Nord Stream 2 AG

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NORD STREAM 2
TRANSBOUNDARY IMPACTS
ENVIRONMENTAL IMPACT ASSESSMENT, DENMARK, NORTH-WESTERN ROUTE

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Environmental Impact Assessment, Denmark, North-western route

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1 TRANSBOUNDARY IMPACTS

NSP2 will cross the TW of Russia and Germany and will run within the EEZs of Finland, Sweden, Denmark and Germany. Potential transboundary impacts are discussed within this section in accordance with the requirements in the Convention on Environmental Impact Assessment in a Transboundary Context (henceforth referred to as the Espoo Convention).

The Espoo Convention requires international cooperation and public participation when a planned activity in one country, referred to as the "Party of Origin" (PoO), may result in significant adverse environmental impacts on another country, referred to as the "Affected Party" (AP).

The potential transboundary impacts have been described in the following sections divided into:

- Transboundary impacts from planned activities within the Danish EEZ on regional or global receptors in the Baltic Sea (see section 1.1);
- Transboundary impacts from planned activities within the Danish EEZ on neighbouring countries (see section 1.2);
- Ttransboundary impacts from unplanned events within the Danish EEZ are discussed (see section 1.3).

1.1 Transboundary impacts from planned activities within the Danish EEZ on regional or global receptors in the Baltic Sea

Some project activities within Danish waters may potentially affect receptors on a regional or global scale. This section assesses potential transboundary impacts with respect to these regional or global receptors in the Baltic Sea.

1.1.1 Hydrography

The marine environment in the Baltic Sea is heavily dependent on the occasional, major inflows of saline water through the Danish straits, as these are essentially the only means of water exchange in the bottom-close parts of the basins in the Baltic Proper. It is therefore essential to ensure that the inflow of oxygenated deep water to the inner parts of the Baltic Sea via the Bornholm Basin is not negatively affected by the presence of the pipeline.

Due to the potential effect on the Baltic Sea ecosystem, the effect of the pipeline structure on water flow patterns and sediment accretion/erosion has been studied for NSP and NSP2. A thorough review of the hydrographic impacts on the Baltic Proper for NSP and NSP2 concluded that there would be no impacts on hydrographical bulk flow /1//2//3/, and impacts on hydrography were therefore assessed to be negligible.

Thus, the pipeline will not influence the practical sill depth and therefore nor the throughflow of new bottom-close water into the Baltic Proper, which occurs during the influx season. Moreover, depth reduction of the vertical cross-sectional areas of the two deep openings to the Bornholm Strait may result in decreased outflow of the pool water from the Arkona Basin, improving oxygen conditions and reducing hypoxia of deep waters during the summer season.

The mean height of the pipelines above the seabed was assumed to be 1.4 m, as a conservative assumption for the theoretical analysis. Analysis of the embedment of NSP pipeline in Danish waters showed that five years after installation, the pipeline was embedded at least 50% in most locations.

A hydrographic monitoring programme was carried out in the Bornholm Basin for the existing NSP route in order to verify the assumptions for the theoretical analysis of the possible blocking and mixing effects of the water inflow to the Baltic Sea caused by the presence of NSP /1//2//3/. The results of this monitoring suggest that the mixing caused by the pipelines in the Bornholm Basin were considerably below any level of effect that could be measured.

Potential impacts from the presence of the pipelines on hydrography during the operational phase are assessed to be local, long term, and of low intensity, and the overall significance to be negligible. In conclusion, there are no significant transboundary impacts on the Baltic Sea caused by the presence of the pipelines and altered hydrography in Danish waters.

1.1.2 Climate

The marine emissions of CO_2 during construction of NSP2 in Danish waters will temporarily increase the total annual emissions of CO_2 from vessels in Denmark. The total load of CO_2 is predicted to comprise approximately 199,000 t during construction, corresponding to approx. 7.7% of the total annual Danish emissions of CO_2 caused by shipping in 2016. The total load of CO_2 during 50 years of operation will amount to 33,667 t, which corresponds to 1.3% of the total annual Danish emissions of CO_2 caused by shipping in 2016. Although CO_2 emissions in general have an impact on a global scale, the increased emissions during the construction and operational phases in Denmark are not anticipated to have a quantifiable impact on the global climate, and therefore no significant transboundary impacts are expected.

The marine emissions of NO_X, SO_2 and particulate matter during construction and operation in Danish waters will temporarily reduce the air quality in areas near the vessels. However, the construction and operational activities will take place offshore, meaning that the emissions will be dispersed and diluted to a level that is not quantifiable and no significant transboundary impacts are therefore expected.

1.1.3 Fish

The proposed NSP2 route passes through an important area of fishery within the Danish and Swedish EEZs that is closed for fishing between 1 May and 31 October to enable undisturbed cod spawning and to avoid catches of fish before they have spawned. The main spawning grounds for cod are within the Bornholm Deep.

The water mass where cod spawning may take place, i.e. the reproductive layer, is confined to water depths of approximately 40-70 m. The proposed NSP2 route crosses this area within Danish waters for a distance of approximately 15 km, and at a water depth of 80-90 m. Suspended sediments caused by construction activities will be limited to the lower 10 m of the water column and will not reach the reproductive volume. Moreover, the size of the area where NSP2 will be constructed is negligible compared to the total size of the area closed for fishery due to spawning of cod.

Therefore, it is assessed that there will be no significant transboundary impacts on Baltic Sea fish caused by the NSP2 project in the cod spawning area in Danish waters.

1.1.4 Marine biodiversity

Potential impacts on marine biodiversity have been assessed and it is concluded that NSP2 will not result in significant impacts on species (at the individual or population level), habitats or the integrity of protected areas during both the construction and operational phases. Impacts at individual and populat levels are generally assessed to be negligible, except for a minor impact on marine mammals due to underwater noise (during construction) and a minor impact on the benthic environment caused by change of habitat (during operation).

With due consideration of the above, it has been assessed that impacts at either the species or habitat level during construction and operation of NSP2 would not combine to result in impacts which would be sufficient to cause a change in biodiversity or ecosystem functioning.

Therefore, it is assessed that there will be no significant transboundary impacts on Baltic Sea biodiversity caused by the NSP2 project in Danish waters.

1.1.5 Shipping and shipping lanes

In Danish waters, the proposed NSP2 route will run inside and along the TSS Bornholmsgat for approximately 42 km close to the Swedish EEZ. The TSS Bornholmsgat carries most of the ship traffic to/from the Baltic Sea and experiences over 50,000 ship passages per year. The proposed NSP2 route additionally crosses the TSS Adlergrund in the Danish and German EEZs, which has approximately 7,000 ship movements per year.

Safety exclusion zones will be implemented around slow-moving construction vessels. Only vessels involved in the construction of NSP2 will be allowed inside the safety zone; therefore, all other vessels not involved in construction activities will be requested to plan their journeys around the safety zone.

The shipping lanes crossed by the proposed NSP2 route in Danish waters provide sufficient space and water depth for ships to plan their journey and safely navigate around possible temporary obstructions. The impact on ship traffic associated with the imposition of a safety zone is assessed to be minor and associated with local and temporary changes to the traffic scheme.

Therefore, it is assessed that there will be no significant transboundary impacts on Baltic Sea ship traffic caused by the NSP2 project in Danish waters.

1.1.6 Fisheries

Commercial fishery in Danish waters comprises both Danish fishing boats and fishing boats of other countries bordering the Baltic Sea.

As mentioned above, safety exclusion zones will be implemented around slow-moving construction vessels. Only vessels involved in the construction of NSP2 will be allowed inside the safety zone; therefore, all other vessels not involved in construction activities (e.g. fishing vessels) will be required to plan their journeys around the safety zone. Due to the local and temporary nature of the impact and given the availability of alternative fishing grounds that can provide the same service, the impacts has been assessed to be negligible.

During operation, the physical presence of pipelines and structures on the seabed has the potential to impact fishing activities either through the imposition of protection zones (loss of opportunity) or through obstruction (additional effort and potential damage or loss of gear). The NSP2 pipelines have been designed to be resistant to impacts from any interaction with fishing gear and Nord Stream 2 AG will apply for a dispensation to remove any fishery restriction zone around the pipelines to allow fishing activities during the operation of the pipeline. Experience from the existing NSP pipelines has demonstrated that fishermen can coexist with the pipeline system, and since installation of the NSP pipelines, no fishery gear has been reported lost or damaged. Therefore, the impact on fishery is assessed to be minor, and there will be no significant transboundary impacts on Baltic Sea fishery caused by the NSP2 project in Danish waters.

1.1.7 Marine strategic planning

There are a number of EU legislative tools designed to protect the marine environment and create a framework for the sustainable use of the marine waters in the Baltic Sea. These include the MSFD and WFD, which are applicable to all EU member states. The BSAP is also relevant to the area

impacted by NSP2. No potentially significant transboundary impacts that have the potential to affect compliance with the EU Directives are predicted. Therefore, NSP2 will not prevent any EU Baltic State from achieving GES for any MSFD descriptor or the WFD. Furthermore, NSP2 will not prevent any country from reaching the targets set out in the BSAP.

1.1.8 Natura 2000 sites

As well as being important at the individual level, Natura 2000 sites together form a network of core breeding and resting sites for rare and threatened species, and some rare natural habitat types. When considering impacts on such sites, it is thus necessary to ensure that the sites are safeguarded at both the individual and network levels to ensure that the coherence and functioning of the overall network is maintained. Such a network in relation to NSP2 covers the Baltic Sea and is hence transboundary and regional in nature.

The assessment of potential impacts on Danish Natura 2000 sites (the Natura 2000 screenings for N189, N209, N211 and N212 and the full Natura 2000 Appropriate Assessment for N252) have demon-strated that there will be no risk of significant or adverse impact on the designated species or habitats, and there will thus be no significant impacts on the integrity of the Natura 2000 sites.

Therefore, the coherence of the Natura 2000 network, including spatial and functional connections will not be affected.

1.2 Transboundary impacts from planned activities within the Danish EEZ on neighbouring countries

This section assesses potential transboundary impacts from construction in Denmark on each neighbouring country in which these impacts may occur. During the operational phase, the only potential transboundary impacts are impacts on regional or global receptors in the Baltic Sea, which are evaluated in section 1.1.

The assessment of the potential for transboundary impacts considers proximity of the NSP2 route to the neighbouring countries as well as the nature of the impacts. Where the NSP2 route runs close to the Swedish and German EEZs, construction activities may potentially cause transboundary impacts on Sweden and Germany. These impacts are evaluated in sections 1.2.1 and 1.2.2, respectively. Based on spatial considerations and NSP monitoring results, no transboundary impacts on Poland arising from the construction or operation of NSP2 when routed to the north of Bornholm in the Danish EEZ have been identified, see section 1.2.3.

1.2.1 Transboundary impacts on Sweden

In the northernmost part of the Danish sector, the pipeline route enters the Swedish EEZ from the Danish EEZ. The environmental conditions around the Danish-Swedish EEZ border are quite similar. The water depth at the border of the Danish and Swedish EEZs where the route is planned is 80 m, and the seabed sediment consists of mud, silt and fine clay.

During the construction phase, activities such as pipe-lay, post-lay trenching and spot rock placement will lead to physical disturbance, release of seabed sediments, noise and emissions, that may result in transboundary impacts.

Release of sediments and sedimentation

Local impacts on the seabed and the marine benthos in the Swedish EEZ is expected due to release of sediments and sedimentation during pipe-lay in Denmark close to the EEZ border between Denmark and Sweden. Identical impacts originating in the Swedish EEZ are expected in the Danish EEZ during pipe-lay activities in Swedish EEZ close to Danish EEZ. The impacts are highly localized at the EEZ border and assessed to be of negligible significance.

Construction activities, mainly post-lay trenching and rock placement, will result in the release of sediment into the water column. The distance between the closest section for post-lay trenching/rock placement in Denmark to the Swedish EEZ is approximately 300 m, with spot rock placement and post lay trenching planned in the shipping lane north-west of Bornholm. Numerical modelling has been performed to assess the sediment dispersion from post-lay trenching and rock placement within the Danish EEZ. The modelling results indicate that most of the suspended sediment will redeposit locally, and that increased concentrations of suspended sediment will be local and temporary, as the suspended sediment concentration will decrease to below 2 mg/l within 16 hours. The modelling results show concentrations of suspended sediment of up to 8.1 mg/l at a distance of 200 m from construction works at the crossing of the existing NSP pipelines and along the NSP2 route sections in the shipping lane. Subsequent sedimentation is assessed to be local and of low intensity.

The release of sediments can result in release of contaminants associated with the sediment, including metals, organic contaminants, nutrients (N and P), and hydrogen sulphide. Remobilisation and redistribution of CWA and contaminants during construction activities are assessed to potentially occur in the close vicinity of the proposed pipeline, where the sediment is disturbed. Calculations and modelling have been undertaken for the release of contaminants into the water column through post-lay trenching and rock placement. Levels of contaminants in the water corresponding to concentrations of suspended sediment of 2 mg/l (relevant for rock placement and trenching) and 15 mg/l (relevant to trenching only) were calculated assuming that the concentration of each contaminant in the sediment equals the highest measured concentration in the area. It is assessed that the marine environment will not be significantly impacted by the release of contaminants from sediments, either directly or through the food chain. Based on the modelling of sediment dispersion and the distance to Swedish waters (approx. 300 m to the closest section where spot rock placement and post lay trenching is planned in the shipping lane), it is assessed that there will be no significant transboundary impacts (e.g. on water quality or benthos) in Swedish waters due to sediment dispersion and the potential release of contaminants.

Generation of underwater noise
Numerical modelling has been performed for underwater noise from the rock placement activities at three locations within Danish waters. The distance between the closest section for post-lay trenching/rock placement in Denmark to the Swedish EEZ is approximately 300 m, with spot rock placement and post lay trenching planned in the shipping lane north-west of Bornholm. The modelling has been undertaken for two scenarios (winter and summer conditions), and it has been concluded that no significant sound levels above ambient level will reach the Swedish EEZ.

Imposition of safety zones around vessels
Within the traffic separation scheme TSS Bornholmsgat between Bornholm and Sweden, the pipeline route is planned to be constructed close to the Swedish EEZ. In this area, safety exclusion zones around slow-moving construction vessels may extend into the Swedish EEZ. This will impose a minor restriction on the south-west bound traffic in the shipping lane located in the Swedish EEZ. The restriction will extend from the traffic separation zone in the middle of the TSS area and into the south-west bound shipping lane. The maximum extent of the safety exclusion zone into the 5 km shipping lane is 2 km; consequently, in any situation, there will be a free width of at least 3 km for safe navigation in the south-west bound lane. The impact on ship traffic in the Swedish EEZ is therefore assessed to be minor and no significant transboundary impact is therefore expected.

Protected areas
No parts of the NSP2 pipeline within the Danish EEZ are close to protected environmental areas inside the Swedish EEZ. The shortest distance to a Swedish Natura 2000 site is 18 km. As described

above, the distances between the activities in Danish waters and protected areas within the Swedish EEZ is such that no transboundary impacts on protected areas in Sweden have been identified.

Conclusion
In conclusion, it is assessed that there will be no significant transboundary impacts on Sweden from construction and operation of NSP2.

1.2.2 Transboundary impacts on Germany

In the southernmost part of the Danish sector, the pipeline route enters the German EEZ from the Danish EEZ. The seabed sediment in this area consists mainly of sand. The water depth at the border where the route is planned to be laid is approximately 30 m and shoals within the German EEZ.

During the construction phase, activities such as pipe-lay, post-lay trenching and spot rock placement will lead to physical disturbance, release of sediments, noise and emissions, which may result in transboundary impacts.

Release of sediments and sedimentation
Local impacts on the seabed and the marine benthos in the German EEZ are expected due to release of sediments and sedimentation during pipe-lay in Denmark close to the EEZ border between Denmark and Germany. Identical impacts originating in the German EEZ are expected in the Danish EEZ during pipe-lay activities in German EEZ close to Danish EEZ. The impacts are highly localized at the EEZ border and assessed to be of negligible significance.

Construction activities, mainly post-lay trenching and rock placement, will result in the release of sediment into the water column. The distance between the closest section for post-lay trenching/rock placement in Denmark to the German EEZ is approximately 2 km, with rock placement planned across the Rønne Banke area. Numerical modelling has been performed in order to assess the sediment dispersion from post-lay trenching and rock placement within the Danish EEZ. The modelling results show concentrations of suspended sediment of up to 91 mg/l at a distance of 200 m and 9.9 mg/l at a distance of 1,000 m from construction works at Rønne Banke. The concentrations are however expected to decrease to below 2 mg/l within 4.5 hours. The modelling results thus indicate that the majority of the suspended sediment will redeposit locally, and that increased concentrations of suspended sediment will be local and temporary. Subsequent sedimentation is assessed to be local and of low intensity.

The release of sediments can result in release of contaminants currently associated with the sediment, including metals, organic contaminants, nutrients (N and P), and hydrogen sulphide. Remobilisation and redistribution of CWA and contaminants during construction activities are assessed to potentially occur in the close vicinity of the proposed pipeline, where the sediment is disturbed. Calculations and modelling have been undertaken for the release of contaminants into the water column because of post-lay trenching and rock placement. Levels of contaminants in the water corresponding to concentrations of suspended sediment of 2 mg/l (relevant for rock placement and trenching) and 15 mg/l (relevant for trenching only) were calculated assuming that the concentration of each contaminant in the sediment equals the highest measured concentration in the area. Based on the modelling of sediment dispersion and the distance to German waters (approx. 2 km to the closest section where spot rock placement is planned across Rønne Banke), it is assessed that there will be no significant transboundary impacts (e.g. on water quality or benthos) in German waters due to sediment dispersion and the potential release of contaminants.

Generation of underwater noise

Numerical modelling has been performed for underwater noise from the rock placement activities within Danish waters. The distance between the closest section for post-lay trenching/rock placement in Denmark to the German EEZ is approximately 2 km, with rock placement planned across the Rønne Banke area. The modelling has been undertaken for two scenarios (winter and summer conditions), and it has been concluded that no significant sound levels above ambient levels will reach the German EEZ.

Imposition of safety zones around vessels
The proposed pipeline route crosses the traffic separation scheme TSS Adlergrund at the border between the Danish and German EEZs. In this area, safety exclusion zones around the slow-moving construction vessels will extend into the German EEZ during pipe-lay in Denmark close to the EEZ border between Denmark and Germany. This will impose a minor restriction on the east bound traffic in the shipping lane located in the German EEZ. The restriction will extend from the traffic separation zone in the middle of the TSS area and into the one-directional shipping lane, with a total width of 4 km. In any situation, there will be a free width of more than 2 km for safe navigation in the west bound lane. The impact on ship traffic in the German EEZ is therefore assessed to be minor and no significant transboundary impact is therefore expected. Identical impacts originating in the German EEZ are expected in the Danish EEZ during pipe-lay activities in German EEZ close to the Danish EEZ.

Protected areas
There is a designated German Natura 2000 site where the pipeline route enters the German EEZ. There are planned seabed intervention works near the German Natura 2000 site; however, as discussed above, any potential impact is assessed to be temporary and correlated with the pipe-lay activities and the presence of vessels. No significant impacts on German Natura 2000 sites have been identified in association with activities in the Danish sector.

Conclusion
In conclusion, it has been assessed that there will be no significant transboundary impacts on Germany from construction and operation of NSP2.

1.2.3 Transboundary impacts on Poland

The route does not enter the Polish EEZ, and the shortest distance from the pipeline to the midline between Denmark and Poland is approximately 13 km, where the pipeline crosses the border between the Danish and German EEZs.

It should be noted that the proposed NSP2 route passing to the north of Bornholm in Danish waters is generally much further from Poland than the existing NSP pipelines, where the NSP environmental monitoring programme has confirmed no significant transboundary impacts. The large distances between activities in the Danish sector and the Polish EEZ are such that no transboundary impacts have been identified.

1.3 Transboundary impacts from unplanned events within the Danish EEZ

Potential unplanned events could include, e.g., an oil spill following a ship collision or a gas leakage.

1.3.1 Risk and transboundary impacts from oil spill

Depending on where a ship collision with consequent oil spill occurs (i.e. inside or outside Danish waters), there may be a risk of transboundary impacts. The risk is low, but if a larger oil spill occurs the impacts on the marine environment could be significant, depending on when contingency measures are initiated.

In HELCOM Recommendation 11/13, it is recommended that Governments of the Contracting Parties to the Helsinki Convention should, in establishing national contingency plans, aim at developing the ability of their combating services:

- To deal with spillages of oil and other harmful substances at sea so as to enable them:
  - To keep a readiness permitting the first response unit to start from its base within two hours after having been alerted;
  - To reach within six hours from start any place of spillage that may occur in the response region of the respective country;
  - To ensure well-organized, adequate and substantial response actions on the site of the spill as soon as possible, normally within a time not exceeding 12 hours.
- To respond to major oil spillages:
  - Within a period of time normally not exceeding two days of combating the pollution with mechanical pick-up devices at sea; if dispersants are used it should be applied in accordance with HELCOM Recommendation 1/8, taking into account a time limit for efficient use of dispersants
  - To make available sufficient and suitable storage capacity for disposal of recovered or lighter oil within 24 hours after having received precise information on the outflow quantity.

Based on HELCOM Recommendation 11/13, it is therefore assumed that countries around the Baltic Sea are capable of controlling a major oil spill within two days of a release, and thereby impacts on the marine environment, both regional and transboundary, will be minimised.

It is noted that Nord Stream 2 AG has produced an Oil Spill Contingency Plan (OSCP), which is a contingency for Tier 2 and Tier 3 spills. The OSCP sets out emergency procedures to enable assessment of the spill and mobilization of appropriate response procedures Contractors are responsible for responding to Tier 1 oil spills, and to this end all contractors are required to have an approved Shipboard Oil Pollution Emergency Plan (SOPEP) and equipment on board.

1.3.2 Risk and transboundary impacts from a gas release

The probability of a gas release is extremely low. Based on an assessment of different scenarios for gas release, it is assessed that a gas release may be a safety issue for ship traffic, but will not pose a threat to the safety of people on Bornholm or on the German, Swedish or Polish coasts.

The impact will depend on the type of leak, its magnitude and the type of repair required. Depending on the location where a gas release occurs, i.e. inside or outside Danish waters, there may be transboundary impacts. The impacts on the marine environment would be local and of a relatively short duration, while the impacts on ship traffic (i.e. changing shipping routes) would be of a longer duration, owing to safety exclusion zones around repair locations that will be of the same extent as exclusion zones during the construction phase.

The transboundary impacts from a gas release would primarily be related to the emission of methane to the air, as methane is a greenhouse gas that is present across all countries and contributes to climate change.

1.4 Conclusion

In general, it is assessed that there will be no significant transboundary impacts from the NSP2 project activities within Danish waters on neighbouring countries. This conclusion is in line with the monitoring results obtained during construction and the first years of the operation of the existing NSP pipelines in Danish waters.

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, which have the potential to affect these countries are of the same nature, but of a significantly smaller magnitude than those resulting from similar construction activities within the German and Swedish EEZs, respectively. No transboundary impacts on Poland have been identified.

It is further assessed that NSP2 project activities in Danish waters will not lead to any significant transboundary impacts on a regional or global level.

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.

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