Nord Stream
The new gas supply route for Europe

Section 7

Description of the environmental impact assessment

7 Description of the environmental impact assessment

This chapter describes the background and methodology used in the environmental impact assessment work. It describes the requirements set by the Finnish legislation on environmental impact assessment and how impacts have been identified and included as part of the assessment work throughout the EIA process (scoping). Also the description and evaluation of the different impacts is described in this chapter.

THE DESCRIPTION OF THE ENVIRONMENTAL IMPACT ASSESSMENT

Introduction (Chapter 7.1) overall view of the EIA context in the Nord Stream project and a presentation on how the content of the actual impact assessment has been structured in the chapter for environmental impact assessment (Chapter 8).

Studied impacts (Chapter 7.2) provides information on how the scoping of the studied impacts has been done in the context of the requirements set by the Finnish legislation on environmental impact assessment.

Methodology of the description and evaluation of project impacts (Chapter 7.3), describes how the studied impacts have been characterized and generally how the significance of the impacts has been assessed.

Comparison of alternatives (Chapter 7.4), describes how the alternatives (see Chapter 6) have been compared with respect to the significance of the impacts.

Impact area (Chapter 7.5) describes the extent of potential impacts along the route in the Finnish project area. The impact area is estimated separately for each impact entity.

7.1 General

The purpose of the Finnish EIA is to perform a systematic assessment of environmental impacts from the planned Nord Stream project. The EIA has been carried out as a national procedure in accordance with the Finnish Act on Environmental Impact Assessment Procedure. The aim of it has been to assess environmental impacts potentially arising inside the Finnish exclusive economic zone (EEZ) and to a certain extent in the Finnish territorial area.

The evaluation has been carried out for three separate project phases: **construction, operation and decommissioning**. Overall, the construction of the two pipelines including both pipelaying and seabed preparation work is expected to take approximately 30 months. The operational life of the pipelines is designed to be approximately 50 years.

Figure 7.1. Arctic terns in the Gulf of Finland (Photo: Antti Tanskanen).

The environmental impacts from construction and operation of the Nord Stream project and comparison of alternatives (see Chapter 7.4) are described in Chapter 8. Environmental considerations for decommissioning of the pipelines are described separately in Chapter 10. The conclusions of the assessment have been summarized presented in Chapter 11. Measures for mitigation and prevention of impacts (Chapter 13) and a proposal for a monitoring plan (Chapter 15) have been described on the basis of the results of the assessment.

THE STRUCTURE OF THE EACH ENVIRONMENTAL IMPACT ASSESSMENT SECTION (Chapter 8)

Overview
A short overview of the baseline conditions.

Impact mechanisms
Description of how each project activity can affect/change the baseline status of a single impact target (the object receiving the impact, i.e. water column, protected area and ship traffic).

Methods and used data
Description of what source material and methodology have been used to assess the environmental impacts. The methodology defines how impacts have been quantified (direct measurements, Geographic Information Systems, threshold values, comparative studies, etc.). The impact assessment almost always includes a qualitative expert assessment and is therefore often a combination qualitative and quantitative methods.

Impact assessment of impacts during construction and operation
Description of the results of the impact assessment. Impacts during construction and operation are discussed separately. The description defines the character, magnitude and overall significance of each assessed impact.

Comparison of alternatives
Description of the difference of each studied alternative with respect to environmental impacts. Compared alternatives include Alternative 1 (C14), Alternative 2 (C16), sub-alternative 1a/2a (South of Gogland in Finnish section) and the non-implementation alternative (0-alternative).

Lack of information and uncertainties
A description on possible uncertainties or missing information which could have made the impact assessment more comprehensive and solid.

Conclusion
Description of the impact magnitude, value and sensitivity of the impact target (the object receiving the impact) and the overall significance of the assessed impacts.

7.2 Studied impacts

7.2.1 The Finnish EIA legislation

The direct or indirect impacts from the Nord Stream project have been identified and assessed based on the requirements of the Finnish legislation on environmental impact assessment. Following impacts have been listed in the Finnish legislation as impacts to be studied:

- impacts on human health, living conditions and amenities
- impacts on soil, water, air, climate, organisms and biological diversity
- impacts on the community structure, buildings, landscape, townscape and cultural heritage
- impacts on the utilisation of natural resources
- impacts on the interaction between the above factors

The specific impacts assessed in the Nord Stream project in Finland have been identified based on the above list according to the process described in chapter 7.2.3.

7.2.2 Impacts from planned activities and unplanned events

Two different types of impacts have been assessed in the Finnish EIA; impacts from planned activities and unplanned events (accidents and incidents). The division has been done in order to distinguish between impacts that are very likely to occur and those that occur unexpectedly from events that have not been planned.

- **Impacts from planned activities:** impacts that result from a planned or known activity (Chapter 8). Such impacts are very likely to occur during the course of the project (e.g., an increase in turbidity levels in the water column due to seabed intervention works).
- **Impacts from unplanned events:** those impacts that result from an unplanned event, i.e. as accidents or incidents (e.g., a fuel spill during construction) (Chapter 9). Although such impacts are not expected during the project, the likelihood (risk) of the impact occurring has been assessed.

The assessment of impacts from planned activities includes an estimation of the impact's character; e.g. quality, type, extent, reversibility and importance. By relating these variables to the magnitude of the impact (extent and duration), the conclusion of the impact's overall significance has been made.

Impacts from unplanned events are assessed by using an impact's significance, which is termed "consequence", and introducing the concept of probability, or the likelihood of an impact occurring.

7.2.3 Identification of impacts from planned activities

Initially, potential impacts assessed in this EIA have been identified by considering the various project activities that might impact the environment (including socio-economical environment). Completion of this stage has required detailed information about the project and design, the various project activities and an understanding of the baseline environmental conditions. A preliminary list of identified potential impacts was presented in the EIA programme /18/. The list was developed further during the EIA report phase.

The list of studied impacts is based on:

- **Project description:** an analysis of the project design and processes resulted in a clear understanding of the project activities.
- **EIA programme:** the EIA programme (scoping document) and the coordinating authority statement (Appendix VIII) on it highlighted the potential environmental and socioeconomic components that may be impacted during a certain timeframe and over a certain distance.
- **Input from parties involved:** the input of i.e. NGO´s, authorities and private persons was considered in determining the potential impacts of concern
- **Expert knowledge:** expert knowledge from specialists and regulators was used to determine the potential impacts and concerns.
- **Prior experience:** prior experience with similar pipeline projects contributed to impact identification.
- **Potential impacts:** the interactions between the project and the environment made it possible to identify potential impacts that may result from planned and unplanned events.

A matrix defining possible interaction between the identified project activities and environmental targets has been based for the three main phases of the project (Table 7.1). In this way, a specific impact could be selected for further impact assessment if an interference with an environmental target was foreseen. The identification process has exclusively taken into account project activities planned for the project area in Finland (marked with F in Table 7.1).

Table 7.1. Impact target matrix for Finnish EIA. If interference between a project activity and an impact target (= potential impact) has been foreseen during the impact identification process, it has been marked with an X. The identification has been done only for planned activities within the project area in Finland (columns marked with F). Social impacts relate to human perception of the project as a whole. Therefore, 'citizens wellbeing' covers all the activities.

		Construction																	Operation				Decommissioning
		Seabed preparation (pre- and post lay)								Pipe laying					Pre-commissioning and commissioning								
		Munitions clearance	Rock placement	Boulder removal	Wreck removal	Trenching	Dredging	Sheetpiling	Support structures	Pipe supply	Shallow water pipelaying	Offshore pipelaying	Hyperbaric tie-in on rock foundation	Anchor handling	Flooding, cleaning, gauging, testing	Dewatering	Drying: dry air	Commissioning	Pipeline on seabed and gas flowing	Monitoring and surveying	Restriction zones	Maintenance rock placement as required	To be decided when appropriate
Activity in	Russia	R	R	R			R		R	R	R	R		R	R	R	R		R	R	R	R	
	Finland	F	F							F		F	F	F					F	F	F	F	
	Sweden	S	S			S				S		S	S	S					S	S	S	S	
	Denmark		D			D				D		D		D					D	D		D	
	Germany				G	G	G	G		G	G	G		G			G	G	G	G	G	G	
Physical & chemical environment	Seabed	x	x									x		x					x			x	
	Water quality	x	x							x		x	x	x					x	x		x	
	Air quality	x	x							x		x	x	x						x		x	
	Noise	x	x							x		x	x	x					x	x		x	
Biological environment	Benthic environment	x	x									x		x					x			x	
	Planktonic environment	x	x											x					x			x	
	Fish and fish stocks	x	x											x					x	x	x	x	
	Marine mammals	x	x							x		x		x					x	x		x	
	Seabirds	x	x							x		x		x						x		x	
Protected areas		x	x							x		x	x	x					x	x	x	x	
Socio-economic environment	Ship traffic	x	x							x		x	x						x	x	x	x	
	Fishery	x	x							x		x	x	x					x	x	x	x	
	Military areas	x	x							x		x		x						x		x	
	Infrastructure	x	x									x		x					x			x	
	Cultural heritage	x	x									x		x					x			x	
	Human health	x	x																x				
	Tourism and recreation	x	x							x		x	x	x					x	x	x	x	
	Citizens wellbeing	x	x							x		x	x	x					x	x	x	x	

During the finalisation of this EIA Nord Stream has announced that the plan is to partly replace the need of an anhoring lay barge with a dynamically positioned laybarge (so called DP - vessel) which requires no anchoring for manoeuvring. According to the plans, the DP vessel will be used from the Russian border for the first 300 km of both pipelines (south-eastern and north-western, KP 0-300). The impact assessment is however made according to a worst-case-scenario, which means that the assessment is based on an assumption where all pipelaying of both pipelines would be done with anchored laybarge. Preliminary environmental considerations on munitions clearance and barrels within the anchoring corridor are presented in Appendix XII. Actual impact assessment will only be possible after anchoring corridor surveys are finalised (autumn 2009).

7.2.4 Transboundary impacts

The Nord Stream pipeline project may have transboundary impacts within both the countries of origin (countries through which the pipeline system passes, which includes Germany, Denmark, Sweden, Finland and Russia) and possible affected parties (those countries in the vicinity of the project area, which includes Estonia, Latvia, Lithuania and Poland).

The assessment of transboundary impacts is not a part of the Finnish national EIA. This EIA solely comprises assessment of impacts potentially arising and affecting impact targets inside the Finnish EEZ borders.

The transboundary impacts have been assessed apart from the Finnish EIA in the Espoo report /5/ in accordance with the Convention on Environmental Impact Assessment in a Transboundary Context (1991).

7.3 Methodology for description and evaluation of project impacts

This chapter provides the terminology used in the impact assessment when describing the character, magnitude and the overall significance of the studied impacts. The description of the impacts “step-by-step” is an important tool which allows the expert to end up to a final conclusion in a similar logical order for different impact. All assessed impacts do not however hold a character that allows them to be described completely with this approach. However, with this similar approach to all of the topics the results of different impact assessments are more comparable with each other.

It is important to stress here that the actual scientific methods and data used for assessing the significance (e.g. guidelines, threshold values, assumptions) of impacts is presented within each sub-chapter in Chapter 8.

7.3.1 Description of definitions for categorizing environmental impacts

7.3.1.1 Characterisation of impacts

Impacts have been characterised according to their **quality, type** and **reversibility**. Quality refers to whether the impact is negative or positive. Type refers to whether an impact is direct or indirect. Reversibility refers to the ability to restore an impacted target to its pre-impact state. Ideally, all impacts associated with the project are reversible. However, if impacts remain after mitigation measures have been taken and the activity in question has ended, impacts are termed 'residual impacts'.

The **importance** of impacts has been assessed as an expert evaluation. The importance – low, medium or high – is based on the value and sensitivity of an impact target and the impact magnitude. The value of an impact target has been estimated, i.e., on the basis of legislation, regulations, proportionality principle and authority and stakeholder input.

IMPACT CHARACTERISATION

Quality of impact

Negative
An impact that results in an adverse change from the baseline or introduces a new, undesirable factor.

Positive
An impact that results in an improvement of the baseline or introduces a new, desirable factor.

Both
An impact that results in an adverse but, also an improvement of the baseline.

Type of impact

Direct
Impacts that result from a direct interaction between a planned project activity and the environment (e.g., occupation of a habitat during pipeline installation).

Indirect
Impacts that result from other activities as a consequence or circumstances of the project (e.g., an increase in fishery activity along the pipeline route due to the creation of an artificial habitat favourable to certain target species). The secondary impacts have been considered as indirect impacts.

Both
An impact resulting in both direct and indirect impacts for same impact target (e.g., increase in turbidity causing direct feeding problems for diving birds and the indirect impacts by causing prey-fish to flee).

Reversibility of impact

Reversible
An impact is reversible when the affected target can return to its pre-impact state (e.g., turbidity levels in the water column will decrease to normal levels following construction).

Partly reversible
An impact is partly reversible if the impact target can partly return to its pre-impact state (e.g., a crater created in connection to munitions clearance can be partially re-filled through natural sedimentation).

Irreversible
An impact is irreversible if the impact target can not return to its pre-impact state (e.g., the occupation of the seabed by the pipeline is regarded as irreversible).

Importance of impact

Low
Impact target has low value and/or sensitivity. It has not caused much concern during the EIA process or the magnitude is minor.

Medium
Impact target has medium value and/or sensitivity. It has caused some concern among stakeholders and the impact magnitude is medium or high.

High
Impact target has high value and/or sensitivity (e.g., Natura 2000 area). It has caused considerable concern among stakeholders and the magnitude can be high.

7.3.1.2 Impact magnitude

The magnitude of the change to the physical, biological and social/socioeconomic environment has been expressed, wherever practicable, in quantitative terms. Social impacts have been given a line because these impacts relate to the human perception of the project as a whole.

The assessment of the **extent** and **duration** of a potential impact determines the impact's magnitude.

IMPACT MAGNITUDE

Extent of impact

Local
Impacts that affect locally important targets in close vicinity to the pipelines. A local impact is typically occurring within 5 km from the source. The impact in this project is therefore principally restricted to the EEZ of Finland (e.g., suspension of sediments in the water column).

Regional
Impacts that affect targets in the EEZ of Finland, but also exceed the territorial borders of Finland. A regional impact is typically occurring within a range of 5 - 40 km from the source.

National
Impacts that affect environmental targets on national extent or of national importance (e.g., loss of a nationally important marine faunal breeding area or social impacts).

Duration of impact

Short
The impact lasts for less than 3 weeks

Medium
The impact lasts for 3 weeks to one year

Long
The impact lasts for one to 10 years

Permanent
The impact lasts for more than 10 years

7.3.2 Overall impact significance

The evaluation of the **overall impact significance** is the most relevant part of the impact assessment. The impacts in this EIA have been defined in categories from “No impacts” to “Significant impacts”. The quality of the impact, either positive or negative is defined apart from the impact significance.

The significance of the impact takes into account the quality, type, extent, reversibility and importance of the impact. These variables have by the means of an expert evaluation been considered in relation to the impact’s magnitude and the value/sensitivity of the impact target.

The definition of impact significance should not be regarded as absolute; the significance is evaluated in relation to the objective to maintain or reach a situation. For example, if an impact affects a species categorised as threatened and another that is not threatened, the impacts on the latter should be regarded as less significant than the former, even if the impact is of the same magnitude.

OVERALL IMPACT SIGNIFICANCE

No impact
The impact target is not affected.

Minor impact
Impact target has typically **low** importance (i.e. low value/sensitivity) or the impact magnitude is assessed to be **low**. The impact is typically **local** and **short-termed**. The impact is typically **reversible**. The impact is typically not significant for the impact target.

Moderate impact
Impact target have typically **medium** importance (medium value/sensitivity). The impact is typically **local** or **regional** and the duration **medium** or **long**. The impact is typically **partly reversible** or **irreversible** and is typically not significant for the impact target.

Significant impact
Impact target has **high importance** (i.e. high value/sensitivity). The extent can typically be **national** and duration **long** or **permanent**. The impact is typically **irreversible** and is typically significant for the impact target.

7.4 Comparison of alternatives

The impacts of the planned Nord Stream pipelines, implemented through Alternative 1 or Alternative 2, are evaluated and compared with the non-implementation alternative (0-alternative). All three alternatives have been assessed as equal alternatives for implementation of the project (see Chapter 6). The sub-alternative 1a/2a has been assessed separately from other alternatives and has been compared with the local section of Alternative 1 or 2.

The route alternatives 1 and 2 are for the most part technically similar. Approximately 90% of the route of Alternative 1 is exactly the same as for Alternative 2. Therefore the impacts from both alternatives will be highly similar. The difference between the alternatives is the ca 42 km long southern deviation of the Alternative 2 in the Kalbådagrund area.

In order to focus more in detail on the difference of the alternatives in the Kalbådagrund area, a separate chapter has been dedicated to only assess the differences between Alternative 1 and 2. The comparison of alternatives has been done in 2 steps

1. Alternative 1 is compared to the non-implementation of the project (0-alternative), where after
2. Alternative 2 has been compared to Alternative 1

The sub-alternative 1a/2a has been assessed as if it would be a “potential route modification” in a short (~ 3 km) eastern section of the pipeline. The sub-alternative has been assessed as a possible modification in both the Alternative 1 and 2.

The main results of the assessment of the impacts of each alternative have been presented in conclusions Chapter 11. The impacts have been presented for each alternative in a table indicating the scale of significance.

7.5 Impact area

The extent of impact describes the geographical area that may be affected by the project. The pipeline route in Finland is approximately 375 km (Figure 7.2). However, potential impact area differs depending on the environmental conditions (sediment types, bathymetry, etc.), the specific impact target (water column, marine mammals, etc.) as well as the impact (increase in turbidity, noise, etc.). As such, the corridor of impact may extend from ~ 1 m (e.g. occupation of seabed) to a number of kilometres on either side of the pipelines (e.g. noise). Certain impacts have been assessed on the national level (e.g. social impacts).

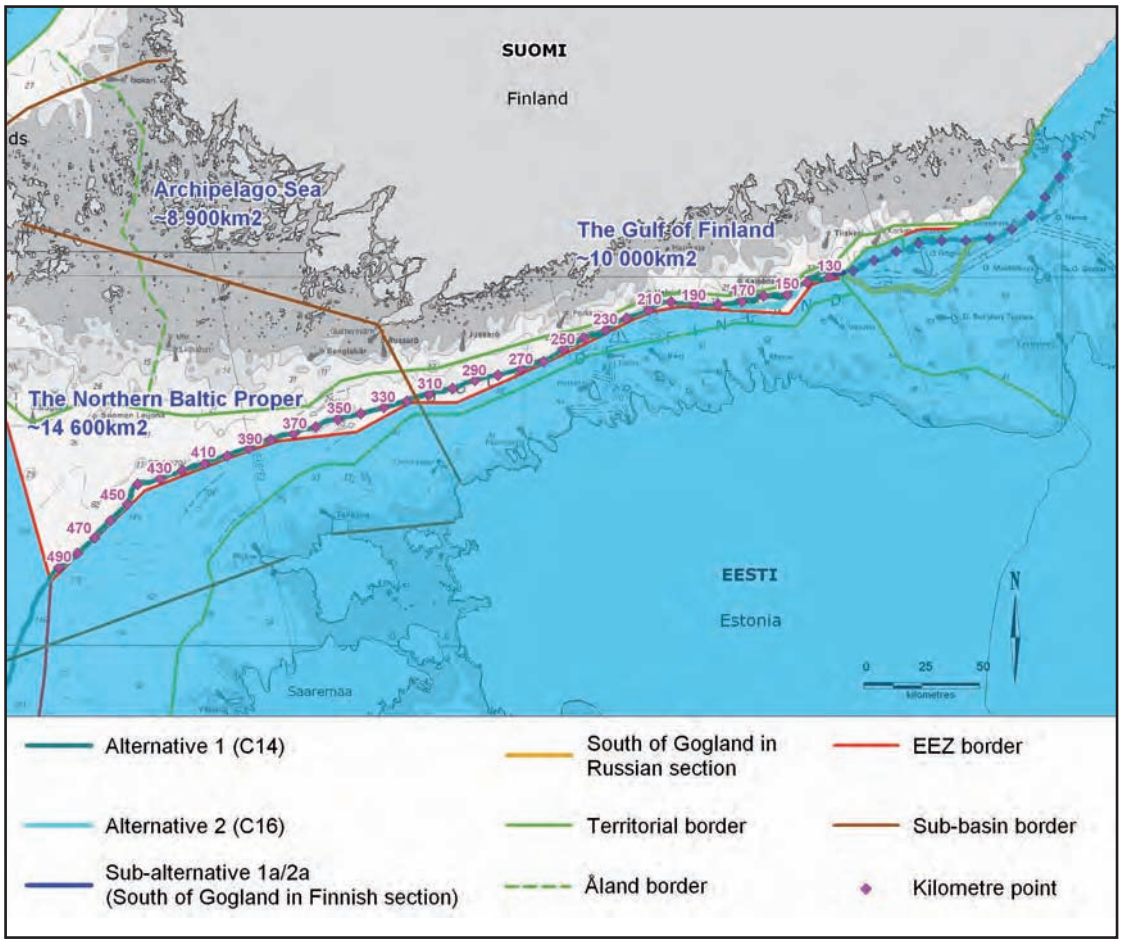

Figure 7.2. The Nord Stream alignment lies solely within the Finnish exclusive economic zone (EEZ) within the Gulf of Finland and the Northern Baltic Proper sub-basins. The approximate water surface area of each sub-basin in Finland is given below the name. The routes are described in Chapter 3.2.

At offshore locations far from environmentally sensitive areas, where the pipeline will be placed directly on the sea floor by the lay vessel without seabed intervention works, the width of the corridor for the impact assessment is relatively restricted.

The impact area for the transport routes between the logistics areas in Kotka and Hanko will follow international shipping routes. The noise, visual and physical impacts on the transport routes result in an impact corridor of max 2,000 m.