Nord Stream
The new gas supply route for Europe

Section 14

Further planning

14 Further planning

14.1 Aim and scope of the chapter

The objective of this chapter is to describe the technical activities to be performed by Nord Stream AG during the period between the submission of the environmental impact assessment (EIA) to the Finnish authorities and the start of pipe-laying activities.

This chapter begins with a brief description of the remaining steps of the EIA and permitting procedures. A description of the technical activities to be performed by Nord Stream AG to prepare for pipe-laying follows.

14.2 The EIA and permitting procedures

As part of the Finnish national EIA procedure, there is a two-month (maximum 60 days) consultation period after submission of the EIA report to the coordinating authority, Uusimaa Environment Centre. Following the consultation period, the coordinating authority will issue its statement on the EIA report at the latest on 3rd of July 2009. The issuance of this statement concludes the national EIA procedure.

The Espoo transboundary report will be notified after submission of the Nord Stream Espoo Report to the Ministry of Environment. Public display and participation will be organised in parallel with the national EIA procedure.

According to the permit authorities the Nord Stream project requires two different permit applications. The permits are:

- Consent according to the EEZ Act
- A permit for construction according to the Water Act.

The EIA processes and permitting procedures are not described in further detail in this Chapter. The Espoo procedure is described in Chapter 4.1., and the national EIA procedure is described in Chapter 4.2. The required permits and legislation are presented in Chapter 4.3.

14.3 Nord Stream activities following submission of the EIA report

The technical design of the Nord Stream pipelines that has been ongoing during the EIA procedure will continue after submission of the EIA report. Figure 14.1 presents Nord Stream's activities prior to the start of construction.

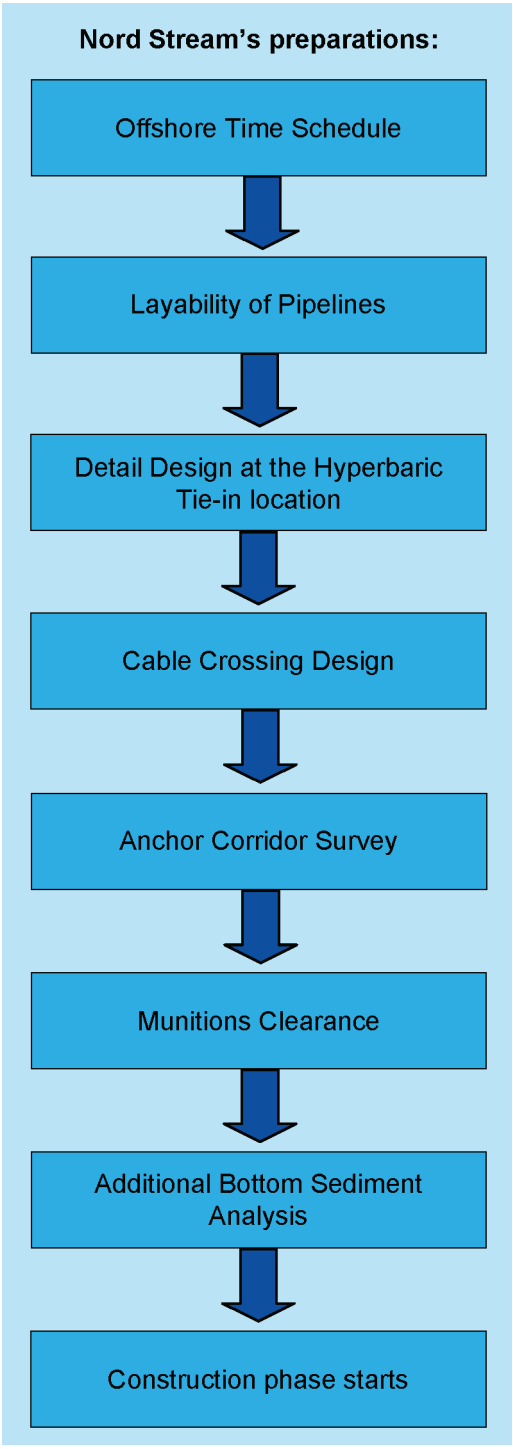

Figure 14.1. An overview of Nord Stream's pre-construction activities following submission of the EIA report.

A more detailed description of the activities is presented in Chapters 14.3.1–14.3.9.

14.3.1 Offshore installation time schedule

The time schedule presented in Chapter 3.5 was established at the time of submission of the EIA report. It is the base case schedule for the Nord Stream project. Nord Stream AG is in the process of optimising the offshore installation time schedule to accommodate the following constraints and variables:

- As a minimum, there will be two pipeline installation vessels, Castoro 6 and Solitaire, which have to be hired for a specific time of operation.
- Limited access for pipeline pull-in and pipeline installation operations at Russian and German landfall sites.
- Limited access for pipeline installation operations between KP 0 and KP 300 due to the ice season (December through April).
- Limited access in Russian and Swedish waters due to fish spawning season.
- Further development and optimisation of pre-commissioning philosophy.
- Further development and optimisation of hyperbaric tie-in philosophy.
- Ongoing discussions with pipeline installation contractors Saipem and Allseas.

Potential changes to the base case time schedule will mainly be related to the installation sequence of the three individual pipeline sections. Two of these sections are located in the Finnish EEZ (KP 0 to KP 300 and KP 300 to KP 675).

Based on the results of the EIA Nord Stream announced in January 2009 that the intention is to use a dynamically positioned lay-barge which uses no anchors for the first 300 km of both pipelines (south-eastern and north-western, KP 0-300). Other parts of the pipeline route are planned to be laid with an anchored lay-barge.

14.3.2 Layability of pipelines

At the time of EIA reporting, the design for pre-lay seabed intervention works was being established. As described in Chapter 3.5, pre-lay works include 12 m x 5 m rock berm supports.

The feasibility of pipeline installation over supports situated in straight lines as well as on curves as defined by SES must be confirmed by the pipeline installation contractors Saipem and Allseas. Detailed installation engineering must consider the following variables:

- location of supports (on a curve or in a straight line)
- radius of pipeline route curves
- water depth along the route
- required pipeline installation tension.

The outcome of the installation feasibility assessment may be that the size of the pre-lay rock berms at some locations needs to be increased, e.g., to 15 m x 5 m and/or 20 m x 5 m. It should be emphasised that the potential increase in pre-lay rock volume is marginal compared with the overall volume for post-lay intervention works. Therefore, the increased impact on the environment will be limited. In this respect, reference is made to the base case pre- and post-lay rock volumes defined in Chapter 3.5.

As stated in section 14.1, this chapter addresses the technical activities, which Nord Stream has to perform from the submission of the EIA to the Finnish authorities until pipe-lay operations can start. It should however be noted, that after installation of the pipelines re-engineering of the post-lay rock berms could be required based on the as-laid configuration of the pipelines. This could lead to variations in rock volume and location of the post pipe-lay rock berms.

14.3.3 Hyperbaric tie-in

Hyperbaric tie-in will be performed in the Gulf of Finland at approximately KP 300.

Gravel basements for tie-in equipment will be built on the seabed prior to pipeline installation. One basement will be built for the north-west pipeline and another will be built for the south-east pipeline.

The pipeline sections will be laid on the basements and then abandoned until hyperbaric tie-in.

If required by detailed design, rock berms/mattresses could be used before tie-in to ensure adequate temporary protection of pipeline ends against environmental loading and possible interaction with trawl gear.

Additional rock could be necessary to ensure stability in the event of unanticipated critical freespans.

The gravel basements will be designed to withstand loads throughout the period prior to tie-in as well as to withstand the loads exerted by the pipelines and the H-frames that will be used during tie-in operations.

14.3.4 Cable crossings

The pipelines will cross several in-service cables in the Finnish section. Cable positions are available in terms of UTM coordinates and heading and presented in the Atlas Map IN-1-F.

Cable crossing agreements for all existing cables will be established with cable owners before the start of pipe-laying.

Cable crossings are mainly carried out by placing artificial support (concrete mattresses or rock berms) to maintain an adequate distance between the bottom of the pipeline and the top of the cable to be crossed for the entire lifetime of the pipeline, as stated in the relevant DNV code.

SES's detailed design will consist of optimising the location, height and dimension of the intervention works in the cable crossing areas according to the local morphology or pipe/cable coverage in order to minimise the required intervention works and fulfil the relevant criteria.

No intervention works are foreseen for out-of-use cables.

14.3.5 Anchor corridor survey

Prior to pipeline installation an anchor corridor survey is required to identify, verify, record and catalogue all probable obstructions that could impact safe pipe lay or anchoring and mooring of the lay barge and/or lead to an adverse impact on the environmental. The corridor will extend 1000 m either side of each final pipeline route in water depths greater than 100m and 800 m in water depths of less than 100m.

The survey scope of work is described in detail in Chapter 3.5 and summarised below.

The scope of work is developed from the detailed munitions screening survey /1/ which has established a highly detailed baseline of potential obstructions and hazards. In addition to establishing the seabed topography across the complete corridor, the survey will focus on locating and assessing cultural heritage and potential hazards (such as munitions) to the pipeline installation and long term integrity,

The anchor corridor survey scope will include four phases as follows:

- **Phase 1:** Geophysical survey, multibeam, side scan sonar, magnetometer
- **Phase 2:** ROV visual inspection
- **Phase 3:** ROV based gradiometer surveys in critical sections
- **Phase:** Expert evaluation of objects

The results of the anchor corridor survey shall be input to a formal risk assessment to determine the risks of anchoring during pipeline installation. If required then mitigation measures shall be implemented to reduce risk (due to unexploded munitions on seabed) during anchoring to an acceptable level.

In January 2009 the phase 1 surveys in the Finnish project area have been finalised. Due to the intention of using dynamically positioned lay-barge for KP 0–300 of both pipelines visual

inspections and expert evaluation (phases 2-4) are expected to be done only in parts where anchored lay-barge will be used.

14.3.6 Munitions clearance

Altogether 29 munitions were identified at 28 locations on Route Alternative 1 (C14) and 31 munitions at 30 locations on Route Alternative 2 (C16) during a munitions survey of the installation corridor. It is also expected that more munitions will be identified in the anchor corridor during the anchor corridor survey. All munitions will be handled to ensure that they do not pose any risks during construction and operation of the pipelines. Clearance of munitions will only be conducted in conjunction with relevant national authorities.

Munitions clearance procedures are described in greater detail in Chapter 3.5.

Due to the intention of using dynamically positioned lay-barge without anchors for KP 0–300 of both pipelines munitions clearance will be done only in parts where anchored lay-barge will be used.

14.3.7 Additional bottom sediment analysis

Because some sections of the pipeline routing have been optimised since the previous sediment surveys conducted by FIMR in 2007-2008 /2/, it will be necessary to carry out additional sediment analysis at locations on the new pipeline routing where seabed intervention work will take place. Still photos of the seabed at each of these locations should be included as well, to monitor benthic fauna and other parameters. These activities are described in further detail in Chapter 15.

14.3.8 Risk assessment of unplanned events

Prior to construction a formal risk assessments shall be conducted of:

- interaction of pipelay barge anchors and anchor wires with unexploded munitions during construction; and

- interaction of commercial fishery trawling gear with the pipeline after construction.

14.3.9 Co-operation with fishery sector

Nord Stream proposes to develop together with fishermen – involving both national associations and FOGA – a training programme for all Baltic Sea fishermen. This programme will address all questions and give recommendations around fishing and submarine pipelines in order to ensure safe fishing activities.

In order to guarantee that fishermen will know how to fish in areas near the pipelines, Nord Stream will ensure there will be professional training of all Baltic fishermen and information material available for all areas around the pipeline. The pipeline and its positions including information on free spans will be integrated into charts that will be made available to the fishermen through appropriate distribution channels and during training sessions.

Lately, a new type of trawling gear was developed for use in Canadian waters where boulders posed an obstruction to traditional bottom trawling doors. The system guarantees that the trawl doors remain above the seabed during bottom trawling. This type of trawl board has also been tested in the SINTEF tests in December and shows large potential: the trawl board passed over the pipe and the bottom net passed over the pipeline without any problem. Nord Stream is considering conducting tests of this gear in co-operation with fishermen and the supplier. Nord Stream is confident that this could be a viable solution as these trawl boards also have a direct advantage for the fishermen: They move with less resistance on the seabed and thereby reduce fuel consumption.

Nord Stream is striving to minimise restriction zones and to minimise risk due to fishing gear-pipeline interaction. Therefore the following actions will be taken:

- Determination of inevitable restriction zones based on present design and risk assessments, including the results of the scale models test.
- Embedment assessment to reduce restriction zones.
- Investigation of potential fishing method and gear adjustments to reduce restriction zones.
- Determination of least number of unavoidable restriction zones based on the results of the previous steps.

This process is ongoing in close co-operation with the fishermen and the responsible authorities.

14.3.10 Additional activities

The EIA and permitting procedures may result in requests for changes to the Nord Stream project. Such requests will be considered and incorporated, to the necessary extent, into plans for the preparation of construction works.