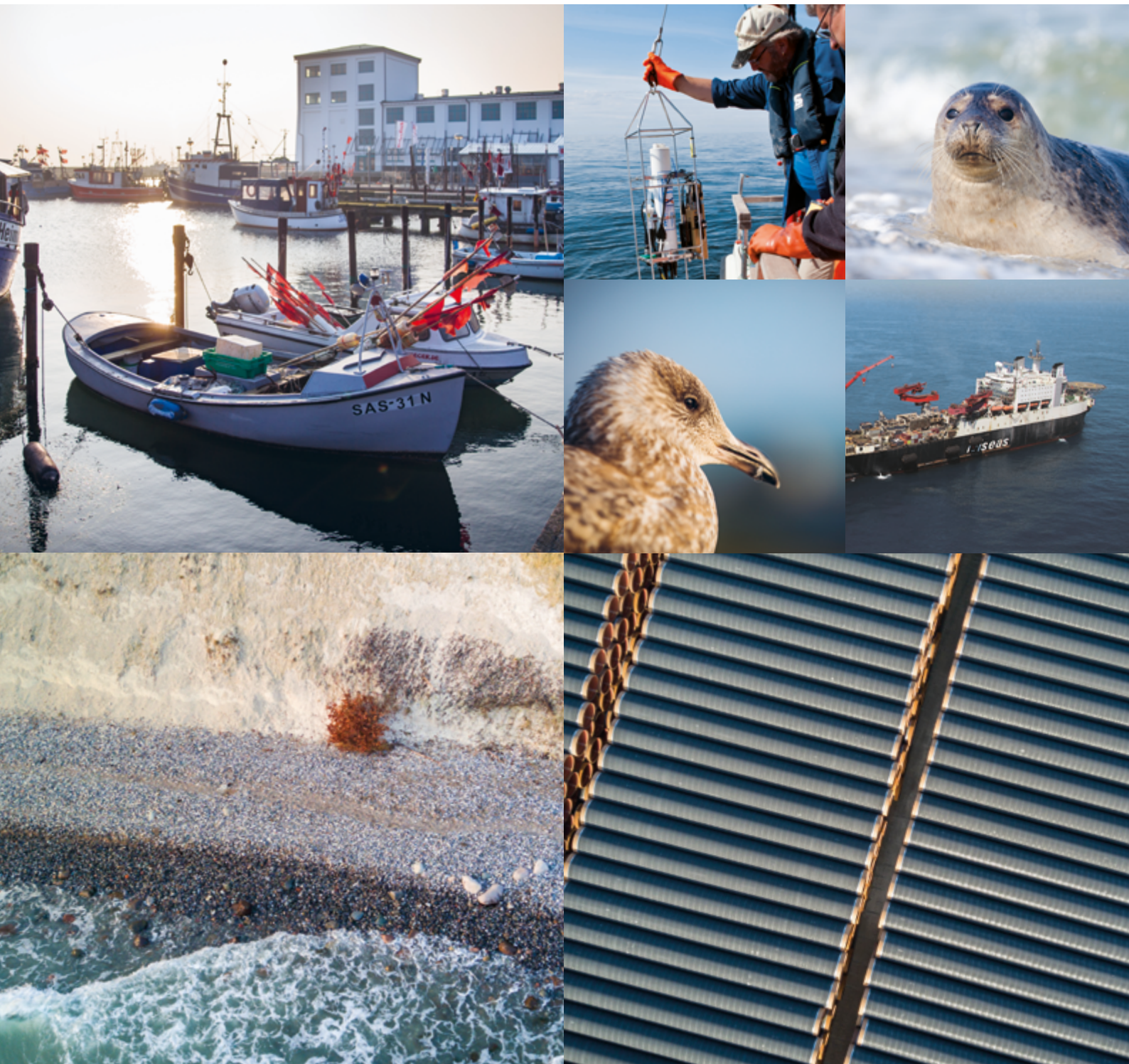


Nord Stream 2

Espoo Report – Non-Technical Summary



Transporting Natural Gas to the EU

Nord Stream 2 is an infrastructure project comprising a natural gas pipeline system to be constructed through the Baltic Sea. The pipelines will transport natural gas from the world's largest gas reserves in Russia to the EU's internal gas market, thus helping to meet the EU's demand for gas, as domestic production declines.



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Nord Stream 2 Non-Technical Summary

1. Overview

Nord Stream 2 is a project to build and operate a new twin pipeline through the Baltic Sea, which will transport natural gas from the world's largest reserves in Russia to the internal gas market in the European Union (EU). The new pipeline will largely follow the route and technical approach of the existing Nord Stream pipeline system, which became fully operational in 2012.

With the EU's domestic gas production projected to fall 50 percent over the next two decades, the region needs to increase imports. The Nord Stream 2 pipeline system will have the capacity to supply gas for up to 26 million households. By supplementing existing transportation routes, it can contribute towards closing the EU's import gap and help to reduce imminent risks to supply security.

Countries which could be affected by the construction or operation of the Nord Stream 2 pipeline system have the chance to find out more about the project and share their views, before construction begins. Nord Stream 2 must assess the project's likely environmental impacts and consult with affected countries. This process is governed by the Espoo Convention – the Convention on Environmental Impact Assessment in a Transboundary Context.



This document is the Non-Technical Summary of the Espoo Report which was prepared for the non-specialist reader and summarises the approach and key findings of Nord Stream 2's Environmental Impact Assessments (EIAs¹), which are further summarised as follows:

- > Nord Stream 2 has undertaken thorough seabed surveys to identify a safe and optimal route through the Baltic Sea and alternate route options were compared in respect to environmental, safety, socio-economic and technical criteria;
- > Nord Stream 2 has adopted the highest international standards for the design and construction of underwater pipelines. All design and construction works will be certified by an independent certifying agency, DNV GL;
- > Nord Stream 2 has prioritised the identification of, and committed to implement, a range of measures – “inbuilt mitigation” – to avoid or minimise potential environmental impacts that could arise. This upfront approach to mitigation represents industry best practice and the EIAs reflect the situation with these measures in place;
- > As a result of this approach, only a limited number of environmental impacts will occur, a majority of which will be **negligible** to **minor** due to their short-term duration and limited spatial extent; and
- > Nord Stream 2 follows in the footsteps of the successful construction and operation of the existing Nord Stream pipeline system. Several years of environmental monitoring demonstrate that this existing system has had no significant environmental impacts.

The expert team behind Nord Stream 2 is committed to building a safe and sustainable subsea pipeline system that causes no significant or lasting impacts to the Baltic Sea, the onshore environment or local communities. You can read more details about the project and the assessed environmental impacts in the full Espoo Report, available via www.nord-stream2.com.

¹ The term “Environmental Impact Assessment (EIA)” has been used in this Non-Technical Summary to refer to the relevant environmental studies that are being prepared by Nord Stream 2 AG. This includes EIAs, as required under the respective national legislation, as well as the Environmental Study prepared for Sweden (due to there being no legal requirement for an EIA), to evaluate the environmental impacts of the project components in each country where they are located.

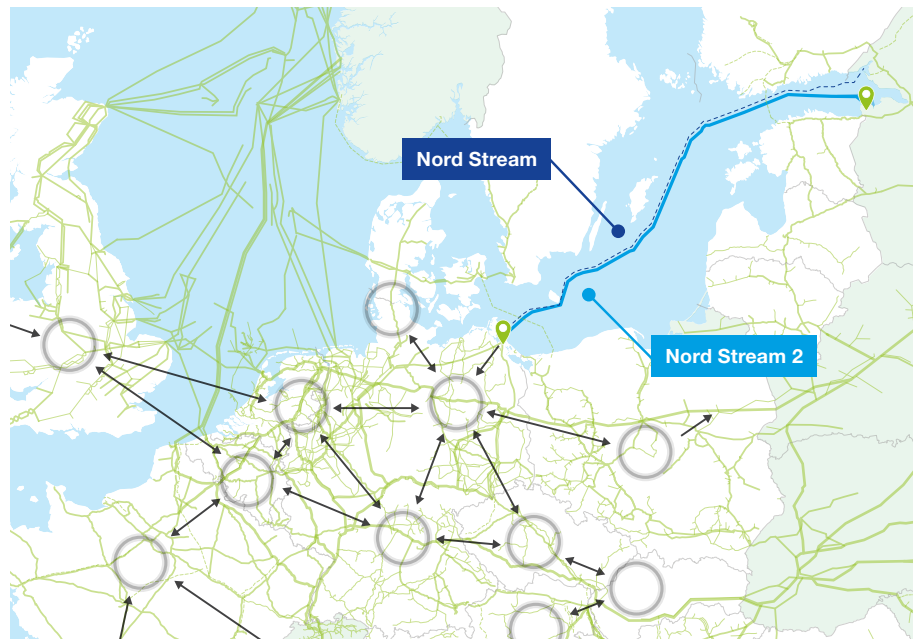
2. What is the Nord Stream 2 Project?

Nord Stream 2 will transport natural gas into the EU market to meet demand

Nord Stream 2 is a planned natural gas pipeline system that will increase transportation capacity into Europe to meet the region's growing import needs. The twin pipelines will run from the Baltic coast in Russia, through the Baltic Sea, reaching landfall near Greifswald in Germany. Once the gas enters the EU internal market, it can be transported onwards to wherever it is needed.

Nord Stream 2 builds on the successful construction and operation of the existing Nord Stream pipeline system, which became fully operational in 2012 and has been recognised for its high environmental and safety standards, green logistics and transparent public consultation process.

Once natural gas delivered by Nord Stream 2 reaches Germany, it can – in the future – flow anywhere in the EU's internal energy market. (Illustration indicative only)



Nord Stream 2 has spent several years conducting research and carrying out surveys around the proposed pipeline route. These investigations range from technical and environmental studies to examinations of social and socio-economic impacts at local, regional and international levels.



What is permitting, EIA and Espoo?

PERMITTING

The Nord Stream 2 Project is subject to national legislation in each of the countries whose territorial waters and/or Exclusive Economic Zones it crosses: Russia, Finland, Sweden, Denmark, and Germany. According to the requirements of country-specific national legislation, Nord Stream 2 submits its national permit applications and EIAs to the relevant national authorities. Necessary permits must be obtained before construction can start in that jurisdiction. This process is known as “permitting”.

ENVIRONMENTAL IMPACT ASSESSMENTS (EIA)

Nord Stream 2 is preparing thorough national Environmental Impact Assessments (EIAs) as part of the permitting process in each country whose waters the pipeline route crosses, namely, Russia, Finland, Sweden, Denmark and Germany. These national EIAs describe and evaluate the potential impacts originating in their respective countries.

ESPOO

Under the Convention on Environmental Impact Assessment in a Transboundary Context (“Espoo Convention”), industrial projects that have potential impacts that cross a national border, such as the Nord Stream 2 pipeline project, need to take this assessment process a step further and assess impacts of a transboundary nature. Therefore, the Espoo Report addresses “transboundary impacts” that may originate in one country but affect another. It also uses this analysis to evaluate the overall impact of the project in its entirety, across all countries that may be affected by it. The Espoo Report thus helps decision-makers assess the implication of the project’s likely environmental impacts and make an informed decision about whether to permit the project to be built. Any interested party has the opportunity to read the report and contribute to the project’s consultation process.

The Nord Stream 2 Project comprises the construction and subsequent operation of a twin subsea natural gas pipeline through the Baltic Sea. The pipeline route will stretch for some 1,200 km from Russia's Baltic coast in the Leningrad region, reaching landfall near Greifswald in Germany. In addition to these two countries, the pipeline will pass through the waters of Finland, Sweden and Denmark.

The Nord Stream 2 Project includes:

- > Offshore pipelines;
- > Onshore facilities at the Russian landfall Narva Bay, including buried pipelines sections of some 4 km and above ground facilities; and
- > Onshore facilities at the German landfall Lubmin 2, including pipelines sections of some 0.4 km housed in twin microtunnels, and above ground facilities.

During construction, Nord Stream 2 will make use of ancillary facilities that include:

- > Coating plants in Kotka, Finland and Mukran, Germany; and
- > Pipe storage yards at Karlshamn, Sweden; Kotka and Hanko, Finland; and Mukran, Germany.

Nord Stream 2 will deliver 55 bcm of natural gas per year – enough to supply 26 million households

The Nord Stream 2 system will have the capacity to deliver 55 billion cubic metres (bcm) of natural gas per year directly to the EU market in an environmentally safe and reliable way. This will be sufficient to supply 26 million households. Each pipeline will have an internal diameter of 1,153 mm (48 inches) and will be constructed from approximately 100,000, 24-tonne concrete-weight-coated steel pipes laid on the seabed. Pipe laying will be carried out by specialised vessels handling the entire welding, quality control and pipe laying process. Both lines are scheduled to be laid during 2018 and 2019, followed by testing of the system at the end of 2019, before gas begins to flow.

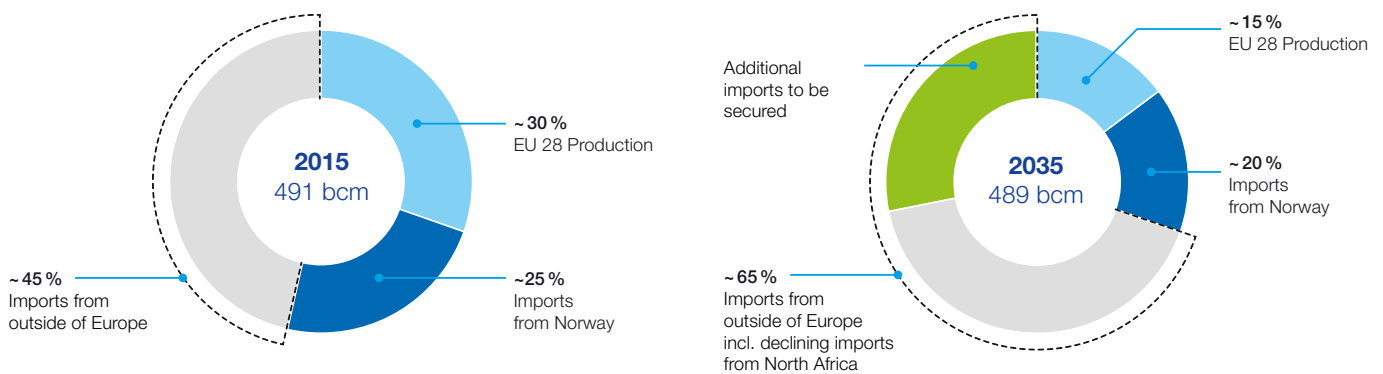
The availability of first-hand knowledge gained from the design, construction and operation of the existing Nord Stream pipeline has benefited the design and planning of Nord Stream 2. The new system will be independent from the existing pipeline, but they will run in parallel for a substantial distance.

2.1 Why is Nord Stream 2 needed?

Natural gas is expected to remain an important energy source with projections of stable or increasing demand in the coming decades. As countries seek to reduce their carbon emissions, gas offers a lower carbon alternative to coal. It can also supplement renewable energy, while renewables take on a growing share in the energy mix.

Domestic EU production of natural gas, however, is expected to fall by 50 percent over the next two decades. As a result, the EU will have to import additional volumes of gas to secure supply from as early as 2020. Given the declining or insecure supply of gas via pipelines from Norway, North Africa and the Caspian Region/Middle East, new import routes will be needed – either as pipeline gas from Russia and/or as liquefied natural gas (LNG) from other holders of large gas reserves.

The EU needs to import more gas to meet demand as domestic production is projected to fall 50 percent over the next two decades



EU faces an import gap as domestic production declines

Source: based on Prognos 2017 Total demand includes all gas sourced by European market, EU countries plus Switzerland and western imports by Ukraine.

Without a new direct gas pipeline supply from Russia, the EU will have to compete with other countries for LNG supplies, many of which, e.g. Asia, have been paying a premium for LNG over EU gas prices. Other imminent risks to supply security also need to be mitigated by having readily available back-up capacity.

Nord Stream 2 will provide a reliable and sustainable additional transportation route into the EU, under sound environmental and economic conditions. By supplementing other existing and planned import options, Nord Stream 2 can contribute towards closing the forecasted EU import gap and help to reduce risks to supply security.

3. What is the international Espoo process?

The international consultation process is an essential phase in the development of the Nord Stream 2 pipeline. National EIAs are being carried out in each of the five countries crossed by the pipeline route, namely, Russia, Finland, Sweden (Environmental Study), Denmark and Germany. Since Nord Stream 2 has the potential to cause transboundary environmental impacts, it is additionally subject to a transboundary EIA (documented in an Espoo Report) in accordance with the Espoo Convention.



Nord Stream 2 will consult with nine countries

The Espoo Convention defines two important groups of consultees:

- > **“Parties of Origin”** are the five countries in which Nord Stream 2 will be located: Russia, Finland, Sweden, Denmark and Germany; and
- > **“Affected Parties”** are the countries which may be affected by Nord Stream 2 in some way, even if it is not located within their boundaries: Estonia, Latvia, Lithuania and Poland. For Nord Stream 2, the five Parties of Origin are also considered Affected Parties. For example, construction activities taking place in Russia may impact Finnish waters, meaning that Finland would be an Affected Party.

To ensure that a description of Nord Stream 2 and its potential environmental impacts are communicated clearly to all Affected Parties and stakeholders, the Espoo Report is written in English and is translated into the nine languages of all Affected Parties.

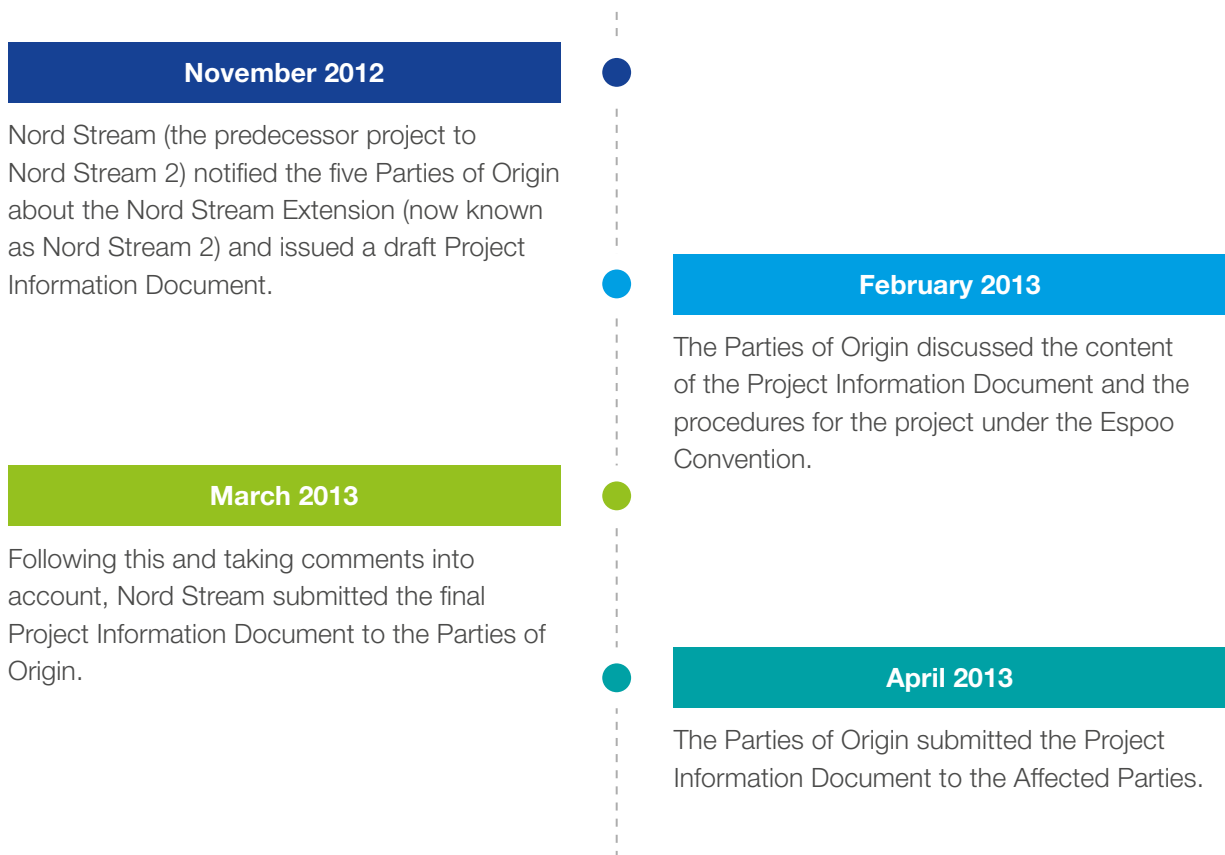


The proposed Nord Stream 2 pipeline route, Parties of Origin and Affected Parties. (Illustration indicative only)



3.1 Has any consultation about the Nord Stream 2 project already taken place?

Based on the process laid out under the Espoo Convention, a number of consultation steps relating to the Nord Stream 2 Project have already been undertaken:



Nord Stream 2 has subsequently engaged in active consultation on the final Project Information Document with all Baltic Sea countries. This included numerous meetings with the relevant authorities to ensure that the Espoo Report will address the issues that are important to them. In total, Nord Stream 2 held over 200 meetings with authorities, non-governmental organisations and other stakeholders, such as fishermen.

Nord Stream 2 has already held over 200 meetings with relevant authorities, NGOs, fishermen and other stakeholders

A list of the key comments received during the consultation process on the Project Information Document, as well as a description of how Nord Stream 2 has addressed these comments, is provided in the Espoo Report.

The process is ongoing and each Party of Origin will define the duration of the period within which comments can be submitted. The Affected Parties are responsible for organising hearings, meetings and other means of consultation on the Espoo Report in line with national legal requirements. Nord Stream 2 has committed to attend such hearings and meetings if requested by the relevant authorities. The Parties of Origin will take the comments received during the consultation phase into account when making a final decision on whether to grant approval for the project.



How can I contribute to the international consultation process?

Through the Espoo process, all countries and individuals potentially affected by the Nord Stream 2 pipeline have the opportunity to learn about the project and share their feedback.

Detailed information about the project and the potential transboundary impacts can be found in the Espoo Report. The Espoo Report is publicly available for anyone to read via www.nord-stream2.com.

This document is the Non-Technical Summary of the Espoo Report. It was prepared for the non-specialist reader to share the most significant findings from the main report.

Public feedback on the Nord Stream 2 Project is welcome and it is a key element in the international consultation process. All views should be shared with the respondent's national authority. The national permitting authorities consider all comments as they make their decision on granting a permit for the project.



4. What alternatives to the Nord Stream 2 proposal were considered?

Several project routing, design and construction alternatives were evaluated during the planning process to ensure that the preferred option would, where possible, minimise environmental and socio-economic impacts, whilst maintaining international good practise in relation to health and safety, satisfying design standards and construction requirements, and maintaining the integrity and reliability of the system over its entire operational life. The selection of alternatives to consider, and the subsequent identification of the preferred option, involved substantial research and drew heavily upon the experience gained from the successful implementation of the existing Nord Stream pipeline system.

The evaluation of each alternative was centred around three main criteria:

- > **Environmental** – Planners worked to avoid, where possible, crossing areas designated as “protected” or otherwise recognised as “environmentally sensitive” as important habitats for animal and/or plant species. Project planners also sought to minimise intrusive activities that have the potential to impact the natural environment.
- > **Socio-economic** – Planners sought to minimise any restrictions on existing users, i. e. the shipping or fishery industry, the military, tourism and recreation users etc., as well as any interference with existing offshore installations, such as cables or wind turbines and onshore land uses. Project planners also sought to avoid munitions (deployed during or after World Wars I and II) and cultural heritage sites, such as shipwrecks, wherever possible.
- > **Technical** – Planners considered how to reduce construction time via the minimisation of potential disruptions of construction works, etc., while also minimising technical complexity, costs, and resource needs.

Nord Stream 2 was optimised to minimise environmental and socio-economic impacts, whilst enhancing construction efficiency and operational reliability

On the basis of the experience of the existing Nord Stream pipeline system, and taking the three main criteria described above into account, a thorough route corridor assessment was performed. This identified a number of feasible route corridor and landfall options as a basis for further planning, each of which were researched before selecting the preferred route.

Sweden and Denmark

Three route alternatives were identified through Swedish and Danish waters. The less favourable options required more seabed intervention works, were located closer to Natura 2000 sites and/or passed through the historical chemical munitions dumping sites, increasing risk of environmental impact. The preferred route is located more than 10 kilometres from Natura 2000 sites and from the island of Bornholm. As this route runs parallel to the existing Nord Stream pipelines, it also minimises restrictions on other marine uses.

Germany

The Pomeranian Bay was selected as the preferred landfall area on the German coast on the basis of environmental, socio-economic and technical evaluations. Four landfall locations – Lubmin West, Vierow, Mukran and Usedom – were evaluated. Usedom was discounted on the basis that it is near important tourism and residential areas. The three remaining route alternatives were assessed to: minimise offshore pipeline length, avoid environmentally sensitive areas, and optimise technical conditions, which led to Mukran being discounted. Lubmin West is the preferred option because it has a direct connection to the existing gas grid and the environmental impact will be lower than Vierow.

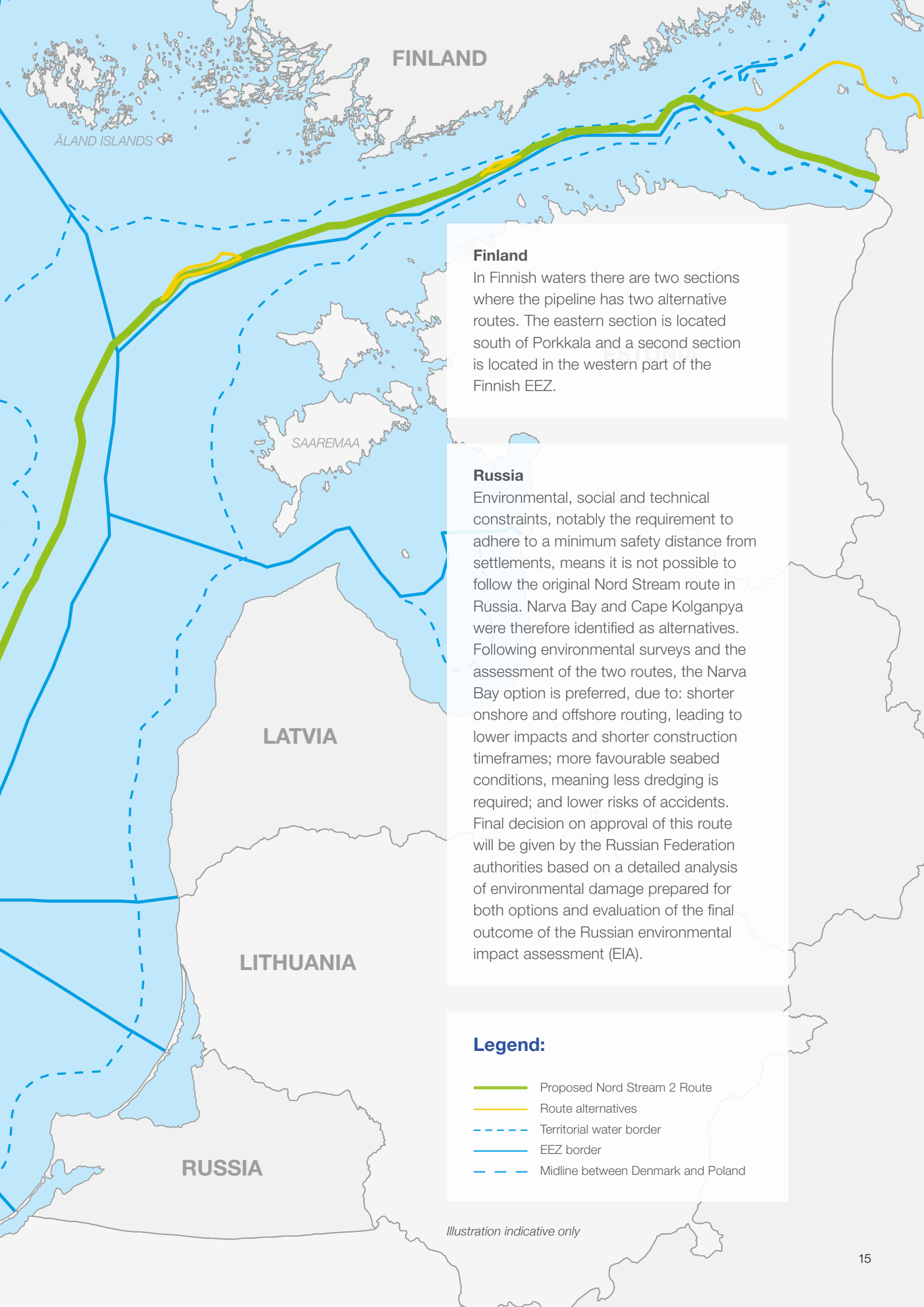
SWEDEN

GOTLAND

BORNHOLM

DENMARK

POLAND



FINLAND

ÅLAND ISLANDS

SAAREMAA

LATVIA

LITHUANIA

RUSSIA

Finland

In Finnish waters there are two sections where the pipeline has two alternative routes. The eastern section is located south of Porkkala and a second section is located in the western part of the Finnish EEZ.

Russia

Environmental, social and technical constraints, notably the requirement to adhere to a minimum safety distance from settlements, means it is not possible to follow the original Nord Stream route in Russia. Narva Bay and Cape Kolganpya were therefore identified as alternatives. Following environmental surveys and the assessment of the two routes, the Narva Bay option is preferred, due to: shorter onshore and offshore routing, leading to lower impacts and shorter construction timeframes; more favourable seabed conditions, meaning less dredging is required; and lower risks of accidents. Final decision on approval of this route will be given by the Russian Federation authorities based on a detailed analysis of environmental damage prepared for both options and evaluation of the final outcome of the Russian environmental impact assessment (EIA).

Legend:

- Proposed Nord Stream 2 Route
- Route alternatives
- - - Territorial water border
- EEZ border
- - - Midline between Denmark and Poland

Illustration indicative only

4.1 What is the ‘zero alternative’?

The “zero alternative” is an evaluation of the situation in which Nord Stream 2 is not constructed. This would of course mean that neither the negative or positive environmental or socio-economic impacts that would arise from the implementation of Nord Stream 2 would be realised.

Although non-implementation of Nord Stream 2 would avoid the predominantly temporary and local environmental and socio-economic impacts, it would also mean other ways of meeting Europe’s growing energy demand would be required.

5. How is Nord Stream 2 planned, constructed and operated?

5.1 What were the key considerations during the planning phase?

Many years of research and analysis go into the planning phase for Nord Stream 2, to establish clear health and safety practices, understand the environmental context, and optimise the technical design. In the planning of construction and technical design, Nord Stream 2 has adopted industry best practice through its approach to limit environmental impact to a minimum by building mitigation measures into the design of Nord Stream 2 from the outset.

Examples of in-built mitigation measures are:

Technical solutions:

- > Detailed route development and optimisation to reduce requirement for intervention works on the seabed, e. g. rock berms.
- > Use of a dynamically positioned lay barge in the heavily mined areas of the Gulf of Finland to minimise impacts from munitions clearance.
- > Controlled rock placement utilising a fall pipe and instrumented discharge head located near the seabed to ensure precise placement of rock material

Marine fauna:

- > Deployment of sonar locators to avoid fish and acoustic deterrent devices to drive marine mammals away prior to munition clearance.
- > Construction activities, such as pipelay and rock placement, are not planned in winter ice conditions to prevent impacts on seals during the breeding season.

Nord Stream 2 has built mitigation measures into the technical design and methods adopted to avoid or minimise environmental impacts wherever possible



Ship traffic:

- > Information on project vessels' plans and schedules will be provided in notices to mariners

Underwater cultural heritage:

- > Implementing stringent measures to avoid impacts on cultural heritage during construction. In general, a safety distance should be assigned to each cultural heritage site.

Nord Stream 2 has adopted a health, safety, environmental and social (HSES) policy, implemented through a management system (HSES MS), which is aligned to international standards. As part of the management system, Nord Stream 2 is developing environmental and social management plans to ensure compliance with the HSES policy throughout construction and operation.

Nord Stream 2 will adopt world class health, safety, environmental and social management practices



What is a Health, Safety, Environmental and Social Management System (HSES MS)?

The Health, Safety, Environmental and Social Management System (HSES MS) enables Nord Stream 2 to identify and systematically control all relevant HSES risks arising during project planning and construction. It also covers the management of security where it may impact the safety of personnel and project-affected communities, the integrity of project assets and the reputation of Nord Stream 2. Once Nord Stream 2 is commissioned, the HSES MS will be adjusted to manage HSES issues for the operational phase.

What is an Environmental and Social Management Plan (ESMP)?

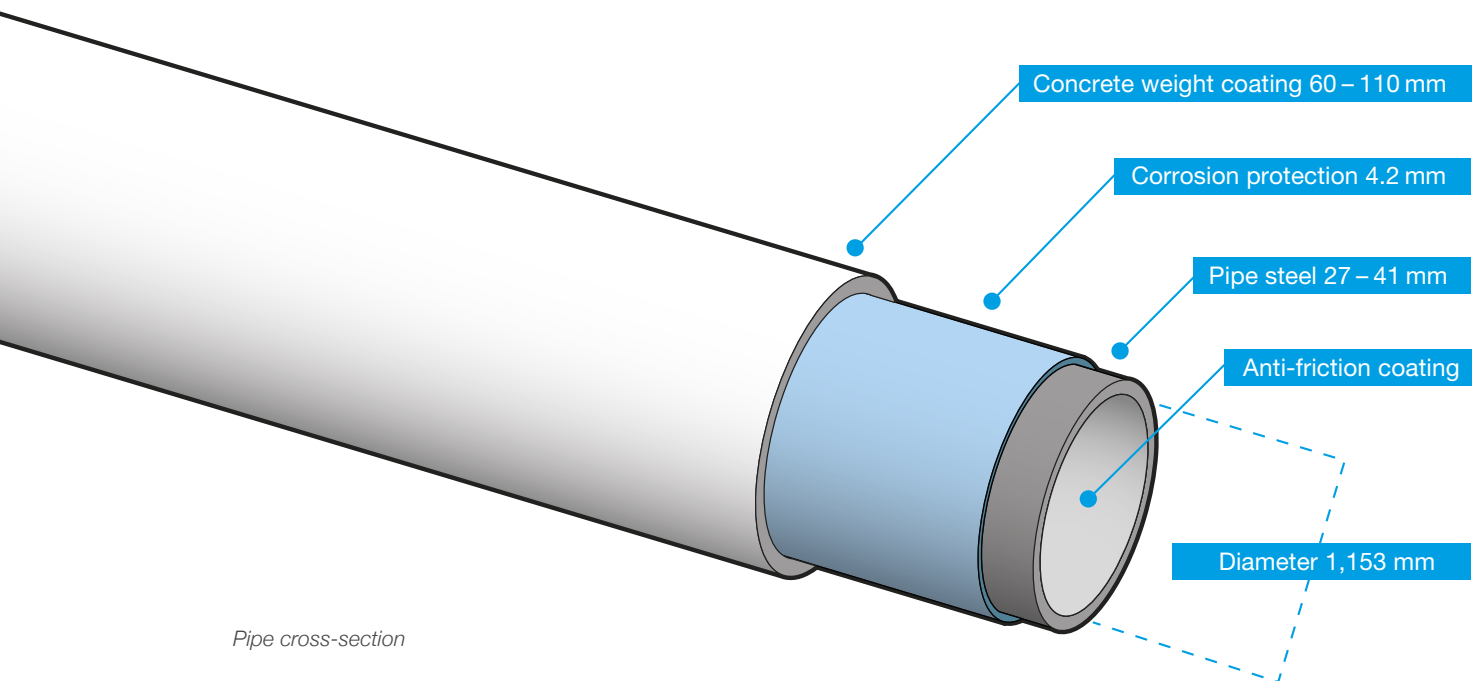
Nord Stream 2 is also developing Environmental and Social Management Plans (ESMP) for construction and operation of Nord Stream 2. The ESMPs contain the relevant, specific HSES commitments included in the national EIAs as well as conditions included in the permits issued by each country. ESMPs will apply to both Nord Stream 2's own staff and its contractors, and Nord Stream 2 will ensure that contractors adhere to the standards and requirements in the HSES MS and applicable ESMPs. HSES information will be proactively communicated internally and externally.

5.2 How is the pipeline constructed?

Pipeline construction is governed by demanding international standards and certification processes at every stage. This helps to ensure the construction process is safe, precise and protective of the environment.

Manufacturing, coating and storage

At steel mills in Germany and Russia, the 12.2-metre pipe sections are fabricated to a precise specification, with a constant inner diameter of 1,153 mm and a wall thickness of up to 41 mm. From there, they are taken to specialised coating yards in Germany and Finland. The pipes are coated internally to reduce friction and externally to provide corrosion protection. An additional outer layer of concrete is applied to the pipes with a maximum thickness of 110 mm. This adds weight to the pipes to increase their stability on the seabed. Now weighing up to 24-tonnes, the pipes are stored in storage yards in Germany, Sweden and Finland, ready to be transported by special carrier ships to the pipelay vessel for immediate use.



Pipe cross-section



Munitions clearance

During the two World Wars, many thousands of mines were laid in the Baltic Sea. While many have been cleared in the intervening years, Nord Stream 2 undertakes munitions surveys to identify remaining mines or munitions on the seabed. Where possible, Nord Stream 2 will avoid known munitions through localised re-routing, or relocate the munitions. Only where this is not possible on safety or responsibility grounds, will detonation in situ be undertaken with appropriate mitigation in place.

Rock placement

In some areas along the route, crushed rock will be strategically placed on the seabed to support and stabilise the pipelines where needed e. g. where there is a free span² which needs support or to provide a solid foundation for a pipeline or cable crossing. The rock material will be placed by a fall-pipe, which improves accuracy. Rock placement activities will be carried out prior to and after pipelay.

Dredging and backfilling

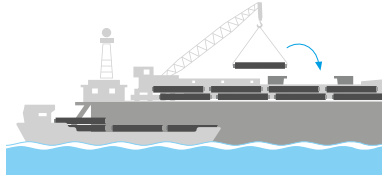
In the nearshore approaches to the Russian landfall and in German territorial waters, the pipelines will be buried entirely in the seabed to ensure that waves and sand movements will not affect their stability. This involves the excavation of a trench prior to pipe-lay, using dredgers of various types. The excavated materials will be removed, stored temporarily and used for backfilling where possible.

Pipelaying

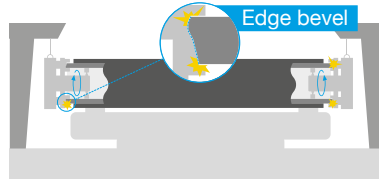
On the pipelay vessel, the pipes are welded together and the welded joints are automatically 100 percent inspected through an ultrasound scan. Finally, after protecting each weld, the pipeline is fed out of the vessel onto a ramp structure called a “stinger”, which prevents overstressing of the pipeline as it enters the water. The process is carefully managed to maintain 24 hour continuous operation, so that pipelaying vessels can lay up to three kilometres of pipeline per day.

² An area where the bathymetry is uneven, such that the pipelines would not be supported on the seabed

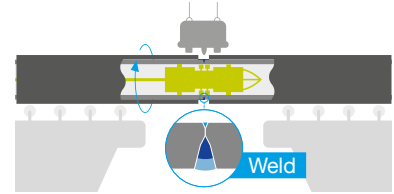
Constructing a subsea pipeline



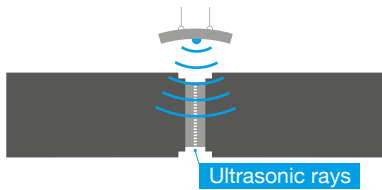
1 The pipes are unloaded from the pipe carrier vessels and stacked on each side of the laybarge. Pipe deliveries occur regularly to ensure that there is always an adequate linepipe buffer on board to maintain the 24-hour pipelay schedule.



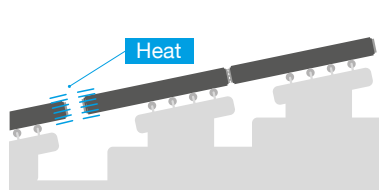
2 To prepare the pipes for welding, the ends are bevelled to make them exactly the right shape to be fitted together. The inside of the pipe is then cleaned using compressed air before it is conveyed to the double-joint welding station.



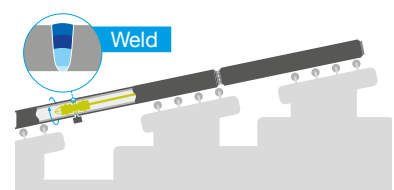
3 Here, 12-metre pipe joints are aligned and welded together to create a double-joint segment measuring 24 metres. These sections will later be connected to the main pipe string.



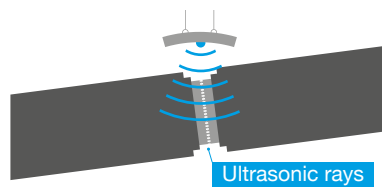
4 The double-joint is moved to a non-destructive testing station where every millimetre of the weld undergoes automatic ultrasonic testing (AUT) to detect any unacceptable flaws. If required, the defect will be removed and the weld rescanned to ensure it meets international standards.



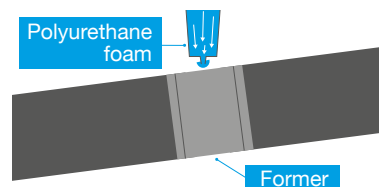
5 Following AUT, the double-joint is moved in a pipe elevator to the central assembly line. There, the insides are checked for debris and the double joint is aligned with the main pipe string in preparation for welding.



6 The double-joint is now joined to the end of the pipeline using a semi-automatic welding process. Qualified welding inspectors oversee each of the steps to ensure that welding is performed in accordance with Nord Stream 2's and authority approved welding procedures.



7 Following welding, the weld between the double-joint and the main pipeline undergoes automatic ultrasonic testing (AUT). Any unacceptable flaws will be removed, and the weld rescanned to ensure it meets international standards.



8 Once the weld is confirmed acceptable, a corrosion resistant, heat-shrink sleeve is applied over the circumferential girth weld. Then, polyurethane foam is poured into a former surrounding the weld area. This foam hardens, providing further protection.



Post-lay trenching

To provide additional protection or stabilisation against waves and currents, the pipelines will, in some areas along the route, be trenched into the seabed after they have been laid. Post-lay trenching is carried out using a pipeline plough which is deployed onto the laid pipeline from a vessel. The pipeline will be lifted into the plough and supported on rollers. A vessel will then pull the plough along the seabed, laying the pipeline into the ploughed trench as it advances. To minimise environmental impacts, the excavated material from the trench will be left on the seabed next to the pipelines so that natural back-filling will occur over time as a result of sea currents.

Onshore construction

In Russia, the base case construction method for the 4 km pipeline onshore section is conventional trenching methods utilising excavators. Side cranes will lower the welded pipeline sections into the trenches which are then backfilled and the work areas will be reinstated. The Nord Stream 2 pipelines will terminate at an above ground maintenance facility which will link with upstream feeder lines and compressor facilities owned by a third party operator.

In Germany, the pipeline installation at the shore crossing will be undertaken through the construction of twin microtunnels which will house the onshore pipeline sections. The Nord Stream 2 pipelines terminate at a maintenance facility which will link with downstream feeder lines owned by a third party operator.

Pre-commissioning and commissioning

Once constructed, each pipeline on the seabed will be dry inside and filled with compressed air for cleaning and gauging. Thereafter the pipelines will be filled with natural gas until the required pipeline pressure to start normal operation is achieved.

5.3 What happens once the pipeline is operational?

During normal operation, pressurized natural gas will be continuously introduced at Narva Bay, Russia and taken out at an equal rate at Lubmin, Germany. Monitoring and maintenance are undertaken to ensure the pipelines operate safely.

Monitoring of gas flow

Pressure and gas flow are remotely monitored 24 hours a day, and the intake and extraction volumes are balanced as needed to ensure that maximum pressure is never exceeded. Specialists are always on hand to take direct control to ensure safety in an emergency. The entire operational procedure is certified by the independent certification agency, DNV GL.

The pipelines will be monitored 24 hours a day to ensure their safe operation

The Nord Stream 2 Control Centre will manage the daily operations of the existing Nord Stream pipeline



Maintenance

Maintenance and inspection are performed regularly throughout the operational life of the pipelines. In addition, routine surveys of the exterior of the pipelines, their support structures, and the seabed corridor, are carried out using a remotely operated vehicle and towed sensors. Based on the outcome of these surveys, any necessary actions are assessed.

6. What methodology was used for the impact assessment?

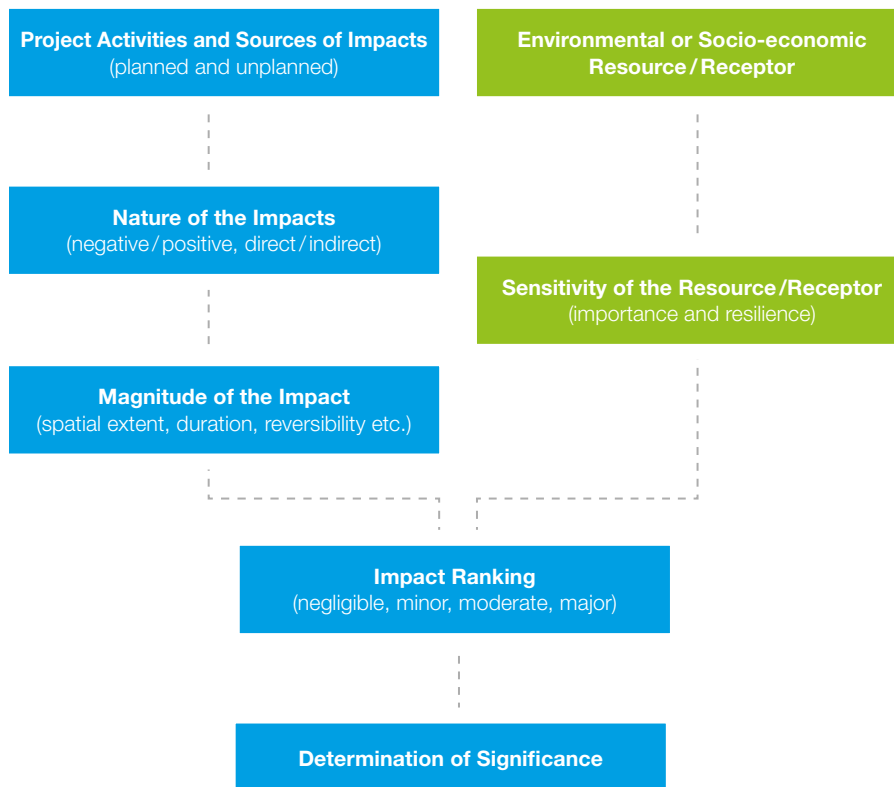
The impact assessment identifies and evaluates the potential for significant environmental or socio-economic impacts to arise from the construction or operation of Nord Stream 2

While the Espoo impact assessment took account of the EIAs undertaken for each country through which the pipelines pass, it has focused on providing an overarching assessment of Nord Stream 2. This approach ensures that an assessment of in-combination impacts on each receptor group has been undertaken, including interactions between impacts arising in different national jurisdictions.

The assessment has drawn from a substantial body of empirical data generated by the monitoring programme of Nord Stream, undertaken during both its construction and operation. Targeted predictive modelling has also been undertaken in order to determine the areas which will be influenced by certain Nord Stream 2 activities (i. e. sediment spread and noise propagation).



As part of the assessment, possible cumulative and transboundary impacts have also been considered, and are described in the relevant sections below.



Process for identifying and assessing potential environmental impacts from planned activities.

Initially, the **project activities** which had the potential to impact environmental (physical-chemical or biological) or socio-economic **resource/receptors** were identified.

The **nature and magnitude of the impact** (i. e. the type and scale of the change) was then determined based on spatial extent, duration, level of damage and reversibility of the impact, as well as the number or proportion of receptors affected.

The **sensitivity of a resource or receptor** to a particular impact was determined based on a combination of receptor importance (e. g. conservation status, or cultural/economic importance) and receptor resilience (the degree to which it can withstand an activity without a change to its status).

Based on this, the overall **impact ranking** was determined, and expressed as a qualitative ranking of negligible, minor, moderate or major. This took the implementation of inbuilt mitigation measures (envisaged in order to avoid and reduce significant adverse impacts) into account.

Impacts were determined as either **“Significant”** or **“Not Significant”**, which are taken into account by the relevant decision making authority when determining the acceptability of the project.

7. What are the results of the impact assessment?

The following section includes a summary of the most noteworthy conclusions of the impact assessment on the *physical-chemical*, *biological* and *socio-economic environments*.

Overall, the assessment concludes that most environmental receptors will not be subject to potentially significant impacts, across all affected countries and on a project-wide basis.

Under each of these environments the impact assessment considers receptors in marine areas, through which the offshore pipelines will pass, as well as those in the vicinity of onshore landfalls at Narva Bay (Russia) and Lubmin 2 (Germany). As impacts associated with ancillary activities largely relate to noise and air emissions, employment and transportation, impact at these sites are only considered with respect to the physical-chemical and social environments.

Overall, only a limited number of environmental impacts will occur, and of these, the majority will be **negligible** to **minor** (and therefore not significant) often due to their short-term duration and limited spatial extent.



7.1 Impacts on the physical-chemical environment

The physical and chemical environment defines the conditions for the biological and the socio-economic environment and therefore is both a receptor in itself, and, more importantly, a carrier of the impacts from Nord Stream 2 activities to the biological and socio-economic receptors.

Marine areas

The marine physical-chemical environment has been considered in terms of: marine geology, bathymetry and sediments; hydrography and seawater quality; and climate and air quality.

Marine geology, bathymetry and sediments

During construction, potential impacts on marine geology, bathymetry and sediments comprise: alterations to the seabed profile and the composition of surface sediments. Impacts will be greatest in areas where dredging or munitions clearance are proposed (Russia, Finland and Germany). However, in all areas, receptors will be restored back to pre-impact status either through human intervention or naturally over time (due to natural sediment transport processes). The majority of impacts have therefore been assessed to be **negligible**, with peaks of **minor** impacts predicted in Russia, Finland and Germany.

During operation, potential impacts comprise the introduction of a new hard surface on the seabed, alteration to seabed profile and change in temperature of the sediment. Impacts will be localised to the immediate vicinity of the pipelines and will generally be within natural variation. The majority of impacts have therefore been assessed to be **negligible**, with peaks of **minor** impacts predicted in Finland and Germany.



Hydrography and seawater quality

During construction, potential impacts on hydrography and seawater quality comprise: an increase in suspended sediment in the water column (reduced transparency of the water); and an increase in contaminants and/or nutrients in the water column. Impacts will be greatest in areas where dredging, munitions clearance or post-lay trenching are proposed (all countries). However, receptors will revert back to pre-impact status and therefore, impacts have been assessed to range between **negligible** to **minor**.

During operation, potential impacts comprise changes to the current patterns and inflows; change in temperature of the water column and increase in contaminants in the water column from anodes. Impacts will be greatest in areas where the pipelines are laid directly on the seabed, without trenching or rock placement. Regardless, all impacts have been assessed to be **negligible**, with the exception of a **minor** impact in Finland and Germany.

Climate and air quality

During construction and operation, potential impacts on climate and air quality comprise: an increase in greenhouse gases (e. g. CO₂) and reduction in local air quality. Although Nord Stream 2 contributions will be detectable above natural variation in close proximity to the activities, quantities are small compared to annual emissions from normal shipping in the Baltic Sea and will not have a quantifiable impact on global climate or local air quality. Impacts have therefore been assessed to be **negligible**, with the exception of a **minor** impact in Germany.

None of the potential impacts from Nord Stream 2 on the marine physical-chemical environment were assessed to be significant

Onshore areas

The onshore physical-chemical environment has been considered in terms of: geomorphology and topography; freshwater hydrology; and climate and air quality.

Narva Bay Landfall

Trenching at Narva Bay will cause temporary impacts, though the trenched area will be gradually backfilled and the working area levelled to the original topography and revegetated after the installation of the pipelines. Where the pipeline passes through a relict dune (2.5 ha), a special restoration plan to mitigate impacts is being developed. Impacts have been assessed to range from **minor** (for modified habitat) to **moderate** (for the primary forest and the relict dune).

Vegetation clearance, removal of the top soil, ground-leveling and trench excavation activities have the potential to alter local drainage patterns and hence the hydrology. However, the soil to be used for trench backfilling will have the same filtration properties as underlying soils to ensure the adequate water drainage. There is also the potential for the release of surface water run-off to impact the quality of surface water bodies. A Water Management Plan will be implemented and the drainage systems will be designed to

ensure that surface water discharges are maintained at greenfield run-off rates, resulting in impacts which have been assessed to be **negligible**.

Although Nord Stream 2 activities will result in small contributions to greenhouse gases (e.g. CO₂), and close to the construction activities air pollutants (e.g. SO₂ and NO_x) will be detectable above natural variation, these are insufficient to have a quantifiable impact on the regional or global climate or local air quality. Impacts have therefore been assessed to be **negligible**.

Lubmin 2 Landfall

Due to the construction of a microtunnel, the coastal section at Lubmin 2 will not be impacted by Nord Stream 2. However, due to the construction of a maintenance facility, small sections of the forest will need to be cleared (approximately 190 × 190m) and some areas of soil excavated. This will lead to a loss of trees and thus to a degradation of the landscape, as loss of naturally occurring dune relief (geomorphological specialty). Impacts have been assessed to be **minor**.

The microtunnel will be approximately 10 m deep, which is below ground water level. As a result, the ground water level will be drawn down to 0.5 m below the floor of the pit, in order to keep the pit water-free during the tunnel construction (for approximately 9 months). However, the groundwater level will revert to pre-impact status shortly after ending the construction works. Impacts have therefore been assessed to be **minor**.

Similar to at Narva Bay, Nord Stream 2 emissions during construction or operation will not have a quantifiable impact on global climate or local air quality. Impacts have therefore been assessed to be **minor**.

Ancillary Sites

At onshore ancillary areas (Kotka and Hanko, Finland; Karlshamn, Sweden; Mukran, Germany), used for pipe coating and storage as well as rock storage, emissions from Nord Stream 2 will be detectable above natural variation in close proximity to the activities, particularly in Finland and Germany. However, quantities will not have a quantifiable impact on global climate or local air quality. Impacts have therefore been assessed to be **negligible to minor**.

7.2 Impacts on the biological environment

Marine areas

The marine biological environment has been considered in terms of both species, notably plankton, seabed dwelling organisms (benthic flora and fauna), fish, marine mammals, birds, and areas designated for their conservation value.



The marine biology of the Baltic Sea is strongly influenced by its abiotic conditions, notably salinity temperature and oxygen, as well as available light. In general, the biodiversity is lower in open water and low salinity areas (such as the Bornholm Basin and inner Gulf of Finland) compared to coastal or sheltered areas (such as at the Pomeranian Bay and Greifswalder Bodden) or other shallow waters (such as Hoburgs Bank and Midsjö Banks). Along sections of the Nord Stream 2 route, less favourable abiotic conditions (e.g. low oxygen conditions at depth), reduce the natural biodiversity. Based on the assessments of impacts at species and habitat level, provided below, it has been evaluated that any in-combination impacts on marine biodiversity or ecosystem functioning that may arise from them, will not be significant.

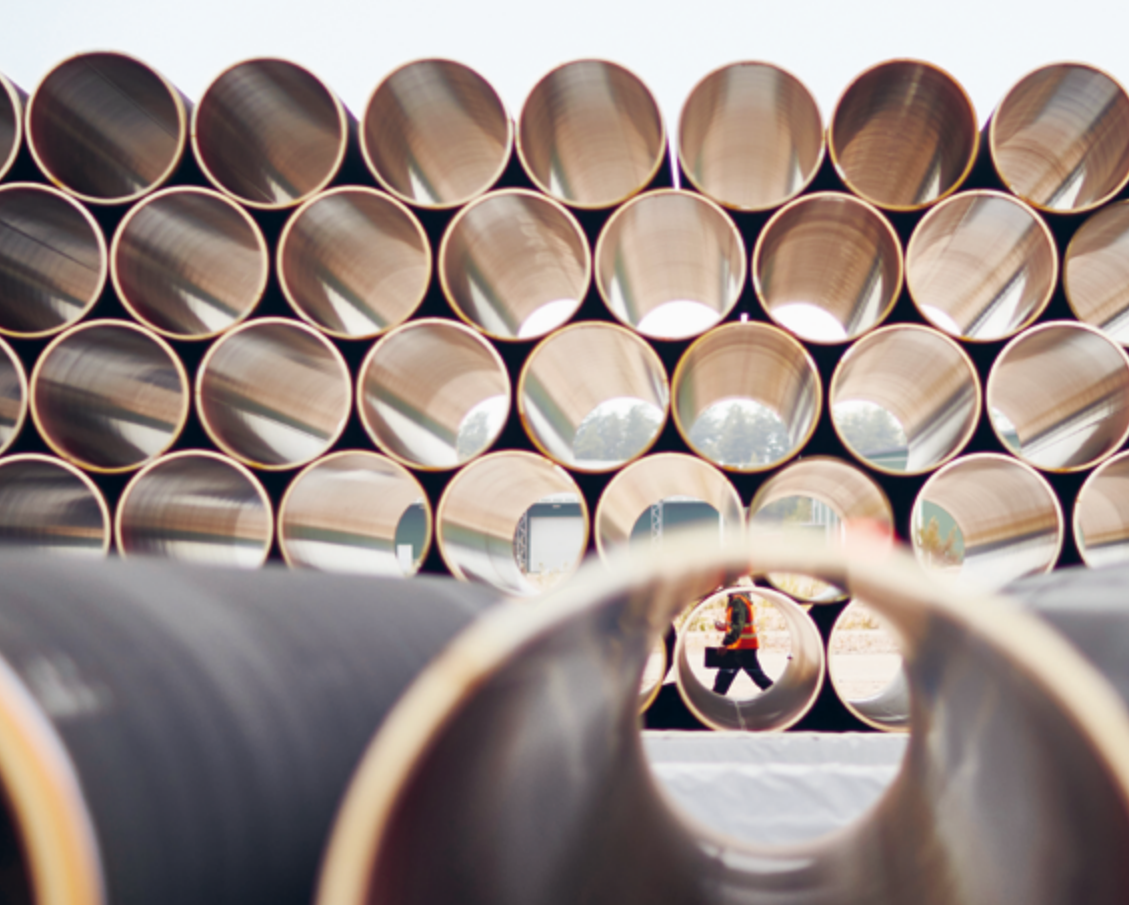
Plankton

Although phytoplankton performs an important function as the basis of the marine food chain **negligible impacts** are generally predicted. This results from its fast regeneration time and that, due to its light dependence, it only occurs in the upper water levels which in general will not be affected by project activities. The exception is near the Russian landfall where dredging may result in a **minor** impact. Similarly **negligible impacts** on zooplankton, resulting from reduced food availability (due to limited impact on phytoplankton, their food source) are anticipated.

Benthic flora and fauna (Benthos)

Benthic flora provide habitat for many invertebrate and fish species, while benthic fauna constitute a central link between plankton and higher levels in the food chain. Along the pipeline route, benthic flora are largely confined to German waters while benthic fauna are largely absent from deeper waters. Several species of benthic fauna are included on the HELCOM and German Red Lists, of which two in the latter category are classified as endangered.

The disturbance of the seabed, due to munitions clearance and seabed works, may damage or destroy benthos and their habitats. The resulting suspension and resettlement of sediment could smother benthos as well as limit the growth of both benthic flora, through restricting light availability, and benthic fauna through reducing their food availability and clogging their respiratory apparatus. For benthic flora, the impact ranking in the Pomeranian Bay and Greifswalder Bodden, where most flora occur, is **minor** but elsewhere along the route, due to their limited occurrence, is at most **negligible**.



Ancillary Sites

For benthic fauna, the impact ranking due to such suspension and resettlement of sediment is **minor** near the landfalls in Germany and Russia and **negligible** elsewhere.

The presence of the twin pipelines will introduce a new hard substrate (artificial reef) for benthic flora and certain epifaunal (non-burrowing) benthic species, and thus may result in a degree of **positive** impact for these species. It will, however, result in a loss of habitat for infauna (burrowing) benthic species which could result in a **moderate** impact in German waters due to the presence of faunal burrowing species of high conservation importance.

Fish

Owing to its brackish conditions, the Baltic Sea fish diversity is low but it nonetheless supports a number of species of both commercial and conservation interest, including several on the HELCOM Red List.

The spawning areas in Greifswalder Bodden and coastal areas close to Narva Bay may experience **minor** impacts from damage to habitats from seabed works and introduction of the new pipelines, and more notably from smothering of larvae and eggs from sedimentation, although elsewhere along the route such impacts will be **negligible**. As the concentrations of suspended sediment will be insufficient to clog gills of adult fish or affect viability of pelagic fish eggs (those in the water column rather than on the seabed) the ranking of such impacts is for most locations **negligible**. The exception is within the Pomeranian Bay and Greifswalder Bodden and Narva Bay, where the proximity of pelagic spawning areas to the dredging sites could result in a **minor** impact ranking.



Underwater noise generation associated with munitions clearance may result in a degree of injury to fish in Russian and Finnish waters with a consequent **negligible** to **minor** ranking. Owing to the lower noise levels generated by other activities, notably rock placement, impacts elsewhere offshore will generally be **negligible**. Disturbance from vessel movement will typically result in short term avoidance behaviour and the impact will therefore generally be **negligible**.

The creation of an artificial reef and consequent colonisation for benthic communities could with time create habitat for pelagic fish species potentially resulting in a degree of **positive** impact.

Marine mammals

Four species of marine mammals are resident in the Baltic Sea: harbour porpoise, grey seal, ringed seal and harbour seal. Of these, harbour seal and harbour porpoise warrant particular attention, as reflected in their inclusion in various Red Lists of threatened species and the EU Habitats Directive. The Gulf of Finland population of ringed seals, also requires particular consideration as its abundance is very low making it vulnerable to impact. Other populations of ringed seals and grey seals are more abundant, making them less vulnerable.

Increased levels of suspended sediment, and hence turbidity resulting from munition clearance and seabed works may result in a degree of visual impairment in mammals. This is not, however, considered of key concern as harbour porpoise primarily use echolocation for orientation and prey location and seals are often found in dark water, where prey congregate. Although some short term avoidance behaviour may result, this will be similar to that occurring during a storm event. Its short duration will be insufficient to affect the reproductive success and functioning of the species and the impacts are therefore **minor** close to the landfalls due to dredging, and **negligible** in offshore areas.

The generation of underwater noise, notably from munitions clearance which will be limited to the Gulf of Finland i. e. Finnish and Russian waters, will be by far the largest generator of underwater noise during construction. This can impact on mammals through injury, onset of permanent or temporary hearing loss, masking of sound, avoidance and other behavioural responses. The degree of impact will depend on location due to both: the variations in the number of munitions detonated in each area; and the species (and specific populations) of mammals present, and their abundance.

For munitions clearance, the use of acoustic deterrents prior to the clearance procedure will drive seals and harbour porpoises away from the clearance zone, substantially reducing the risk of fatal injuries for all mammal species, while those associated with onset of hearing loss and non-fatal blast injuries are as outlined below:



Harbour Seal

No impacts are predicted since this species is only present in areas too far from the pipeline to be affected by it.



Harbour porpoise

The Gulf of Finland where munitions clearance will take place has very low densities of harbour porpoises. Any impact resulting from onset of permanent hearing loss or blast injury will affect insufficient numbers to influence species viability or functioning. Hence the impact will be **minor**.



Grey Seal

Although present throughout the Gulf of Finland, due its good environmental status and abundance, impacts are unlikely to affect the long term functioning of this population. In general, unless detonation of a large munition is required, areas where blast injury may be experienced will not extend into grey seal sanctuaries, colonies or sites protected for such species, around which their numbers will be highest. Impacts are therefore considered to be **minor** (except for the Kallbådan Natura 2000 area, see “Designated Sites” below).



Ringed Seal

The low abundance of the inner Gulf of Finland ringed seal populations makes this population of ringed seal particularly vulnerable to any impact that may occur, as it could affect a relatively large proportion of the small population resulting in a **moderate** impact from onset of permanent hearing loss or blast injury. This would, however, be restricted to the eastern part of the Gulf of Finland, where this population occurs. The Gulf of Riga and Archipelago Sea population of ringed seal, which is present in the western part of the Gulf of Finland, have higher abundance, so impacts associated with onset of permanent hearing loss and blast injury are ranked as **minor** for this population.



Impacts associated with onset of temporary hearing loss, masking, avoidance and other behavioural responses from munitions clearance are assessed as **minor** for all mammal species.

Rock placement may result in a degree avoidance and by masking of hearing of mammals. However, the very short duration of each rock placement activity is insufficient to affect species functioning resulting in an at most **minor** impact ranking.

Birds

Near the Russian landfall, the islands, reefs and surrounding water provide valuable habitats for breeding and migratory birds, recognised through their inclusion within a Ramsar site. In German shallow waters the Pomeranian Bay and Greifswalder Bodden are both designated as Specially Protected Areas (SPA) and Important Bird and Biodiversity Areas (IBA). Both are important as wintering and staging areas while the latter provides valuable benthic feeding areas for seabirds in the section crossed by the pipelines.

Nord Stream 2 will use acoustic deterrents to temporarily encourage marine mammals away from munitions clearance areas, to minimise impacts from injury or hearing loss.



Offshore, shallow waters, notably Hoburgs Bank and Midsjö Banks in Sweden (also IBAs) are important wintering areas and stop off points for migratory birds. Only a few bird species forage in the more open and deeper waters where the majority of the pipelines will be located.

Increased levels of suspended sediment from munition clearance and seabed works may affect feeding efficiency of birds that rely on fish and benthos, due to decreased visibility and avoidance of the areas by such prey. Due to the limited spatial and temporal extent of such events the impacts are assessed to be **negligible** in offshore areas where there are few birds, and **minor** in nearshore areas, including those designated for birds, where they are present in greater concentrations.

Underwater, the generation of noise from munitions clearance may affect diving seabirds. Based on the numbers potentially affected, impact rankings are **negligible** in offshore areas and **minor** in the Gulf of Finland. Above water, seabirds may be displaced temporarily from their territories, due to vessel disturbance. Depending on the location and hence species present, the impact ranking ranges from **minor**, close to the landfalls, to **negligible** in the shallow areas in Swedish waters.

Designated Sites

Impacts to nature conservation areas in the vicinity of the pipelines' route may occur if the protected habitats and/or species, which are the qualifying interest of the designation, are affected. The pipeline crosses five Natura 2000 sites, four IBAs and several protected areas, although many of these designations overlap.

The potential for a **moderate** impact ranking, due to the onset of permanent hearing loss of grey seals, a designated species at the Kallbådan Islets and Waters Natura 2000 site (Finland) which includes the Kallbådan seal sanctuary, cannot currently be ruled out. Further analysis, including assessment, as required by the EU Habitats Directive, will be undertaken based on more accurate data on munitions locations and characteristics, to determine if this precautionary ranking can be reduced. A further five Natura 2000 sites/protected areas (four in Finland and one in Estonia) with seals as a conservation objective, may experience **minor** impacts due to the potential for onset of temporary hearing loss.



Onshore areas

The terrestrial environment in the vicinity of the landfall areas have been considered in terms of flora and fauna (mammals, birds, amphibians, reptiles, invertebrates), as well as biotopes/habitats.

Narva Bay Landfall

The Narva Bay landfall is within an area that exhibits a high species diversity of flora and fauna. The pipelines' route runs through the Kurgalsky Nature Reserve which is a national protected area and also listed as Ramsar site

Vegetation clearance, soil removal and earthworks notably that required to construct the pipelines will affect a spectrum of habitat types resulting in impacts rankings ranging from **negligible** to **moderate** on flora and habitats. The **moderate** impacts are associated with loss and fragmentation of old growth forest, with complex moss flora, and relict dune. For old growth forest some loss will be permanent with reestablishment in other areas occurring over a long time.

The forest areas and coastal and relict dunes also provide secure habitats for fauna. The loss of the supporting habitat combined with the loss of connectivity for some species beyond the area impacted result in a **moderate** impact ranking for fauna. Effects, associated with habitat fragmentation and loss of connectivity, will diminish as trees establish and canopy cover increase.

Other impacts relate to soil compaction, alteration to hydrological regime, emission to air, operational noise and light generation but due to their short term and reversible nature and limited spatial extent will have **negligible** to **minor** rankings. For species particularly sensitive to noise, impacts may reach **moderate** ranking during construction activities.

The project will require temporary construction activities within the Kurgalsky nature reserve and result in some long term changes to habitats. However due to the small areas affected and the fact that the overall integrity and functioning of the reserve will not be affected the impact ranking on the protected area is evaluated as **minor**.

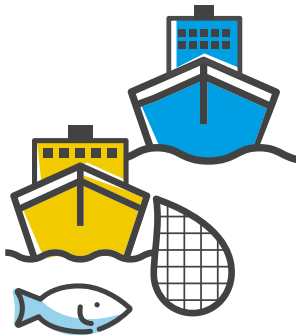
Lubmin 2 Landfall

As the onshore section of the pipelines will all be micro-tunnelled and the construction and operational areas accommodated within land zoned for industrial development the potential for impacts on flora or fauna at this site are **negligible to moderate**, with the higher ranking relating to impacts at a very local scale.

7.3 Impacts on the socio-economic environment

Marine areas

Socio-economic receptors in marine areas have been considered in terms of: people (recreational water users); commercial and other uses of marine areas, and underwater cultural heritage.



People

The offshore nature of the majority of the construction activities and the short term nature of any nearshore activities results in a **negligible** impact on recreational water users.

Commercial fisheries

The presence of the pipelines’ structures on the seabed during operation, which can result in a loss of fishing habitat, reduction in catch, or loss or obstruction of fishing gear, is ranked as **minor** on a project-wide basis.

Marine traffic

Due to the short term duration of safety zones around construction vessels in any location and their limited spatial extent, impacts are ranked as at most **minor**.

Other uses of the marine environment

In addition to a range of other activities and uses of the marine environment occur in the Baltic Sea including windfarm sites (existing or proposed) military practice areas, raw material extraction sites or existing or planned cables or pipelines. Due to the ability to either avoid such sites, or agree measures to safeguard them with the relevant owners or operators, any impact will be **negligible**

Monitoring stations in Estonia, near the Narva Bay landfall could, under rough weather conditions, experience increases in suspended sediment levels for very short periods, but any interruption of the monitoring datasets can similarly be managed through coordination with the relevant authorities, so that potential impacts will also have a **negligible** ranking.

Cultural Heritage

Underwater cultural heritage along the pipelines’ route largely comprises wrecks and their cargo. The presence of prehistoric features is highly unlikely due to environmental conditions.



Several possible cultural heritage objects detected within the vicinity of the pipelines' route will be subject to visual survey and discussion with the relevant authorities to agree specific management measures. These may typically include local pipeline realignment, controlled lay or recovery. A chance finds procedure, also agreed with the authorities, will be applied in the event that previously unknown features are uncovered during construction. Such measures will ensure that any impact on cultural heritage is generally **negligible**, but may for specific features be **minor** if for example their removal is required, or alteration of their setting occurs. The provision of survey data to relevant institutes will, however, result in a degree of **positive** impact on availability of research resources.

Onshore Areas

Socio-economic receptors in onshore areas have been considered in terms of: people (residents and visitors); economic resources and uses of land, and cultural heritage.

Narva Bay Landfall

The distance of local communities or businesses from construction activities (taking place both on- and offshore) limits the potential for impacts from noise, air emissions and visual intrusion which are thus generally **negligible**, but may be **minor** at the closest residential properties. As only a small part of the Narva Bay will be affected, impacts on both local users of, and visitors to, this area will also be **negligible**. A **negligible** impact may also result due to restricted access to, or diversion of, an access road within the reserve leading to several villages and a military barracks. Roadside communities may, however, experience **minor** impacts due to the potential for congestion and risk of accidents associated with construction traffic.

Two Neolithic sites have been identified in the landfall area but these and any as yet undiscovered remains will be safeguarded through measures set out in the chance finds procedure resulting in a **minor** ranking. Employment generation may bring some **positive** impacts locally and more broadly in the region.

Lubmin 2 Landfall

The onshore section of the pipelines will be micro-tunnelled and construction and operational areas accommodated within land zoned for industrial development and surrounded by forests, which screen it from settlements and recreational users of the beach and forests. No traffic related impacts are anticipated due to the site's locally adjacent main road. Impacts from onshore activities are thus **negligible**. Communities and beach users could, however, be subject to very short term noise and visual disturbance from nearshore activities associated with dredging and micro-tunnelling, resulting in a **minor** impact. Employment generation may bring some **positive** impacts.

Nord Stream 2 will implement mitigation measures to reduce construction noise

Ancillary Sites

At onshore ancillary areas (Kotka and Hanko, Finland; Karlshamn, Sweden; Mukran, Germany), used for pipe coating and storage as well as rock storage, employment generation will result in a degree of **positive** impact. The location of such sites within existing industrial areas limits negative impact on local communities, although transport of rock from sites of potential quarries to the Mussalo harbour at Kotka could result in a degree of disruption and risks to safety of people resulting in a **minor to moderate** impact ranking.



An environmental and socio-economic monitoring programme will be developed to verify the environmental impacts and confirm conclusions of the EIA report. The results of the monitoring will also be used to assess whether further environmental mitigation measures are needed.



8. Will Nord Stream 2 monitor possible impacts during construction and operation?

Extensive environmental monitoring will take place during the Nord Stream 2 construction and operational phases in every country through which the pipelines pass. The purpose of environmental monitoring is to verify the assessments presented in the national EIAs and Espoo Report. Environmental monitoring will focus on areas where greater impacts are expected, or where there is uncertainty about possible impacts. Monitoring programmes are currently being developed based on the EIAs and the results and conclusions of the previous Nord Stream monitoring programme. The permit conditions and reporting requirements set by each national authority will also influence the design of the monitoring programme. Once the permit conditions and monitoring requirements by the authorities are set, and prior to the start of construction, Nord Stream 2 will finalize the monitoring programmes. As part of Nord Stream 2's commitment to open and transparent communication, all results of environmental monitoring will be made publicly available.

9. How has Nord Stream 2 considered marine spatial planning?

In addition to assessing potential environmental impacts, the Espoo Report also considers how Nord Stream 2 will comply with relevant EU legislation and programmes designed to protect the Baltic Sea environment and promote its sustainable use. This includes the Marine Strategy Framework Directive (MSFD), Water Framework Directive (WFD) and Baltic Sea Action Plan (BSAP), which together aim to improve the quality of European waters and create a common framework for marine spatial planning.

The assessment has concluded that Nord Stream 2 will not prevent achievement of the long term goals, or be contrary to the objectives and initiatives set out in the MSFD, WFD and/or BSAP.

10. How will the Nord Stream 2 pipeline be decommissioned?

Nord Stream 2 will need to be decommissioned, or taken out of service, at the end of its operating life. The decommissioning programme will be developed during the pipeline's operational phase to ensure that it can take into account any new or updated legislation and guidance, good international industry practice as well as improved technical knowledge.

Since it is currently uncertain which decommissioning method will be used for Nord Stream 2, it has not been possible to undertake a detailed impact assessment for the decommissioning phase. However, consideration has been given to potential options and the associated potential impacts within the Espoo Report. Current industry best practice guidelines for similar infrastructure indicate that leaving the pipelines on the seabed (in situ) would be the preferred option, with potential impacts likely to be similar to those predicted for the operational phase of Nord Stream 2. One alternative would be for the pipelines to be removed by a reverse pipelay process, divided into sections and then disposed of onshore. Impacts of this option would be similar, or greater, than those predicted for the construction phase of Nord Stream 2.

Ultimately, the same criteria that guided planning and construction of Nord Stream 2, including environmental, socio-economic, technical and safety considerations will guide the identification of the preferred decommissioning method. Regardless of the method chosen, Nord Stream 2 will comply with all applicable legal requirements for decommissioning at that time.



11. How has Nord Stream 2 addressed risks from unplanned events?

Comprehensive risk assessments are standard practice in the offshore pipeline industry to understand, mitigate or prepare for possible risks. Nord Stream 2 is committed to being an industry leader in this realm. Drawing from international agreements, industry guidelines and years of experience within the field, including the existing Nord Stream project, Nord Stream 2 has undertaken and will continue to undertake (as appropriate) thorough risk assessments that span the construction and operational phases of Nord Stream 2.

As part of this process, Nord Stream 2 has assessed risks to both the environment (e.g. oil spills, interaction with non-mapped munitions and gas release) and to personnel. Measures to reduce or avoid any unacceptable risks have been explored and incorporated (e.g. implementation of a safety zone around vessels and careful route planning). Based on the comprehensive risk assessments, all risks associated with Nord Stream 2 construction and operation have been found to be acceptable.

To prevent or mitigate potential impacts from accidents and unplanned events during construction and operation, Nord Stream 2 has developed a mitigation strategy which ensures compliance with international requirements and follows best practise. Furthermore, a chance finds procedure will be prepared by Nord Stream 2 to set out a protocol should an unexpected risks or impacts arise during the construction phase (e.g. identification of un-mapped munitions). Nord Stream 2 will additionally develop and implement an emergency response plan for the operational phase of Nord Stream 2. Nord Stream 2 will only undertake activities for which the associated risk is assessed as acceptable.

Nord Stream 2 is committed to thorough risk preparation and risk mitigation.

All risks associated with Nord Stream 2 construction and operation have been found to be acceptable.

12. Will Nord Stream 2 combined with other projects result in cumulative impacts?

The Espoo Report also considers the potential for impacts arising from Nord Stream 2 to interact with impacts from other reasonably foreseeable planned projects ('cumulative impacts'). Impacts from these projects may not be significant when considered alone, but may have the potential to cause significant cumulative impact when the projects are considered together.

Based on the cumulative impact assessment undertaken in the Espoo Report, no planned or existing projects are expected to have a significant cumulative impact when considered in combination with Nord Stream 2

Based on the cumulative impact assessments undertaken within the national EIAs, projects were screened to identify planned projects which, in combination with Nord Stream 2, had the potential to cause significant cumulative impacts. Projects considered included: upstream facilities and Ust Luga Port developments, Baltic Connector pipeline, 50 Hertz cables, offshore wind farm projects, raw material extraction areas and downstream facilities. The potential for cumulative impacts from these projects in combination with Nord Stream 2 were then assessed. In response to a request during the international consultation process, consideration was also given to the potential for cumulative impacts as a result of existing projects i. e. the existing Nord Stream pipeline system, in combination with Nord Stream 2.

The assessment concludes that there will be no significant cumulative impacts as a result of planned or existing projects in combination with Nord Stream 2.



13. What are the potential transboundary impacts?

Transboundary impacts have been considered at two levels i. e. where the impacts may be primarily experienced at country level and where the impacts are primarily experienced at a regional or global scale.

The assessment at a regional and global scale considered:

- > **Climate** – primarily greenhouse gas emissions;
- > **Hydrography** – since changes on major Baltic inflows may affect conditions across the Baltic Sea as a whole;
- > **Shipping and Ship Traffic** – due to the global importance of the Baltic Sea for cargo transportation;
- > **Commercial Fisheries** – due to the regional importance of the Baltic Sea for commercial fishing operations;
- > **Existing and Planned Infrastructure** – due to the transnational interconnection of Baltic Sea countries through communications and power cables;
- > **Biodiversity** – given that the biodiversity of the Baltic Sea is influenced by regional pressures and is of regional and global importance;
- > **Marine Spatial Planning** – given that the Maritime Spatial Planning Directive (and related EU Directives) require countries to cooperate at a regional scale to protect and create a framework for the sustainable use of marine waters in the Baltic Sea; and
- > **Natura 2000 sites** – since such sites together function as coherent network which spans several countries.

This assessment demonstrated that Nord Stream 2 will not lead to any significant transboundary impacts on a regional or global level, with any of the impacts that are predicted ranging from **negligible** to **minor**.

No significant trans-boundary impacts on a regional or global level are predicted.

The assessment of country level transboundary impacts identified that only the generation of underwater noise from munitions clearance in two Parties of Origin (Russia and Finland) has the potential to result in significant impacts. Three Affected Parties could be affected i. e. Finland (from activities in Russia), Russia (from activities in Finland) and Estonia (from activities in both Russia, and Finland). The impacts relate primarily to the potential for onset of permanent hearing loss that may be experienced by the Gulf of Finland ringed seal population, although the potential for a degree of more severe injuries cannot be excluded. The use of acoustic deterrents will ensure that the risk of severe to fatal injuries for all marine mammals is extremely low.

The country level assessments also considered where non-significant transboundary impacts may occur. A summary of the potential transboundary impacts (both significant and not significant) that may be experienced by each Affected Party is provided below.



Transboundary impacts on Russia (from Finland)

Due to the low potential for munitions to be present close to the Russian-Finnish border there is a low likelihood of transboundary impacts on mammals in Russian waters from munitions clearance in Finnish waters. However, as a precautionary approach, a **moderate** impact ranking has been applied for onset of permanent hearing loss and non-fatal injury on the Gulf of Finland breeding ringed seal population, and a **minor** ranking applied to the same impacts for grey seals and harbour porpoise.

Munitions clearance in Finnish waters could also produce an onset of temporary hearing loss in all these species of mammals in Russian waters, resulting in a **minor** impact ranking, while fish over a very small area could experience a similar temporary loss of hearing, resulting in a **negligible** impact ranking.

Release of sediments from munitions clearance in Finnish waters may result in very small and short term increases in concentrations of suspended sediments. Any impact on seawater quality or sediment depths in Russian waters will be minimal, resulting in a **negligible** impact ranking.



Transboundary impacts on Finland (from Russia and Sweden)

For the reasons described above in relation to impacts on Russian waters, clearance of munitions in Russian waters close to the border with Finland could result in a **minor** impact ranking on grey seals and harbour porpoise and **moderate** ranking on the Gulf of Finland ringed seals in Finnish waters, due to onset of permanent hearing loss and non-fatal injury and a **minor** impact ranking due to onset of temporary hearing loss. Similarly onset of temporary hearing loss in fish in Finnish waters is assessed to have a **negligible** impact ranking.

There is a small risk that seals within the Natura 2000 site (FI0100078) Pernaja and Pernaja Archipelago and various sanctuaries in Finland which are designated for ringed and grey seals may experience a small degree of onset of temporary hearing loss from munitions clearance in Russian waters, but modelling has demonstrated that such impacts would be **minor**.

Release of sediments from munitions clearance in Russian waters may result in a very small and short term increase in concentrations of suspended sediments. Any impact on seawater quality or sediment depths in Finnish waters will be minimal, resulting in a **negligible** impact ranking.

Rock placement in Swedish waters close to the Finnish border may result in a small area being affected by noise levels which could cause onset of temporary hearing loss in marine mammals and fish in Finnish waters. However, due to the very short duration of each rock placement activity, it is considered insufficient to affect species functioning resulting in a **negligible** impact ranking.

Transboundary impacts on Estonia (from Russia and Finland)

The risk, and degree, of impact in Estonian waters from underwater noise, due to munitions clearance in Russian and Finnish waters will vary by location depending on the number of munitions cleared and the species and specific populations of mammals present.

Again a precautionary approach has been adopted resulting in a **moderate** ranking for onset of permanent hearing loss and non-fatal injury on the Gulf of Finland ringed seal population, and a **minor** ranking for the same impacts on Gulf of Riga and Archipelago breeding ringed seal population, grey seals and harbour porpoise. As the Gulf of Finland breeding ringed seal population is only present in the eastern part of Estonian waters, for a substantial length of the Estonian border with Finland the transboundary impact ranking will thus be **minor**.

Onset of temporary hearing loss from munitions clearance in Finnish and Russian waters could also be experienced by mammals in Estonian water, resulting in a **minor** impact ranking.

Ringed and grey seals in the vicinity of the Uhtju Natura 2000 site (SAC EE0060220) in Estonia, may experience a small degree of temporary hearing loss from munitions clearance in Russian waters, but modelling results have indicated that any such impacts will be at most **minor**.

While dredging at the Narva Bay landfall will result in local increases in suspended sediments, under normal weather conditions these will not cross into Estonian waters. Any impact on seawater quality or sediment depths in Estonian waters will be minimal resulting in a **negligible** impact ranking on these receptors. The potential for such changes in these parameters to impact on monitoring undertaken at stations south of the Narva Bay landfall in Estonia can be addressed through coordination with relevant authorities and is therefore also **negligible**.

Release of sediments from munitions clearance in Russian and Finnish waters or rock placement in Finnish waters may result in a very small and short term increase in concentrations of suspended sediments. Any impact on seawater quality or sediment depths in Estonian waters will be minimal, resulting in a **negligible** impact ranking.

Transboundary impacts on Germany, Denmark Sweden, Lithuania, Latvia and Poland

The main construction activities (i. e. dredging, post-lay trenching, rock placement and munitions clearance) in neighbouring countries which have the potential to cause transboundary impacts are located a sufficient distance away from the German, Danish, Swedish, Lithuanian, Latvian and Polish EEZs that **no** potential transboundary impacts have been identified.

Most potential trans-boundary impacts were assessed to be negligible or minor and therefore not significant.



14. Share your views

This Non-Technical Summary contains the key findings of the Nord Stream 2 Espoo Report. For more detail, any interested party including members of the public can read the full report via www.nord-stream2.com.

The full Espoo Report, like this summary, is publicly available and submitted to the relevant national authorities in those countries which the pipeline crosses, and in countries which may experience transboundary impacts from the pipeline.

The Espoo Report is a key element of the public consultation process and interested parties are invited to submit any feedback on the project proposals and related impact assessments. Comments should be submitted directed to the respondent's national authority.

The national authorities will keep a record of all comments and the Parties of Origin take into account this feedback as part of their decision on whether to grant a permit for the project. Before granting a permit, relevant national authorities may also set specific conditions of implementation which must be met by the Nord Stream 2 Project.



Nord Stream 2 provides regular updates about the project and its progress via the project website, www.nord-stream2.com and on Twitter, @NordStream2.

Respect for Energy Security, Safety and Environmental Protection

Nord Stream 2 is committed to working in harmony with the world around it. This means showing the utmost respect for international energy needs, for the safety of personnel and others, and for protecting the natural environment and local communities along the proposed Nord Stream 2 route.



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