressure testing (?)	Discharge of test water	Water quality Pelagic flora and fauna, fish, fishery, mammals
	Physical disturbance/noise	Fish, mammals, birds, human
<b>Operation</b>		
Operation of pipeline	Possible safety zone around pipeline with anchoring prohibited	Anchoring of ships
	Occupation and changes of seabed by the pipeline	Oxygen/anoxic conditions in sediment , benthic flora and fauna
	Barrier effect from pipeline on the seabed	Water exchange/water quality, sediment transport, flora and fauna
Operation of service platform	Safety zone of 500 m around the platform. Ship traffic, anchoring, fishery prohibited	Ship traffic, fishery
	Occupation/changes of seabed, air emission, noise	Benthic environment, fishery, ship traffic, air quality (local, regional, global)
	Platform structure	Visual impacts (human, recreational interests)
Accident with pipeline/service platform	Ship accident with gas release from pipeline, damage to service platform	Human safety, water quality, flora and fauna, air quality
1: If pipeline storage/coating yard and supply base is established in Sweden.		

Table 8.3 (PID Nov. 2006 - Table 8.5) Possible environmental impacts related especially to the Nord Stream pipeline inside Swedish waters.

8.4 EIA issues of special importance inside Danish waters

Possible environmental impacts related to the establishment of the Nord Stream inside DANISH waters		
Activity	Impact parameter	Environmental parameter affected
<b>Planning</b>		
Planning of pipeline route	Crossing protected areas, areas with restrictions, reserved areas	Potential temporary restriction in normal use of area (proximity to VTS – Bornholms Gat Vessel Separation Scheme)
<b>Construction</b>		
Pipeline installation	Safety zone of 1,500 m around lay vessel/platform. Area occupied around lay vessel	Fishery Ship traffic
	Physical disturbance/noise from lay vessel and supply vessels	Fish, fishery, mammals, birds, tourism and recreational areas
	Risk of accident with ship collision and related oil spill	Human safety Water quality, flora, fauna, tourism and recreational areas
	Contact with dumped munitions (chemical and conventional ammunition)	Human safety Fauna
Seabed rectification, dredging, trenching and backfilling	Suspended sediment, sedimentation, release of contaminants, nutrients, oxygen consuming substances	Surface sediment, water quality, plankton production, flora and fauna, fish, fishery, mammals, birds, tourism and recreational areas
Rock dumping	Suspended sediment Occupation of seabed	Benthic flora and fauna
Fuel consumption	Fuel consumption	Air quality (local, regional, global)
<b>Operation</b>		
Operation of pipeline	Possible safety zone around pipeline with anchoring prohibited	Benthic flora and fauna and water quality caused by pipeline damage.
	Occupation and changes of seabed by the pipeline	Oxygen/anoxic conditions in sediment, benthic flora and fauna
	Barrier effect from pipeline on the seabed	Water exchange/water quality, sediment transport, flora and fauna
Accident with pipeline	Ship accident with gas release from pipeline, explosion dumped ammunition, break at free span	Human safety, water quality, flora and fauna, air quality

Table 8.4 (PID Nov. 2006 -Table 8.6) Possible environmental impacts related especially to the Nord Stream pipeline inside Danish waters.

8.5 EIA issues of special importance inside German waters

Possible environmental impacts related to the establishment of the Nord Stream inside GERMAN waters		
Activity	Impact parameter	Environmental parameter affected
<b>Planning</b>		
Planning of pipeline route	Crossing protected areas, areas with restrictions, reserved areas	Passing Natura 2000 area Adler Grund and Greifwalder Bodden (EC Habitat and Bird Protection area) Crossing Natura 2000 (EC Bird Protection Area) Oder banke Crossing Military Exercise Areas
<b>Construction</b>		
Pipeline installation	Safety zone of 1,500 m around lay vessel/platform. Area occupied around lay vessel	Fishery Ship traffic
	Physical disturbance/noise from lay vessel and supply vessels	Fish, fishery, mammals, birds, tourism and recreational areas
	Risk of accident with ship collision and related oil spill	Human safety Water quality, flora, fauna, tourism and recreational areas
	Contact with dumped munitions (chemical and conventional ammunition)	Human safety Fauna
Seabed rectification, dredging, trenching and backfilling <sup>1</sup>	Suspended sediment, sedimentation, release of contaminants, nutrients, oxygen consuming substances	Surface sediment, water quality, plankton production, flora and fauna, fish, fishery, mammals, birds, tourism and recreational areas
Rock dumping	Suspended sediment Occupation of seabed	Benthic flora and fauna
Fuel consumption	Fuel consumption	Air quality (local, regional, global)
<b>Pre-commissioning</b>		
Pressure testing (?)	Discharge of test water	Water quality, pelagic flora and fauna, fish, fishery, mammals
	Physical disturbance/noise	Fish, mammals, birds, human
<b>Operation</b>		
Operation of pipeline	Possible safety zone around pipeline with anchoring prohibited	Anchoring of ships

Possible environmental impacts related to the establishment of the Nord Stream inside GERMAN waters		
Activity	Impact parameter	Environmental parameter affected
Planning		
	Occupation and changes of seabed by the pipeline	Oxygen/anoxic conditions in sediment, benthic flora and fauna
	Barrier effect from pipeline on the seabed	Water exchange/water quality, sediment transport, flora and fauna
	Low gas temperature (pipeline temperature)	Flora and fauna
Accident with pipeline	Ship accident with gas release from pipeline, explosion dumped ammunition, break at free span	Human safety, water quality, flora and fauna, air quality
1: If pipeline storage/coating yard and supply base is established in Germany (Lubmin). (?): To be investigated in more detail. Discharge sites of test water not decided.		

*Table 8.5 Possible environmental impacts related especially to the Nord Stream pipeline inside German waters.*

**8.6 Environmental impact on Estonia, Latvia, Lithuania and Poland (other affected parties)**

<b>Possible transboundary environmental impacts related to the establishment of the Nord Stream to ESTONIA, LATVIA, LITHUANIA, POLAND</b>			
<b>Activity</b>	<b>Impact parameter</b>	<b>Environmental parameter affected</b>	<b>Country</b>
<b>Construction</b>			
Pipeline installation	Safety zone of 1,500 m around lay vessel/platform. Area occupied around lay vessel	Fishery Ship traffic	EE, LV, LT, PL
	Physical disturbance/noise from lay vessel and supply vessels	Fish, fishery, mammals, birds,	EE, LV, LT, PL
	Risk of accident with ship collision and related oil spill	Human safety Water quality, flora, fauna, tourism and recreational areas	EE, LV, LT, PL
Seabed rectification, dredging, trenching and backfilling	Suspended sediment, sedimentation, release of inorganic and organic contaminants, nutrients, oxygen consuming substances	Surface sediment, water quality, plankton production, flora and fauna, fish, fishery, mammals, birds, tourism and recreational areas	EE, LV, LT, PL
Rock dumping	Suspended sediment Occupation of seabed	Benthic flora and fauna	EE, LV, LT, PL
Installation of service platform	Safety zone, physical disturbance, noise, dredging, suspended sediment	Fishery, ship traffic	EE, LV, LT, PL
Onshore construction sites – activity from onshore construction site to installation sites <sup>1</sup>	Physical disturbance, noise from supply vessels/helicopter etc.	Fauna especially birds, mammals. People living in the area.	(EE, LV, LT, PL) <sup>1</sup>
Fuel consumption	Fuel consumption	Air quality (local <sup>1</sup> , regional, global)	EE, LV, LT, PL

<b>Possible transboundary environmental impacts related to the establishment of the Nord Stream to ESTONIA, LATVIA, LITHUANIA, POLAND</b>			
<b>Activity</b>	<b>Impact parameter</b>	<b>Environmental parameter affected</b>	<b>Country</b>
<b>Construction</b>			
<b>Pre-commissioning</b>			
Pressure testing	Discharge of test water	Water quality Pelagic flora and fauna, fish, fishery, mammals	(EE, LV, LT, PL) <sup>2</sup>
<b>Operation</b>			
Operation of pipeline	Possible safety zone around pipeline with anchoring prohibited	Anchoring of ships	(EE, LV, LT, PL) <sup>3</sup>
	Barrier effect from pipeline on the seabed	Water exchange/water quality, sediment transport, flora and fauna	(PL)
Operation of service platform	Safety zone of 500 m. around the platform. Ship traffic, anchoring, fishery prohibited	Ship traffic, fishery	EE, LV, LT, PL
Accident with pipeline/service platform	Ship accident with gas release from pipeline, damage to service platform	Human safety, water quality, flora and fauna, air quality	EE, LV, LT, PL
1: If pipeline storage/coating yard and supply base is established in one-several of the countries. 2: An impact depends on where test water is discharged. 3: If 200 m protection zone (anchoring prohibited) is established. EE, LV, LT, PL: Estonia. Latvia. Lithuania. Poland			

*Table 8.6 (PID Nov. 2006 - Table 8.8) Possible transboundary environmental impacts to Estonia, Lithuania, Latvia and Poland, related to the Nord Stream pipeline.*