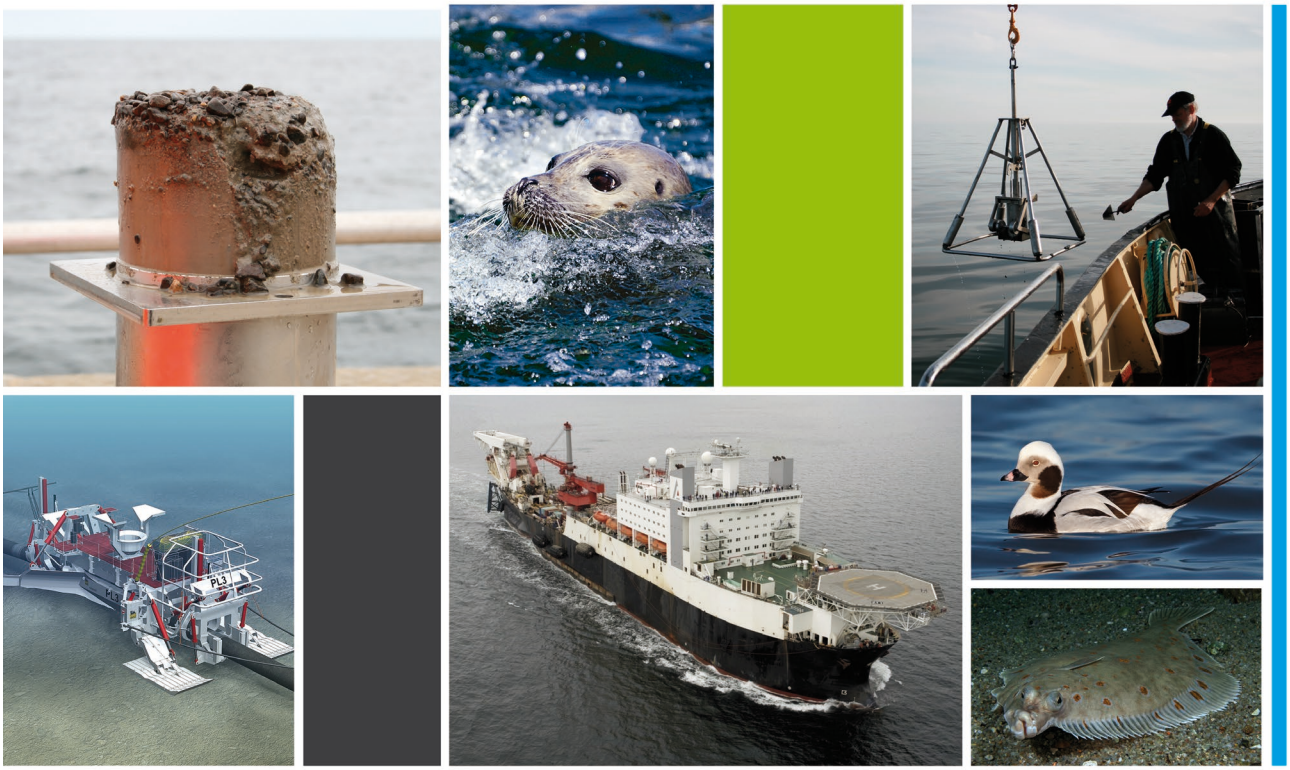
Nord Stream 2 AG

April 2019



NORD STREAM 2 NON-TECHNICAL SUMMARY

ENVIRONMENTAL IMPACT ASSESSMENT, DENMARK, SOUTH-EASTERN ROUTE

RAMBØLL

Nord Stream 2
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0 NON-TECHNICAL SUMMARY

0.1 Background and justification for the project

The relevance of gas as a primary energy source is projected to stay stable or even increase over the next decades, given the necessity to reduce coal consumption due to climate reasons and phase-out of nuclear in large parts of the European Union (EU). In view of declining EU28 domestic production, the EU needs to import additional volumes of gas by as early as 2020 to ensure sufficient gas supply for the coming decades.

The Nord Stream 2 Pipeline System (NSP2) comprises two pipelines through the Baltic Sea planned to deliver natural gas from vast reserves in Russia directly to the EU gas market to fill the growing gas import demand. The approximately 1,230 kilometre (km) twin subsea pipelines will have the capacity to supply 55 billion cubic metres (bcm) of gas per year in an economical, environmentally safe and reliable way, compensating for the drop in the EU's domestic production. The privately funded, €9.5 billion infrastructure project will ensure long-term access to an important, low-emissions energy source, thereby contributing to the EU's climate protection efforts. Additional supplies will boost competition in the market and support the EU's global industrial competitiveness. Nord Stream 2 follows in the footsteps of the successful experience of construction and operation of the existing Nord Stream Pipeline (NSP), which has been recognised for its high environmental and safety standards, green logistics, open dialogue and public consultation.

Nord Stream 2 AG is a project company established for the planning, construction and subsequent operation of the Nord Stream 2 Pipeline. The company is based in Zug, Switzerland and owned by Public Joint Stock Company (PJSC) Gazprom. Five European energy companies, ENGIE, OMV, Shell, Uniper and Wintershall, have committed to provide long-term financing for 50% of the total cost of the project. The financial commitment by the European companies underscores the Nord Stream 2 project's strategic importance for the European gas market, contributing to competitiveness as well as medium- and long-term energy security, especially against the background of expected declining European production. At its headquarters, Nord Stream 2 AG has a strong team of over 200 professionals of over 20 nationalities, covering survey, environmental, health and safety, engineering, construction, quality control, procurement, project management and administrative roles.

NSP2 will deliver reliable and sustainable transportation capacity for natural gas under sound environmental and economic conditions, closing the upcoming EU import gap and covering imminent security of supply risks.

0.2 EIA procedure and public participation

0.2.1 EIA procedure

Construction of pipelines for the transportation of hydrocarbons (i.e., petroleum products) on the Danish continental shelf requires a permit pursuant to the Act on the Continental Shelf and Certain Pipeline Installations in Territorial Waters and the Administrative Order on Pipeline Installations. The permit application must be submitted to the Danish Energy Agency (DEA), which processes the application and issues the permit on behalf of the Danish Minister for Energy, Utilities and Climate.

Gas, oil and chemical pipelines with a diameter exceeding 800 mm and a length of more than 40 km may only be granted a permit on the basis of an Environmental Impact Assessment (EIA). The EIA report must contain, as a minimum, the information listed in the Danish EIA Act, including a description of the resources or receptors likely to be significantly affected by the project, both inside and outside of Danish territory and during both the construction and operational phases of

the project. The EIA report must also describe the main realistic alternative approaches to the project.

Denmark has signed the Convention on Environmental Impact Assessment in a Transboundary Context ("Espoo Convention"), which promotes international cooperation and public engagement when the environmental impact of a planned activity is expected to cross a national border. The NSP2 project is subject to the requirements of the Espoo Convention, as the pipeline will cross the territories of five countries and may cause transboundary impacts on four additional countries located in the Baltic Sea region.

The Danish EIA Act requires that a non-technical summary be prepared in conjunction with an EIA so that all interested members of the public may become informed about the project. This non-technical summary covers the Danish part of the NSP2 project. As described in section 0.3 below, the Danish part of the project includes the proposed pipeline route from the Swedish Exclusive Economic Zone (EEZ) border north-east of Bornholm through the Danish EEZ south and west of Bornholm to the German EEZ border south-west of Bornholm. Additional information on the project is available on the NSP2 website, www.nord-stream2.com.

0.2.2 Public participation

In accordance with the Danish EIA Act, the EU EIA Directive and the Aarhus Convention, the Danish authorities must enable public participation in environmental decision-making. Therefore, the DEA must publish information concerning the application and the EIA report on the Agency's website and allow at least eight weeks for public consultation. Public participation may also involve stakeholder meetings and public presentations of technical material.

Furthermore, Nord Stream 2 AG is dedicated to transparent communication and active consultation with relevant stakeholders, including regulatory bodies, non-governmental organisations, experts, affected communities, and other interested and affected parties. The communication strategy incorporates best practices and lessons learnt from the NSP process. Nord Stream 2 AG has already engaged with various stakeholders to inform them about the envisaged project and to understand their views. Further information on Nord Stream 2 AG's communication strategy can be found on the NSP2 website.

0.3 Pipeline route alternatives

0.3.1 Investigation of route alternatives

Nord Stream 2 AG investigated several route alternatives through Danish waters. The objective was to find the most effective way of meeting the purpose and need of the project while also avoiding or reducing potentially significant negative impacts.

The route alternatives were identified based on previous planning and experience from NSP, supplemented with new route surveys and seabed investigations, including geophysical and geotechnical investigations. Environmental, socio-economic, and technical criteria were then assessed for each of the route alternatives to determine the preferred route.

Alternative routes, all of which traverse Danish waters, are shown in Figure 0-1.

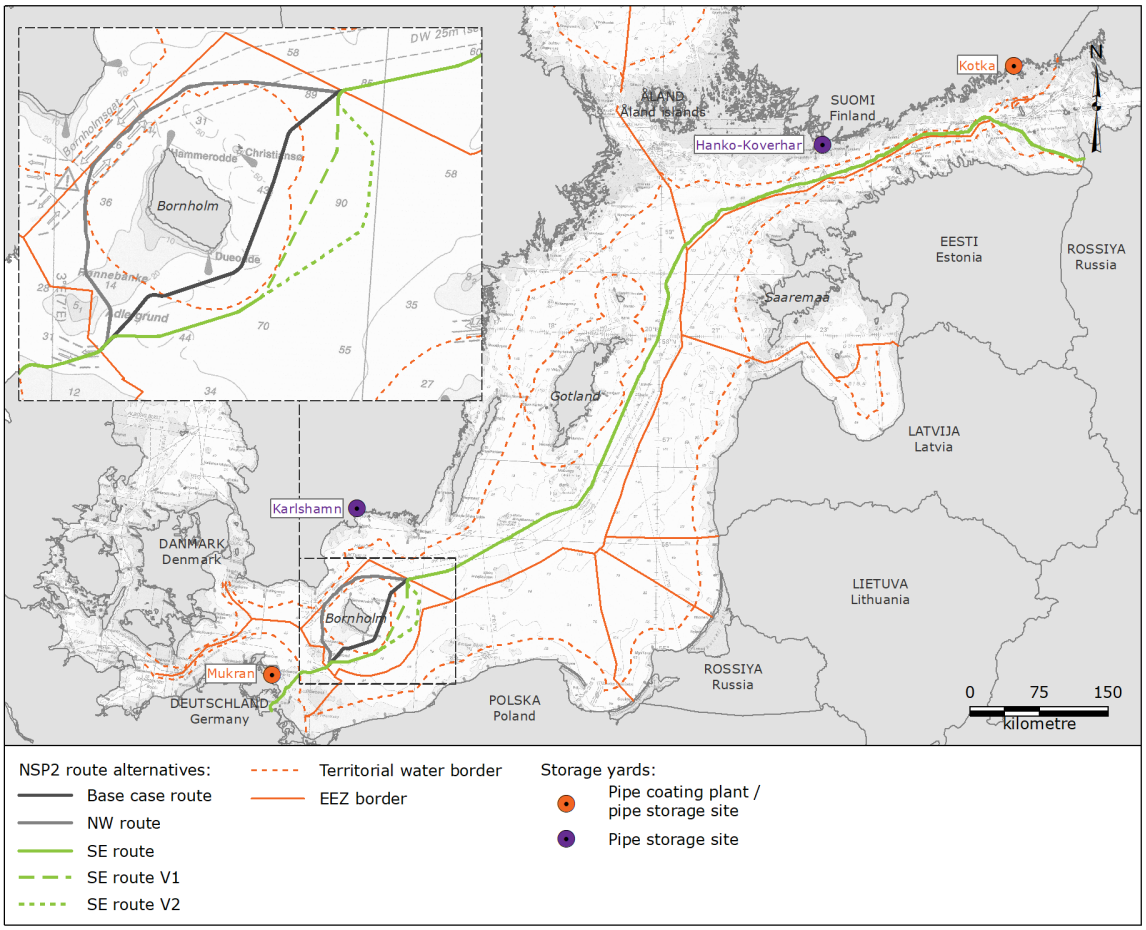

Figure 0-1 Route corridor options developed for the NSP2 project in Denmark.

0.3.2 Selection of the preferred route

A construction permit application for the NSP2 base case route, including EIAs and Espoo documentation, was sent to the relevant authorities for all involved countries in April 2017. Permits have been granted in Germany, Sweden, Finland and Russia. In Denmark, the NSP2 base case route application is being evaluated by the Minister of Foreign Affairs as a construction permit for a route in Danish Territorial Waters (TW) can only be granted if the activity is compatible with national foreign, security and defence policy interests, cf. section 3a(2) of the Act on the Continental Shelf and Certain Pipeline Installations in the Territorial Waters.

As it is not clear when a recommendation by the Minister of Foreign Affairs will be given, Nord Stream 2 AG developed a route outside of Danish TW to the north and west of Bornholm (NW route). This routing was selected after the Danish authorities advised in a letter dated November 2017 that the disputed area between Denmark and Poland was not available for the route of the gas pipelines that Nord Stream 2 AG previously had developed. The EIA and permit application for the NW route were submitted for processing to the Danish Energy Agency (DEA) in August 2018.

Given the recent delimitation of the EEZ borders between Denmark and Poland, Nord Stream 2 AG has now decided to develop a route outside of Danish TW to the south and east (SE) of Bornholm and the base case route, and has selected the SE route in the present EIA as a proposed route for NSP2 (hereafter referred to as the "NSP2 route"). The eastern part of the NSP2 route in Danish waters splits into two potential route variants, referred to as the "NSP2 route V1" or "V1" and the "NSP2 route V2" or "V2", respectively. Both NSP2 route variants are described and assessed in this EIA, so that either may ultimately be selected as the preferred alternative.

The proposed NSP2 route has been evaluated as a feasible alternative compared to the base case route. Aspects considered as part of the route alternatives assessment included: maritime safety, chemical warfare agent (CWA) risk area, extent of intervention works, fishery in the area, maritime spatial planning, military practice areas and the biological environment. Based on the comparison, it is concluded that the reference base case route is the preferred route for the Nord Stream 2 project in Danish waters in relation to environmental and socio-economic aspects, but that the proposed NSP2 route (SE route) is also a viable route alternative.

0.3.3 No-action alternative

According to the regulations, an EIA should include a "no-action" (or "zero-") alternative, which describes a situation in which the planned project is not carried out. In the present case, should NSP2 not be constructed and operated in Danish waters, there would be no environmental or social impacts, neither adverse nor positive. Furthermore, the pipelines already installed in Germany, Sweden, Finland and Russia would not be used.

0.4 Project description

0.4.1 Project schedule

Nord Stream 2 AG has conducted research and carried out technical, geophysical and environmental surveys over several years to identify the optimal route alternative. The schedule for NSP2 planning, permitting and construction is outlined in Figure 0-2.

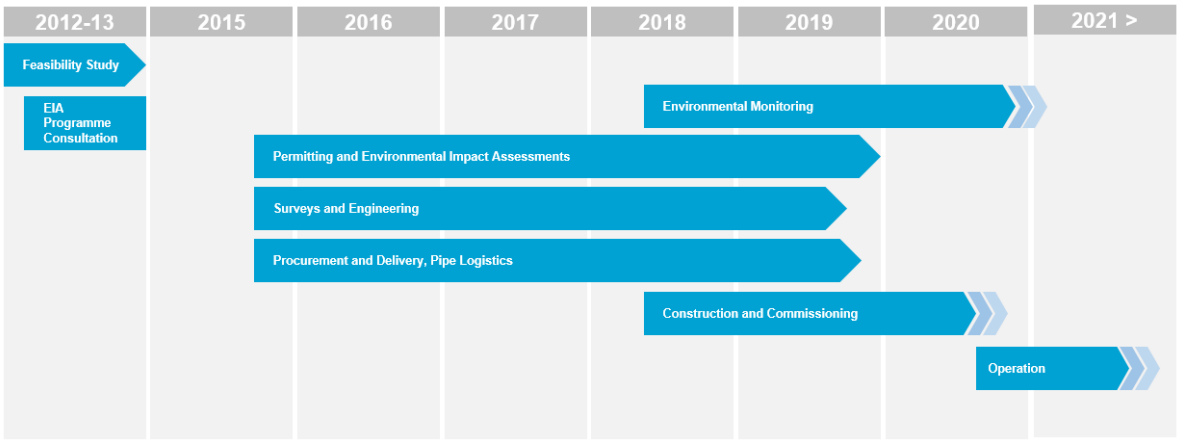

Figure 0-2 NSP2 project schedule.

0.4.2 Proposed NSP2 route

NSP2 is designed to transport natural gas and comprises two 48" diameter subsea pipelines and associated onshore facilities with the capacity to deliver 55 bcm of natural gas per year to the EU market. The pipelines will extend through the Baltic Sea from the southern Russian coast (Narva Bay) in the Gulf of Finland to the German coast (Lubmin area), with no spur lines or intermediate landfalls.

The proposed NSP2 route will cover approximately 1,230 km if the combination of the proposed NSP2 route with V1 is selected, and approximately 1,248 km if the combination of the NSP2 route with V2 is selected. The route crosses the TW of Russia and Germany and runs within the EEZs of Finland, Sweden, Denmark and Germany (see Figure 0-3).

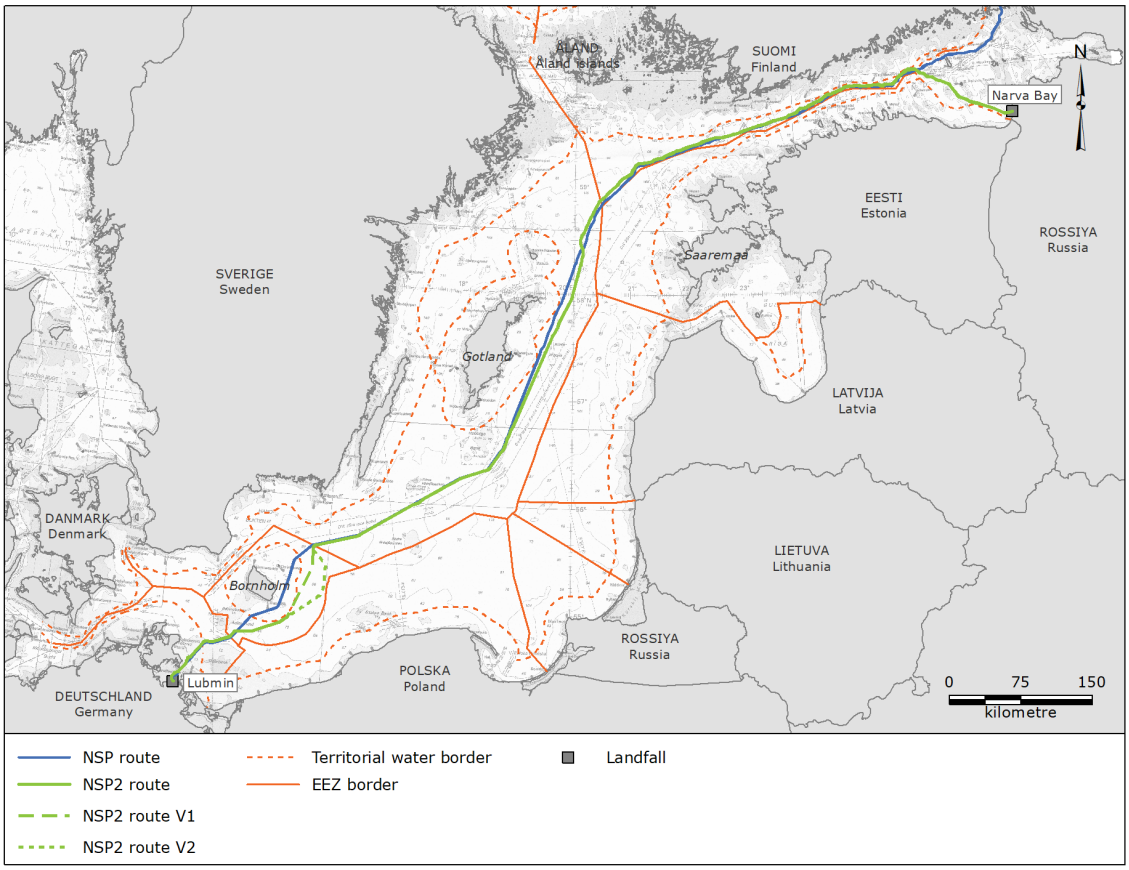

Figure 0-3 Proposed NSP2 route in the Baltic Sea.

In Danish waters, the proposed NSP2 route runs exclusively in the EEZ south and east of Bornholm. The length of the proposed route in Danish waters is approximately 147 km if the combination of the proposed NSP2 route with V1 is selected, and approximately 164 km if the combination of the proposed NSP2 route with V2 is selected. The two NSP2 pipelines (Line A and Line B) will run almost parallel to one another, with a separation distance for the two lines of between 35 m and 155 m.

0.4.3 Construction activities and status

Construction activities in Danish waters include pipe-lay and seabed intervention works. Pipeline installation is expected to last approximately 115 days in total for the two pipelines if the combination of the proposed NSP2 route with V1 is selected, and approximately 125 days if the combination of the proposed NSP2 route with V2 is selected, and the installation is assumed to be sequential, meaning that one pipeline will be installed at a time. Construction activities are scheduled to start in the beginning of 2020, but this may be subject to change during project development.

Pipe-lay will be undertaken using specialised vessels handling the entire welding and pipe-laying process. In the Danish sector, it is expected that a dynamically positioned (DP) pipe-lay vessel will be used. DP vessels do not require anchors and are kept in position by horizontal thrusters that constantly counteract forces from the pipeline, waves, currents and wind.

In some areas, the offshore installation of the pipelines will require additional stabilisation and/or protection against hydrodynamic forces (e.g. waves, currents), which can be achieved by either trenching the pipelines into the seabed or with rock placement. Stabilization is expected over 4 km of the route, and can be achieved either by post-lay trenching or rock placement.

Rock placement is the use of rock pieces to provide support and cover for sections of the pipeline to ensure its long-term integrity. Rock placement will be used in the areas where NSP2 pipelines

cross the NSP pipelines, and spot rock placement may also be used to provide additional stability to the pipelines. For cable crossings, a solution with flexible or rigid separation mattresses is envisaged.

Construction activities are presently underway, both onshore at the two landfall areas in Germany and Russia, as well as offshore in German, Swedish, Finnish and Russian waters.

0.4.4 Operational activities

Nord Stream 2 AG will be the owner and operator of NSP2. During normal operation, pressurized natural gas will be continuously introduced at Narva Bay, Russia and taken out at an equal rate at Lubmin, Germany.

An operations concept and security system has been developed to ensure the safe operation of the pipelines. The technical expectation of operation of the infrastructure is at least 50 years.

0.5 EIA methodology

This section provides a summary of the methodology applied in the EIA. The assessment methodology enables characterisation of the potential impacts from planned activities and assessment of their overall significance. Potential impacts from unplanned events are assessed using either a similar methodology or an established risk-based methodology, as appropriate. The resources and receptors that may be impacted by NSP2 are summarised in Table 0-1.

Table 0-1 Resources or receptors susceptible to potential impacts associated with NSP2.

Resource or receptor type		Resource or receptor
Environmental	Physical-chemical	Bathymetry
		Sediment quality
		Hydrography
		Water quality
		Climate and air
	Biological	Plankton
		Benthic flora and fauna
		Fish
		Marine mammals
		Birds
		Protected areas
		Natura 2000 sites
		Biodiversity
Socio-economic	Socio-economic	Shipping and shipping lanes
		Commercial fishery
		Cultural heritage
		People and health
		Tourism and recreational areas
		Existing and planned installations
		Raw material extraction sites
		Military practice areas
		Environmental monitoring stations

Although conventional and chemical munitions are not a resource or receptor, and therefore not included in the list above, munitions were identified during consultation as an issue requiring consideration. Munitions have been assessed in relation to the above-listed resources and receptors, as applicable.

0.5.1 Identifying potential impacts

A systematic approach was applied in the EIA to identify and evaluate the potential impacts that the NSP2 project may have on the physical-chemical, biological and socio-economic environment and to describe mitigation measures to avoid, minimise or reduce any potentially negative impacts to acceptable levels. Throughout the EIA, where appropriate, a worst-case assessment of an impact has been considered to ensure that the conclusions are conservative.

The temporal scope of the assessment has included impacts that could arise during the construction and operational phases of the project. The pre-commissioning and commissioning phases will not impact resources or receptors in Danish waters; as such, they have not been addressed in the EIA. Impacts during decommissioning will depend on the decommissioning method, which will be developed near the end of the operational phase. Therefore, only a high-level assessment of potential impacts during decommissioning was undertaken, which is summarised in section 0.8.

0.5.2 Assessment of potential impacts

The impact assessment methodology has taken into consideration the nature, type and magnitude of a given impact as well as the sensitivity of a given resource or receptor to determine an impact ranking. The magnitude of an impact is defined by its spatial extent, duration and intensity. The sensitivity of receptors/resources to each impact was determined by considering their resilience and ecological and/or socio-economic importance, including protected status.

On this basis, an impact ranking was determined and expressed as a qualitative ranking (see Table 0-2). Impact rankings also accounted for the implementation of mitigation measures built-in to the project to avoid or reduce significant adverse impacts.

Table 0-2 Impact ranking categories for planned activities.

Negligible	Impact that is indistinguishable from the background/natural level of environmental and socio-economic change. Impact is considered "not significant".
Minor	Impact of low magnitude, within standards and/or associated with low or medium importance/sensitivity resources/receptors, or impact of medium magnitude affecting low importance/sensitivity resources/receptors. Impact is considered "not significant".
Moderate	Broad category within standards, but impact of a low magnitude affecting high importance/sensitive resources/receptors, or medium magnitude affecting medium or high importance/sensitivity resources/receptors, or of high magnitude affecting low sensitivity resources/receptors. The impact may or may not be significant, depending on the context, and further mitigation may be required to avoid or reduce the impact to non-significant levels.
Major	Impact that exceeds acceptable limits and standards and is of high magnitude affecting medium or high importance/sensitivity resources/receptors. Impact is considered "significant".

For the purposes of this EIA, a "significant" impact is one that should be considered by the relevant authority when determining the acceptability of a project.

0.5.3 NSP2 modelling and assumptions

An early task in the EIA process was to determine the characteristics of the physical changes that would arise from NSP2 activities. This was informed by a substantial body of empirical data gathered from the NSP monitoring programme, which spanned both construction and operation, as well as the completion of targeted field surveys specifically for the NSP2 project. In the cases of sediment release, underwater noise, airborne noise and air emissions, the results from NSP monitoring were supplemented with targeted modelling studies. The release of contaminants, including CWA, and nutrients during construction was evaluated based on the results of sediment release modelling and the levels of such substances identified during prior field environmental surveys.

0.6 Assessment of potential impacts

In this section, potential impacts are assessed and described for the entire NSP2 route in Danish waters. The NSP2 route V1 and the NSP2 route V2 are discussed separately only where the impacts differ between these two route variants.

0.6.1 Bathymetry

Modelling has shown that potential changes to water depth caused by the NSP2 project (during the construction and operational phases) would not be significant enough to cause bathymetry-related impacts on local bottom-dwelling communities or the basic physical-chemical conditions for life near the pipelines.

It is therefore assessed that impacts on bathymetry during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.2 Sediment quality

Along the Danish portion of the proposed NSP2 route, the bedrock consists mainly of sandstone and mudstone. Along the proposed NSP2 route, surface sediments mainly consist of mud and sandy mud, Quaternary clay and silt and muddy sand. In the shallowest parts close to the German EEZ, the bottom becomes more sandy.

Modelling indicates that seabed intervention works will lead to sedimentation in a localised area that corresponds to a sediment layer of approximately 1 mm. The predicted levels of sedimentation are not considered sufficient to alter the sediment quality in terms of chemistry, content of contaminants or the natural processes that take place in the sediment. Furthermore, survey results have indicated that intervention works will not expose sediment of a fundamentally different quality, and the physical characteristics of the sediment will not be changed.

Changes in bottom-water dynamics due to the presence of the pipelines and other structures on the seabed can affect sedimentation and erosion patterns. These impacts are assessed to be highly localised and insignificant in relation to the vast bottom habitat area around the proposed NSP2 route.

Sacrificial anodes will be used to protect the pipelines from corrosion, which will result in the release of aluminium, zinc and cadmium. The amounts of metals released from the anodes will be so small that sediment is not expected to be affected above background variations.

It is therefore assessed that impacts on sediment quality during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.3 Hydrography

The predicted sedimentation levels arising from NSP2 construction activities are within the natural range of yearly sedimentation in the Bornholm Basin, and therefore not of a magnitude that would cause any hydrographical changes in the marine environment.

The potential hydrographical effect on deep water flowing into the Baltic Proper was evaluated, and it was concluded that the pipelines will not lead to any significant "blocking effect".

It is therefore assessed that impacts on hydrography during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.4 Water quality

Construction activities will result in increased levels of sediments in the water column, potentially along with contaminants and/or CWA that were previously present in these sediments. Modelling has shown that sediments will be suspended for a duration of several hours before resettling on the seabed. In the deeper parts of the route, where measured levels of contaminants are highest, the halocline will prevent the upward migration of contaminants to the surface waters, where they may impact pelagic species and seabirds. The impact will thus be temporary and local to the area around the pipelines.

There is also the potential for discharges from project vessels to impact water quality; however, all project vessels will comply with the requirements of applicable international conventions regarding pollution at sea. As such, no impacts from vessel discharges are expected.

Gas flowing through the NSP2 pipelines during operation has the potential to increase the surface temperature of unburied pipeline sections, creating a temperature difference between the pipeline and the surrounding seawater. Natural mixing will ensure that the water temperature reaches equilibrium with the surrounding water within 1 m after crossing the pipeline, and the impact is therefore highly local. Modelling has shown that the transfer of heat from the buried parts of the pipelines to the sediment and the surrounding seawater is insignificant.

Sacrificial anodes will be used to protect the pipelines from corrosion, which will result in the release of aluminium, zinc and cadmium. Elevated levels of anode metal ions in the water column are expected only within a few metres of the anodes, and the levels will be insignificant compared with the existing level of water-borne inflow of metals to the area.

It is therefore assessed that impacts on water quality during construction and operation of NSP2 will be **negligible** and **not significant**, except for impacts associated with the release of sediments and contaminants into the water column, which are assessed to be **minor** and **not significant**.

0.6.5 Climate and air quality

Vessel traffic associated with construction and operation of NSP2 will generate air emissions that have the potential to impact climate and/or air quality. The total release of air pollutants during both project phases has been calculated and corresponds to an amount that will not be significant in comparison with the annual Danish emissions caused by shipping. In addition, all construction and operation activities will occur several kilometres away from inhabited areas, so no onshore air quality impacts are expected.

It is therefore assessed that impacts on climate and air quality during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.6 Plankton

Construction activities will result in increased levels of sediments in the water column, potentially along with contaminants and/or CWA that were previously present in these sediments. Modelling has shown that sediments will be suspended for a duration of several hours before resettling on the seabed. In the deeper parts of the route, where measured levels of contaminants are highest, the halocline will prevent the upward migration of contaminants to the surface waters, where they may impact plankton. The impact will thus be temporary and local to the area around the pipelines.

Further, the previously described release of metals from sacrificial anodes into the water column may impact plankton. This will only occur within a few metres of the anodes, and the levels will be insignificant compared with the existing level of water-borne inflow of metals to the area.

It is therefore assessed that impacts on plankton during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.7 Benthic flora and fauna

Physical disturbance associated with construction activities may result in the disturbance of benthic flora and fauna. The impact would be limited to the footprint of the physical disturbance, which covers a negligible area in comparison with the surrounding habitats that are physically uniform and support similar benthic communities.

Construction activities will result in increased levels of sediments in the water column, potentially along with contaminants and/or CWA that were previously present in these sediments. Modelling has shown that sediments will be suspended for a duration of several hours before resettling on the seabed. Most contaminants and CWA are unlikely to be dissolvable in water and will therefore also resettle on the seabed within hours. The impact will thus be temporary and local to the area around the pipelines.

During operation, the presence of the pipelines and structures on the seabed can potentially create a new hard-bottom substrate (a "reef effect"), where benthic fauna can settle. Mobile animals may then be attracted to the area in search of food and/or shelter. Overall, any changes to the population structure near the pipelines will be limited, given that the pipelines will occupy a negligible part of the total area with a similar habitat in the Baltic Sea.

It is therefore assessed that impacts on benthic flora and fauna during construction and operation of NSP2 will be **negligible** and **not significant**, except for impacts associated with change of habitat, which are assessed to be **minor** and **not significant**.

0.6.8 Fish

Physical disturbance from construction works will be limited to the footprint of the proposed NSP2 route and will not lead to impacts on fish at the population level. The ecosystem is furthermore expected to revert to its pre-impact state within a short time span.

Bottom-dwelling fish, as well as fish eggs and larvae close to the seafloor, can be smothered as sediments that were released into the water column during construction settle back onto the seabed. However, modelling has shown that the rate and amount of sediment resettling on the seabed after construction works would not exceed thresholds that could permanently impact fish at the population level, and the impacts will thus be local and temporary.

Construction activities will result in increased levels of sediments in the water column, potentially along with contaminants and/or CWA that were previously present in these sediments. Suspended sediments can cause avoidance behaviour and injury/death in adult fish and can also reduce the viability of eggs and larvae. Modelling has shown that sediments will be suspended only into the lower 10 m of the water column for a duration of several hours before resettling on the seabed. Furthermore, most contaminants and CWA are unlikely to be dissolvable in water and will therefore also resettle on the seabed within hours. Any impact will thus be temporary and local to the area around the pipelines.

Underwater noise can potentially result in physical injury, behavioural disturbance, and in a worst case, death. Modelling of rock placement, considered the noisiest project activity, has shown that noise levels will not exceed the threshold for permanent hearing loss, although there is a risk of temporary hearing loss very close (within 100 m) to the noise source. Behavioural impacts are considered temporary, as the construction vessels will be continuously moving, and of low intensity, as fish are expected to leave the area as ships approach.

The proposed NSP2 route crosses an important cod spawning area, and the following potential sources of impact during construction have been considered: physical disturbance, release of sediments and contaminants into the water column and generation of underwater noise. On the basis of the assessments performed and described above, no impacts on cod spawning are anticipated.

During operation, the presence of the pipelines and structures on the seabed can potentially create a new hard-bottom substrate (a "reef effect"), which may attract fish in search of food and/or shelter. Overall, any changes to the population structure near the pipelines will be limited, given

that the pipelines will occupy a negligible part of the total area with a similar habitat in the Baltic Sea.

It is therefore assessed that impacts on fish during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.9 Marine mammals

Marine mammals commonly found in Danish waters along the proposed NSP2 route include the harbour porpoise and grey seal. Foraging harbour seals may also potentially enter the project area. These species are protected under several international agreements as well as national legislation.

Construction activities will result in increased levels of sediments in the water column, potentially along with contaminants and/or CWA that were previously present in these sediments. Modelling has shown that sediments will be suspended for a duration of several hours before resettling on the seabed, and will not lead to injuries. In the deeper parts of the route, where measured levels of contaminants are highest, the halocline will prevent the upward migration of contaminants, thereby reducing the likelihood of toxicological impacts. The overall impact will thus be temporary and local to the area around the pipelines.

Underwater noise can potentially result in physical injury, hearing loss, behavioural disturbance or masking effects. Modelling of rock placement, considered the noisiest project activity, has shown that noise levels will not exceed the threshold for permanent hearing loss, although there is a risk of temporary hearing loss very close (within 80 m) to the noise source. Behavioural and masking impacts are considered temporary, as the construction vessels will be continuously moving, and of low intensity, as animals are expected to leave the area as ships approach.

During operation, the gas flowing through the pipelines will generate noise. A comparison of modelling results for noise generated by the NSP pipelines with ambient noise measurements in the area indicate that the noise from the NSP2 pipelines will be below ambient levels.

The change of habitat brought about by the presence of the pipelines on the seabed has been assessed not to lead to changes in diversity or abundance of benthic and/or fish species, and is therefore not anticipated to affect marine mammal foraging behaviour.

It is therefore assessed that impacts on marine mammals during construction and operation of NSP2 will be **negligible** and **not significant**, except for behavioural response impacts associated with the generation of underwater noise, which are assessed to be **minor** and **not significant**.

0.6.10 Seabirds

Construction activities will result in increased levels of sediments in the water column, potentially along with contaminants and/or CWA that were previously present in these sediments. Suspended sediments can impact the foraging efficiency of some birds due to increased turbidity or reduced food availability because prey may avoid the affected area. Modelling has shown that sediments will be suspended only into the lower 10 m of the water column and for a duration of several hours before resettling on the seabed. Furthermore, most contaminants and CWA are unlikely to be dissolvable in water and will therefore also resettle on the seabed within hours. Any impact will thus be temporary and local to the area around the pipelines.

Benthic prey for bottom-feeding seabirds can potentially be covered as sediments that were suspended into the water column during construction settle back onto the seabed. However, modelling has shown that the rate and amount of sediment resettling on the seabed after construction works would not be sufficient to affect the ability of seabirds to locate prey.

The physical presence of construction vessels (visual presence and noise) has the potential to disturb seabirds and cause them to temporarily abandon their resting and/or foraging areas. Data indicate that in general, impacts are expected to be limited to a 1-2 km radius around the working area. Any impacts on birds within this radius are considered temporary, as the construction vessels will be continuously moving.

It is therefore assessed that impacts on seabirds during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.11 Protected areas

The proposed NSP2 route does not cross any protected areas within Danish waters. The minimum distance from the proposed NSP2 route to a Ramsar site is more than 29 km from the NSP2 route V1 and more than 35 km from the NSP2 route V2 and to the nearest HELCOM MPA is approximately 18 km, irrespective of the route variant selected.

Impacts on protected areas have been assessed by considering the least resilient species, habitats or ecosystems for which a given protected area has been designated, particularly those associated with the pressures that have been identified as part of the protection, e.g., eutrophication, pollution, introduction of non-indigenous species (NIS), physical disturbance, etc. On this basis, no significant impacts on protected areas were identified.

It is therefore assessed that impacts on protected areas during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.12 Natura 2000

The proposed NSP2 route does not cross any Natura 2000 sites within Danish waters. The nearest Danish Natura 2000 site is N252 Adler Grund and Rønne Banke, which is located approximately 18 km from the proposed NSP2 route at the nearest point, irrespective of the route variant selected.

At N252 Adler Grund and Rønne Banke, there are designated sandbank and reef habitats, but no designated species. The following sources of potential impact have been included in the Natura 2000 screening for these marine habitat types: release of sediments, contaminants and CWA into the water column and subsequent sedimentation (from e.g. post-lay trenching). No significant impacts on protected reef or sandbank habitats were identified.

In conclusion, it is assessed that there will be **no risk of significant impact** on the designated habitat types in Danish Natura 2000 sites during construction and/or operation of NSP2.

0.6.13 Biodiversity

Biodiversity is typically referred to as the "health" of an ecosystem. The Helsinki Commission (HELCOM) has assessed the biodiversity status of the waters around Bornholm as ranging from "Bad" to "Moderate", reflecting an impaired biodiversity status.

Impacts on biodiversity are consistent with the impacts identified for species, habitats and protected areas discussed above. Additionally, based on a review of the potential for in-combination impacts, it is considered that NSP2 will not impact the overall integrity and functioning of habitats, nor the trophic interactions between species. The potential of introducing NIS is limited by the fact that ballast water will only be exchanged outside of the Baltic Sea.

It is therefore assessed that impacts on biodiversity during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.14 Shipping and shipping lanes

During construction, vessels that are not involved in construction activities will not be allowed to enter the safety zones created around construction vessels. The imposition of safety zones will be temporary at any given location as the construction activities progress. Furthermore, the shipping lanes crossed by the proposed NSP2 route generally provide sufficient space and water depth for other ships to plan their journey and safely navigate around possible temporary obstructions.

During operation, safety zones will also be imposed in connection with periodic, vessel-based inspection and maintenance activities. However, given that inspection activities are planned at one- to two-year intervals (or less), impacts are expected to be lower than those anticipated during construction.

It is therefore assessed that impacts on shipping and shipping lanes during construction of NSP2 will be **minor** and **not significant**. Impacts on shipping and shipping lanes during operation of NSP2 will be **negligible** and **not significant**.

0.6.15 Commercial fishery

During construction, fishing vessels will not be allowed to enter the safety zones created around construction vessels. The imposition of safety zones will be temporary at any given location as the construction activities progress. Additionally, supply vessels will bring pipes and other supplies to the pipe-lay vessel. The increased traffic has the potential to damage fishing gear, particularly longlines at the surface of the water column.

During operation, the physical presence of pipelines and structures on the seabed has the potential to impact bottom trawling activities through either protection zones or through damage or loss of gear. The NSP2 pipelines are designed to be resistant to impacts from interaction with fishing gear, and therefore Nord Stream 2 AG will apply for a dispensation to remove the fishery restriction usually enforced around pipelines in Danish waters during the operation of the pipeline. In addition, post-lay trenching and natural embedment of the pipelines will reduce their height above the seabed, thereby reducing the risk of bottom trawling gear becoming stuck.

It is therefore assessed that impacts on commercial fishery during construction of NSP2 will be **negligible** and **not significant**. Impacts on commercial fishery during operation of NSP2 will be **minor** and **not significant**.

0.6.16 Cultural heritage

Pipe-lay, anchor-handling, post-lay trenching and rock placement could damage cultural heritage objects (CHOs) or make them inaccessible for archaeological investigation. To ensure the integrity of CHOs during the construction and operation of NSP2, all targets found during route surveys will be visually inspected. Mitigation measures, as necessary, will be elaborated together with the relevant Danish authorities. Safety zones will be defined around identified CHOs. This approach was effective during NSP construction, with post-lay wreck surveys showing no impacts in Danish waters.

It is therefore assessed that impacts on cultural heritage during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.17 Conventional and chemical munitions

Potential impacts on resources and receptors in connection with conventional and chemical munitions that have been dumped in the Baltic Sea following World Wars I and II have been assessed in the respective assessment sections for each resource or receptor that may be impacted by disturbance of munitions during the construction and operational phases of the project.

0.6.18 People and health

The closest Danish populations to the proposed NSP2 route are on the islands of Bornholm and Ertholmene, which are respectively located approximately 23 km and 30 km (shortest distances) north-west of the NSP2 route V1 and approximately 24 km and 37 km (shortest distances) north-west of the NSP2 route V2.

The noise levels from pipe-lay activities (considered worst-case for airborne noise) are not expected to exceed the World Health Organization (WHO) maximum onshore threshold guideline of 40 decibels (dB). In fact, it is unlikely that the noise will be heard above ambient level.

Pipe-lay will be conducted on a 24-hour basis. During the night-time periods, the pipe-lay vessel will use spotlights. When visibility is good, it is possible to see 19 km or more across the Baltic Sea, and therefore the spotlight is unlikely to be visible from either Bornholm or Ertholmene.

During operation, the potential also exists for airborne noise and light impacts arising from periodic, vessel-based inspection and maintenance activities. However, given that inspection activities are planned at one- to two-year intervals (or less), impacts are expected to be lower than those anticipated during construction.

It is therefore assessed that impacts on people and health during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.19 Tourism and recreational areas

During construction, recreational vessels used for e.g. diving or fishing will not be allowed to enter the safety zones created around construction vessels. The imposition of safety zones will be temporary at any given location as the construction activities progress. Furthermore, construction activities will lead to airborne noise, which may impact the enjoyment of recreational areas. However, given the distances between Bornholm and Ertholmene and the proposed NSP2 route, airborne noise is not expected to reach nuisance levels on the islands at any time.

The water turbidity (i.e., cloudiness) may be increased during construction due to the suspension of sediment into the water column. However, given the use of safety zones around project-related vessels, no recreational activities, including those susceptible to such impacts (i.e. diving), will take place near the areas of highest turbidity. Suspended sediment beyond the safety zone will be at much lower levels and will settle to the seabed within a few hours.

During operation, safety zones around vessels used for periodic inspection and/or maintenance of the pipelines may affect recreational vessels within the immediate vicinity of the pipelines. However, the impact will be less than that during construction due to the low frequency of surveys.

It is therefore assessed that impacts on tourism and recreational areas during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.20 Existing and planned installations

Crossings of existing installations, including cables and the NSP pipeline system, will be implemented using experience from NSP and best practice measures, and in agreement with the respective owners of each installation. This will ensure that a separation is maintained between the NSP2 pipelines and each installation and that the operation of the infrastructure is not affected.

It is therefore assessed that impacts on existing and planned installations during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.21 Raw material extraction sites

The proposed NSP2 route does not cross any areas in Danish waters that are currently being used for the exploration or extraction of natural resources, nor do they cross any areas of potential future extraction. Therefore, no impacts on raw material extraction sites are anticipated during the construction or operational phase.

It is therefore assessed that impacts on raw material extraction sites during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.22 Military practice areas

The NSP2 route V1 and the NSP2 route V2 both cross two areas used for naval shooting exercises by the Danish and Swedish militaries, as well as one submarine exercise area used by the German military. These areas are located east of Bornholm. During exercises, ships are forbidden to enter these areas. The Naval District Bornholm and the Danish Navy inform the public when military practice areas are active.

During construction, supply vessels will bring pipes and other supplies to the pipe-lay vessel. The increased vessel traffic to and from the project area can potentially conflict with military practice activities. Nord Stream 2 AG will coordinate with the appropriate authorities to ensure that there will be no conflicts between military activities and construction of NSP2. During operation, the pipelines and related support structures will be present on the seabed, which may conflict with submarine exercises carried out by the German military east of Bornholm. However, on the basis of communication with the German Armed Forces, it has been confirmed that bottoming does not occur in the area to be occupied by the pipelines, and therefore there will be no impact.

It is therefore assessed that impacts on military practice areas during construction and operation of NSP2 will be **negligible** and **not significant**.

0.6.23 Environmental monitoring stations

Long-term trends in physical, chemical and biological variables are being monitored at selected environmental monitoring stations throughout the Baltic Sea. Monitoring stations in the Danish waters around Bornholm include Swedish, Finnish, and HELCOM stations. There are four stations located within 10 km of the proposed NSP2 route; of these, none are located less than 1 km from the NSP2 route V1 and one of them is located less than 1 km from the NSP2 route V2. The station is used by the Finnish authorities for monitoring of physical and chemical parameters as well as benthos.

Modelling indicates that the impacts associated with increased suspended sediments and contaminants, as well as sedimentation on the seabed, will be short-term and limited to the near vicinity of the pipelines. It is therefore assessed that there will be a limited potential for impacts on environmental monitoring stations. In order to exclude any potential impact on historical and future data acquired by long-term monitoring stations, Nord Stream 2 AG will consult with the responsible authority to minimise potential interference. No impacts on environmental monitoring stations are anticipated during the operational phase.

It is therefore assessed that impacts on environmental monitoring stations during construction and operation of NSP2 will be **negligible** and **not significant**.

0.7 Marine strategic planning

Several directives and programmes are in place with the aim of improving the quality of European waters and creating a common framework for marine spatial planning. These include the Marine Strategy Framework Directive (MSFD), Water Framework Directive (WFD) and Baltic Sea Action Plan (BSAP).

An assessment has been undertaken to determine the compliance of NSP2 with these directives and programmes, and shows that NSP2 will not prevent the achievement of the long-term goals, or be contrary to the objectives and initiatives set out in the MSFD, WFD and/or BSAP.

0.8 Decommissioning

NSP2 is designed to operate for at least 50 years. The proposed decommissioning programme will be developed during the latter years of operation to enable consideration of any new or updated legislation and guidance, as well as to utilise good international industry practice and technical knowledge gained over the lifetime of NSP2. The condition of the NSP2 infrastructure may also influence the preferred decommissioning method and relevant mitigation measures.

The preferred option for decommissioning of the offshore NSP2 structures is likely to be leaving *in situ*. Management and mitigation methods for decommissioning will be developed in agreement with the relevant national authorities, in accordance with the legislative requirements at the time of decommissioning and with due consideration of available knowledge and technology.

0.9 Cumulative impacts

In addition to assessing the impact of the NSP2 project on individual resources or receptors (see section 0.6), it is also necessary to consider the potential for NSP2-related impacts to interact with impacts from other existing or planned projects. These other projects may generate their own individually insignificant impacts, but when considered together with the impacts from NSP2, a significant combined or cumulative impact could result.

This section considers the potential for cumulative impacts from the construction and/or operation of NSP2 in conjunction with other planned and existing projects. These other projects have been selected on the basis of location, timing, degree of certainty (for planned projects), and potential for resulting in impacts on the same receptors as NSP2.

0.9.1 Planned projects

The only planned project identified as having the potential to combine with NSP2 and generate cumulative impacts is the Baltic Pipe subsea natural gas pipeline, which could cross the proposed NSP2 route.

The Baltic Pipe project is in the planning stage and anticipates that pre-lay seabed intervention work will begin in November 2020 and the actual installation of the Baltic Pipe is expected to be carried out within the period April – August 2021. The NSP2 pipelines are scheduled to be laid at the start of 2020 in order to facilitate testing and commissioning of the system within the second half of 2020. Therefore, there should be no temporal overlap and therefore no cumulative impacts are foreseen for the construction phases of the two projects. Sources of potential cumulative impacts during operation of the two systems that were assessed included the physical presence of pipelines and structures on the seabed; change of habitat, physical disturbance above water (e.g. from the presence of vessels); the release of metals from anodes and the imposition of safety zones around vessels.

For each source, the assessment concluded that negligible cumulative impacts are expected, due to the localised extent and/or short duration of the impacts for both projects.

Therefore, it is assessed that there would be **negligible** and **not significant** cumulative impacts on all resources and receptors due to interaction between NSP2 and planned projects, and no potential transboundary impacts were identified.

0.9.2 Existing projects

Consideration was also given to the potential for cumulative impacts from interaction of NSP2 with existing projects; namely, existing telecommunication cables and the NSP pipeline.

The assessment concluded that due to the localised extent and low magnitude of the impacts from each project, there would be negligible cumulative impacts on all resources and receptors due to interaction between NSP2 and existing projects, and no potential transboundary impacts were identified.

0.10 Unplanned events and risk assessment

The construction and operation of NSP2 may give rise to hazards that could present risks to the environment, the public/third parties or workers. As such, comprehensive risk assessments have been carried out to understand, mitigate or prepare for possible risks. The identified risks to the environment and public during construction and/or operation of NSP2 that have been assessed in this EIA relate to the following unplanned events:

- Vessel collisions and subsequent oil spill;
- Gas release;
- Unplanned munitions encounter;
- Unplanned maintenance works;
- Wet buckle (construction phase only).

In all phases of the project, Nord Stream 2 AG will only undertake activities for which the associated risk is assessed to be acceptable.

0.11 Transboundary impacts

The Espoo Convention (Article 1 vii) defines a transboundary impact as:

"*…any impact, not exclusively of a global nature, within an area under the jurisdiction of a Party caused by a proposed activity the physical origin of which is situated wholly or in part within the area under the jurisdiction of another Party.*"

The Convention requires that an assessment of potential transboundary impacts be performed when a planned activity may lead to impacts across the boundaries of Parties of the Convention. NSP2 crosses the jurisdictions of several countries and will be constructed in a marine environment, where an impact may be experienced some distance from its source. Therefore, the potential for planned activities in Danish waters to impact resources or receptors in neighbouring countries was assessed in the EIA. The potential for transboundary impacts has been identified for Sweden, Germany and Poland, see Table 0-3. Furthermore, the EIA also assessed the potential for transboundary impacts on regional or global receptors in the Baltic Sea arising from the construction and operation of NSP2 in Danish waters, see Table 0-4.

Table 0-3 Assessment of potential transboundary impacts arising from the construction and operation of NSP2 in Danish waters.

Source of potential impact	Sweden	Germany	Poland
Release of sediments into the water column			
Release of contaminants into the water column			
Release of chemical warfare agents into the water column			
Sedimentation on the seabed			
Generation of underwater noise			
Imposition of safety zones around vessels			
Impacts on protected areas			
Negligible impact / Minor impact			

Table 0-4 Assessment of potential transboundary impacts on regional or global receptors in the Baltic Sea arising from the construction and operation of NSP2 in Danish waters.

Potentially impacted regional or global receptors	Potential impact
Altered hydrography	
Air quality and climate	
Fish	
Marine biodiversity	
Shipping and shipping lanes	
Fisheries	
Marine strategic planning	
Natura 2000 sites	
Negligible impact / Minor impact	

Where the pipelines enter the German and Swedish EEZs, the nature and magnitude of the potential environmental impacts arising from the activities within the Danish EEZ will be of the same nature, but of a significantly smaller magnitude than those resulting from similar construction activities within the German and Swedish EEZs, respectively. Furthermore, the shortest distance from the pipeline to the Danish/Polish EEZ border is approximately 7.0 km for the combination of the proposed NSP2 route with V1 and approximately 3.6 km for the combination of the proposed NSP2 route with V2, and significant impacts are not expected to reach Polish waters. It is therefore generally assessed that the impacts from activities within the Danish EEZ on neighbouring countries will be **negligible to minor** and thus **not significant**. This is in line with the monitoring results obtained during the construction and first years of operation of NSP.

Furthermore, the construction and operation of the NSP2 pipelines within the Danish EEZ will have no significant impact on protected areas, including internationally protected areas (Natura 2000 sites, Ramsar sites). Therefore, the coherence of the Natura 2000 network, including spatial and functional connections, will not be affected.

Lastly, the EIA also evaluated the potential for transboundary impacts from unplanned events, such as an oil spill following a ship collision or a gas leakage. Unplanned events have been subject to a risk assessment (see section 14), which concluded that the likelihood of occurrence is extremely low. The potential for transboundary impacts is also assessed to be **negligible** and **not significant**.

0.12 Mitigation measures

Nord Stream 2 AG is committed to designing, planning and implementing NSP2 with the lowest reasonably practicable impact on the environment. The environmental and social management system (ESMS) for managing planned impacts and emergency response is detailed in section 0.14.

A key objective during the planning and design of NSP2 has been to identify the means of reducing the impact of the project on the receiving environment. To achieve this, mitigation measures have continually been developed and integrated into each phase of the project. These mitigation measures have been identified through consideration of legal requirements, best practice industry standards, applicable international standards, experience from NSP and other infrastructure projects, as well as application of expert judgement.

In developing mitigation measures, the primary goal has been to prevent or reduce identified negative impacts. If it was not possible to avoid an impact (i.e. there is no technically or economically feasible alternative), minimisation measures have been planned. In cases where it is not possible to reduce the significance of negative environmental impacts through management actions, restoration or offset measures are considered.

Mitigation measures during construction and/or operation of NSP2 have been proposed for the following topics: water quality, non-indigenous species, shipping and shipping lanes, commercial fishery, cultural heritage, conventional and chemical munitions, existing and planned offshore installations, military practice areas, environmental monitoring stations and the management of hazardous materials and wastes.

0.13 Proposed environmental monitoring

The purpose of an environmental and socio-economic monitoring programme is to verify and evaluate the assumptions and environmental impacts described in the EIA. In addition, the data gathered through a monitoring programme may identify the need for further environmental mitigation measures if, contrary to expectations, they indicate unforeseen environmental impacts.

The proposed NSP2 monitoring programme draws on the vast knowledge and experience acquired from the NSP monitoring programme. This concluded that impacts on the marine environment were negligible to minor, not significant and limited to the immediate vicinity of the pipelines. It is anticipated that the NSP2 programme will include monitoring activities before, during and/or after construction, see Table 0-5.

Table 0-5 Proposed parameters to be included in the environmental and socio-economic monitoring activities for NSP2.

Parameter	Prior to construction	During construction	During operation
Water quality Turbidity and sedimentation		X	
Cultural heritage Wrecks and other identified objects	X		X
Munitions Condition of nearby munitions	X		X
Chemical warfare agents Chemical warfare agents in seabed sediment	X	X*	X
Fishery VMS and logbook study	X		X
Maritime traffic Monitoring of maritime traffic (AIS data) to report to authorities and monitor appropriate and safe behaviour of construction vessels		X	
NSP2 pipelines footprint Monitoring of the seabed area occupied by the NSP2 pipelines and associated structures and documentation of physical loss for overall habitat types			X
*An expert from the Danish Navy will likely be on board the pipe-lay vessel.			

The precise approach of the final monitoring programme will be elaborated in consultation with the Danish authorities. Environmental and socio-economic monitoring results will be made publicly available.

0.14 Health, Safety, Environmental and Social Management System

A health, safety, environmental and social management system (HSES MS) has been developed by Nord Stream 2 AG to enable identification and management of all relevant HSES risks associated with the project. The HSES MS also covers the management of security where it may impact the safety of personnel and affected communities, the integrity of project assets and the reputation of Nord Stream 2 AG.

The current HSES MS is applicable to the planning and construction phases of NSP2. It will be adjusted once the pipeline system is commissioned so as to manage HSES issues for the operational phase. Throughout all phases of the project, Nord Stream 2 AG will ensure that HSES information is proactively communicated both internally and externally, and that all staff and contractors adhere to the standards and requirements in the HSES MS.

0.15 Summary

In summary, the construction and operation of NSP2 may result in **mainly negligible** to **a few minor** impacts on the environment. No impacts, either individually or in combination, are assessed to be significant.

A summary of the potential impacts on all resources and receptors assessed in the EIA is provided in Table 0-6 (physical-chemical and biological) and Table 0-7 (socio-economic), based on the assessment of potential impacts (see section 0.6).

Table 0-6 Summary of the overall impacts caused by the NSP2 project on physical-chemical and biological resources or receptors.

Source of potential impact		Physical-chemical					Biological							
		Bathymetry	Sediment quality	Hydrography	Water quality	Climate and air quality	Plankton	Benthic flora and fauna	Fish	Marine mammals	Seabirds	Protected areas***	Natura 2000	Biodiversity
Construction phase	Physical disturbance on the sea-bed													
	Release of sediments into the water column													
	Release of contaminants into the water column													
	Release of chemical warfare agents into the water column													
	Sedimentation on the seabed													
	Generation of underwater noise									**				
	Physical disturbance above wa-ter*													
	Emissions of air pollutants and greenhouse gases													
	Introduction of non-indigenous species													
Operational phase	Physical presence of pipelines and structures on the seabed									****				
	Change of habitat													
	Physical disturbance above wa-ter*													
	Emissions of air pollutants and greenhouse gases													
	Generation of heat from gas flow through the pipelines													
	Release of metals from anodes													
	Introduction of non-indigenous species													

* E.g. from presence of vessels, airborne noise and light.
** Impact on marine mammals from underwater noise is assessed to be "Negligible" for PTS/TTS and "Minor" for behavioural response and masking.
*** Protected areas include Ramsar sites and HELCOM MPAs.
**** This impact refers to the noise of the gas flowing through the pipeline.

Negligible im-pact

Minor impact

Table 0-7 Summary of the overall impacts caused by the NSP2 project on socio-economic resources or receptors.

Source of potential impact		Socio-economic								
		Shipping and shipping lanes	Commercial fishery	Cultural heritage	People and health	Tourism and recreational areas	Existing and planned installations	Raw material extraction sites	Military practice areas	Environmental monitoring stations
Construction phase	Physical disturbance on the seabed									
	Release of sediments into the water column									
	Release of contaminants into the water column									
	Physical disturbance above water									
	Imposition of safety zones around vessels									
	Sedimentation on the seabed									
Operational phase	Physical presence of pipelines and structures on the seabed									
	Physical disturbance above water									
	Imposition of safety zones around vessels									

Negligible impact Minor impact