Nord Stream 2 AG

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NORD STREAM 2
ROUTE SELECTION IN DANISH WATERS

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This route selection report has been translated from the English original version to a Danish version. In the event that the translated version and the English version conflict, the English version shall prevail.

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CONTENTS

1. INTRODUCTION

The study of route options for the Nord Stream 2 pipelines (NSP2) in Danish waters (as presented in the environmental impact assessment for NSP2 in Danish waters /1/) has to a large extent been built on previous planning and experience from the existing Nord Stream pipelines (NSP).

Various route options were considered during the planning of NSP to find the most optimal route corridor based on environmental grounds. The route selection for NSP was done in close consultation with the relevant Danish authorities and on their recommendation, the present NSP-route was selected as the preferred route alternative in Danish waters.

In 2013 two route alternatives for NSP2 following the existing NSP route as well as a more direct route for NSP2 were presented to the Danish authorities in the Project Information Document (PID) /2/ together with the EIA programme prepared for the Danish section of the NSP2 pipeline system /3/. At this stage no negative comments were received regarding the proposed route options' i.e. no concern regarding a route on TW was raised.

This report presents a review of the selection process for the NSP-routing in Danish waters as well as the route selection process for NSP2. Furthermore, this report provides a review of changes in environmental parameters for the route selection for NSP2 compared to the environmental parameters for NSP.

2. ROUTE SELECTION PROCESS FOR NSP

In the period from 2005 to 2009 Nord Stream AG identified, studied and conducted field investigations in a number of different pipeline routes in the Danish waters around Bornholm before selecting the preferred S-route for the project.

The different pipeline routes are shown in Figure 2-1. The process of selecting the preferred route was completed in close collaboration with the relevant Danish authorities as described in the sections below.

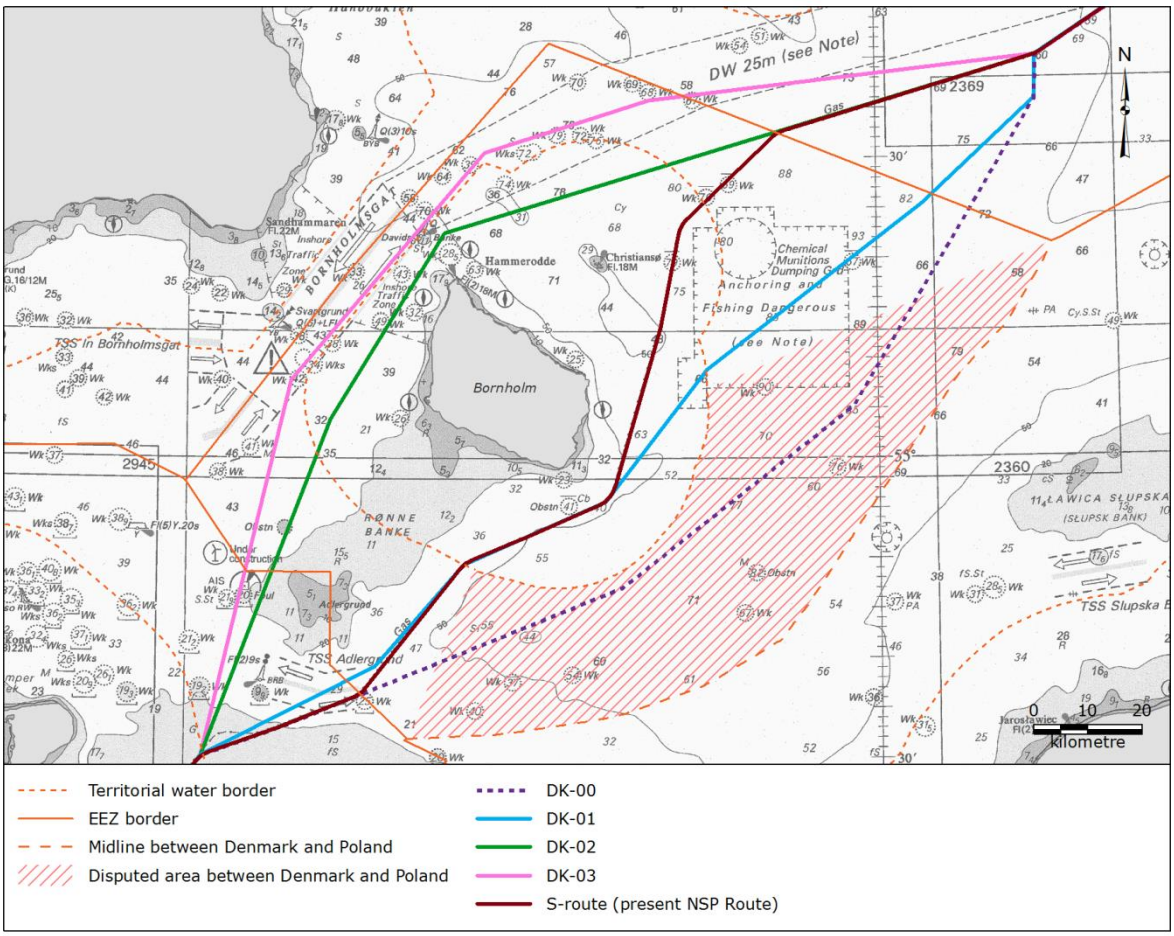

Figure 2-1 Different pipeline routes investigated from 2005 to 2009

2.1 Initial proposed route (route DK-00)

In 2006 when Nord Stream AG approached the Danish authorities concerning NSP, the preferred route was to the east and south of Bornholm (Route DK-00) outside Danish territorial waters (TW).

This route had been surveyed in mid-2005 and served as the basis for the conceptual engineering at that stage of the project. The route was presented in the notification documentation sent out for transboundary consultation according to the Espoo Convention in November 2006 /4//5/.

Route DK-00 was the preferred route until comments from the transboundary consultation were received in the beginning of 2007, e.g. /6/. It was pointed out that the route was located in an area where maritime borders have not been agreed between Denmark and Poland, and therefore jurisdiction in the area was (and still is) claimed by Denmark as well as Poland.

As stated in the information provided by the then Minister for Climate and Energy /7/ to the European Affairs Committee of the Danish Parliament in November 2009[1], the Danish authorities hereafter informed Nord Stream AG that the area of the proposed pipeline route was not available for the project. On the request of the Danish authorities Nord Stream AG therefore abandoned this route option and started investigating other alternatives.

2.2 Investigations for alternative routes (route DK-01/02/03)

In order to acquire sufficient basis for making the final route selection, Nord Stream AG surveyed three alternative route options, i.e. one route south of Bornholm but to the north of the legally uncertain area, and two routes north of Bornholm – the two routes deviating around the northern tip of the island, the David's Bank, which is a designated Natura 2000 area. The three alternative routes were identified DK-01/02/03 and were surveyed during 2007-2008. The routes are shown in Figure 2-1.

Route DK-01 was chosen as an alternative to avoid the area where jurisdiction is claimed by both Denmark and Poland and to minimise the route length. Route DK-02 and DK-03 were chosen as alternatives since they pass north of Bornholm and thereby bypass the chemical munitions dumpsite and area where anchoring and fishery is discouraged due to the potential presence of chemical munitions or chemical warfare agents (CWA) east of Bornholm (CWA risk area).

In consultation with the Danish authorities Nord Stream AG came to the conclusion in 2007 to progress with alternative DK-02 (north of Bornholm but south of the David's Bank) as the preferred route since the route would bypass the chemical munitions dumpsite and CWA risk area east of Bornholm in its entirety (as stated in /11/). This route passes through Danish TW, and passes north of Bornholm but south of the main shipping traffic lane in this region.

Route DK-03 was developed as a variant of the route DK-02, but passes only through the Danish EEZ. The north-western part of the route was located within the international regulated shipping route leading in and out of the Baltic Sea and this route would therefore be located within or on the margin of this deepwater shipping lane.

The three alternative routes were presented in an additional transboundary consultation in October 2007 /8//9/ and route DK-02 was the preferred route at that time until comments were received in the beginning of 2008, e.g. comments from the Danish Maritime Authority (DMA) and the Royal Danish Administration of Navigation and Hydrography (RDANH) /15//17/. In summary, it was considered that both the Danish and Swedish maritime authorities find a route to the east and south of Bornholm more optimal, because this would take the pipeline further away from the heavily-trafficked shipping route north of Bornholm. Hence, impacts to said shipping route during construction and through the presence of the pipelines during operation were not further assessed.

Based on the additional transboundary consultation (e.g. /10/ - /17/) the Danish Energy Agency informed Nord Stream AG that a route to the south of Bornholm should be investigated further /11/. Nord Stream AG therefore started investigating further the possibility of going east and south of Bornholm.

The Danish authorities were of the opinion that Nord Stream AG should investigate whether environmental and safety matters could be optimized by choosing a route which passes east and south of Bornholm, but this time closer to Bornholm and outside the disputed marine area, see

[1] In November 2009, one month after the granting of the NSP Permit, the European Affairs Committee of the Danish Parliament raised questions to the then Minister for Climate and Energy concerning the NSP Permit. The Minister was asked to account for – among other things – the possibilities of influencing the line routing of Nord Stream. The question was answered in a memo dated 2 December 2009, which was prepared by the DEA /7/

information provided by the then Minister for Climate and Energy /7/ to the European Affairs Committee of the Danish Parliament in November 2009.

2.3 Final route (S-route)

At a meeting with Nord Stream AG and the Danish authorities in March 2008 the route option to the east and south of Bornholm (DK-01) was discussed /18//19/.

The route DK-01 crosses the area where anchoring and fishery is discouraged due to the possible presence of chemical munitions or CWA. Therefore, in order to avoid traversing this area, the S-route was developed as a combined route, east and south of Bornholm. The route alternative deviates from the northern route (DK-02) at the EEZ boundary between Denmark and Sweden, where it diverges to the south along the 'S-section', passing west of the CWA risk area. The route then follows the DK-01 route to the south of Bornholm before diverging south and joining the DK-00 route at the EEZ boundary between Denmark and Germany.

As stated in the information provided by the then Minister for Climate and Energy to the European Affairs Committee of the Danish Parliament in November 2009 /7/, the Danish authorities hereafter ordered Nord Stream AG to investigate a route corresponding to the S-route east and south of Bornholm.

In an email from the Danish Ministry of the Environment (23 April 2008) to the Espoo point of contacts from the Danish focal point it is confirmed that Nord Stream AG would investigate the S-route /20/.

Additional information, including the S-route as the preferred route, was then sent out in yet another transboundary consultation according to the Espoo Convention in November 2008 /21/.

Based on this route selection process and after a combined assessment of the available material, including the consultation responses and comments on these, the Danish Energy Agency, in consultation with the competent authorities, assessed that the EIA for the section of the pipelines applied for in Danish waters, has resulted in a satisfactory outcome, and the construction permit for NSP in Danish waters, including the S-route, was granted to Nord Stream AG by the Danish Energy Agency on 20 October 2009 /22/.

To summarize, the selection of the S-route was thus based on close consultation with the relevant Danish authorities as the optimal route in Danish waters. This is supported by the information provided by the then Minister for Climate and Energy /7/ to the European Affairs Committee of the Danish Parliament in November 2009:

[Quotation translated: Based on an overall assessment, it is the opinion of the involved Danish authorities that the permitted route is the optimal one in Danish waters of the Baltic Sea at Bornholm, and that this route has been found after investigating other possible routes in the area.]

3. ROUTE SELECTION PROCESS FOR NSP2

The NSP2-study of route options in Danish waters (as presented in the environmental impact assessment for the NSP2-project in Danish waters /1/) has to a large extent been built on previous planning and experience from NSP and supplemented with new route surveys and seabed investigations. Furthermore, the experience from installation of NSP has given important input to the planning and technical design of NSP2.

Based on the history of the NSP routing (see section 2) potential routes through the EEZ waters where maritime borders have not been agreed between Denmark and Poland, and passing to the north of Bornholm within/adjacent to the deepwater shipping were screened out as non-practicable alternatives and the following three different route alternatives for NSP2 were identified in Danish waters (see Figure 3-1):

- FS route – west of NSP
- ES route – east of NSP
- RA route - direct route through area where anchoring and fishing is discouraged

In 2013 Nord Stream AG consulted with relevant Danish authorities under coordination of the Danish Energy Agency regarding these three different route alternatives for NSP2. The consultations were based on the Project Information Document (PID) /2/ together with the EIA programme prepared for the Danish section of the pipeline system /3/.

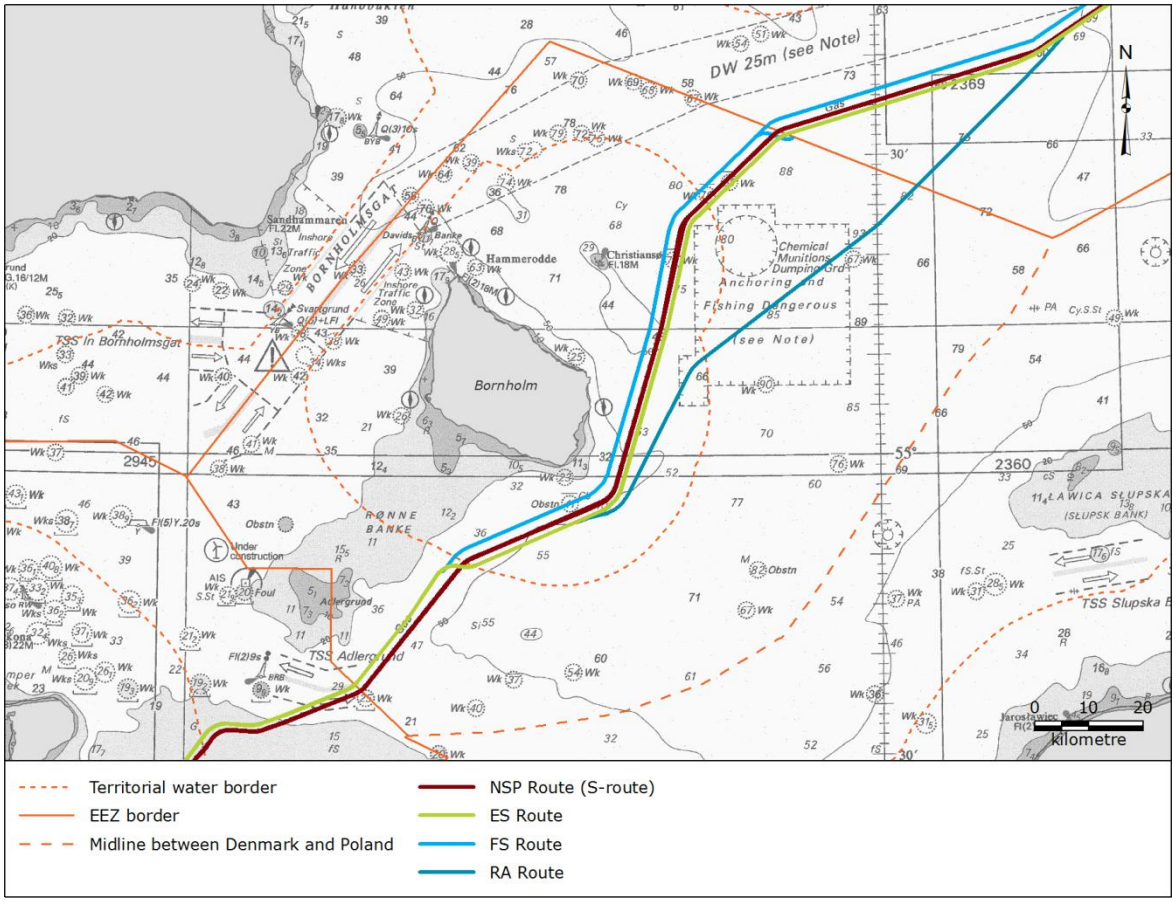

Figure 3-1 Route evaluation for NSP2 in Denmark

After an initial engineering evaluation, the FS route was assessed to entail the largest amount of post-lay trenching and/or rock placement since this route is closest to shore with shallower water depths and harder substrates. Therefore, this route was evaluated to potentially cause the largest environmental impact. Furthermore, the FS route is the route closest to the Natura-2000 area Ertholmene.

It was further assessed that as-laid embedment of the pipelines would also be limited and likely the least of the three considered route options due to the harder seabed closer to shore. Therefore, trawling in the area might be affected the most by this route.

Initial evaluation therefore resulted in the FS route being disregarded at an early stage of the route selection for NSP2.

On the basis of the consultation feedback and experience from NSP, the two other route alternatives – the ES and RA routes – were evaluated pursuant to relevant biological and socio-economic aspects in Danish waters. The following aspects were scrutinised:

- Maritime safety
- CWA risk area
- Fishery in the area
- Marine spatial planning
- Military areas
- Extent of intervention works during construction
- Impacts on biological environment

The two route alternatives – the ES and RA routes – were evaluated for all the aspects above and it was evaluated which route option would give rise to the least potential for environmental or socio-economic impact /1/. The comparison in relation to relevant environmental, socio-economic and technical aspects in Danish waters is summarized in Table 3-1.

Table 3-1 Comparison of the considered routes for NSP2

Risk issue	Route preference	
	ES route	RA route
Maritime safety	Comparable	Comparable
Chemical Warfare Agents (CWA)	Preferred	
Fishery	Preferred	
Marine spatial planning	Preferred	
Military practice areas	Preferred	
Intervention works		Preferred
Biological environment	Comparable	Comparable

Based on the table above, the ES route was adopted as the preferred and proposed route for NSP2. The following were key considerations in the decision:

- The ES route lies to the east of the existing NSP pipelines for the most part of the route in Danish waters, and is thus further from Bornholm;
- The ES route reflects positive aspects of marine spatial planning (NSP and NSP2 run parallel and the area on the seabed physically occupied by the pipelines which could affect other uses of the seabed is thus reduced to a minimum);

- ES route avoids CWA risk area and the area extensively used for fishery;
- The ES route is preferable in respect to technical feasibility, existing knowledge from NSP and known permitting process whilst also seeking to avoid or reduce the potential for significant environmental impacts.
- The preference of the RA route in relation to the amount of intervention work needed does not prevail the overall preference of the ES route.

The assessments conducted as part of the EIA report for NSP2 /1/ has therefore been performed for the construction and operation of a pipeline system following the ES route.

4. CHANGES IN ENVIRONMENTAL PARAMETERS SINCE NSP

The proposed route for NSP2 (the ES route) is generally parallel to the existing route of NSP (the S-route) in Danish waters.

The assessment of route alternatives for NSP was based on evaluations which covered a number of parameters related to e.g. the biological, chemical and socio-economic environments in the Baltic Sea. As mentioned above it was challenged by a number of factors, such as the EEZ-border between Poland and Denmark not yet being settled by agreement between Denmark and Poland and intensive maritime traffic with several traffic separation schemes. Furthermore, the route needed to consider a European important commercial fishery (with bottom trawling) in particular east of Bornholm, as well as the location of a chemical munitions dumping ground from the second world war limiting the possibilities for seabed intervention in an area close to the Swedish EEZ-border.

Based on the EIA's for NSP and NSP2 respectively, this section summarises to which extent changes have occurred within the biological, chemical and socio-economic parameters evaluated as part of the route selection process for NSP and NSP2 in Danish waters.

Changes since the selection of the route of NSP to the following parameters are described further below:

- Maritime safety
- CWA risk area
- Fishery in the area
- Marine spatial planning and infrastructure
- Military areas
- Extent of intervention works during construction
- Impacts on biological environment

4.1 Maritime safety

In general the ship traffic pattern in Danish waters has not changed between the route-selection process for the existing NSP and the route selection process for NSP2 as presented in the EIA /1/. Figure 4-1 shows the ship traffic pattern as of 2014 as presented in the EIA for NSP2 (2017), along with the route alternatives for NSP.

The following is concluded based on the EIA's for NSP and NSP2 respectively:

- The ship traffic in **Route A** (as assigned in Figure 4-1 below) is in the range of 50,000 ship movements per year in 2006 (NSP) as well as in 2014 (NSP2).

- The ship traffic in **Route K** (as assigned in Figure 4-1 below) is reduced from 6,910 ship movements in 2006 (NSP) to 2,400 movements in 2014 (NSP2) resulting in fewer crossings of the pipeline corridors. However, **Route K** crosses all investigated pipeline routes.

- The traffic separation scheme TSS Adlergrund came into force end 2010 after the installation of Nord Stream. In 2006 (NSP) the shipping in this area (between Bornholm and Poland) was represented by **Route I** (as assigned in Figure 4-1 below) in the EIA with 13,550 movements. In 2014 (NSP2) the shipping in the area was represented by **Route I** with 5,300 movements and **Route O** with 7,000 movements, meaning that the ship traffic density in the area is in the same range (12-14,000 movements per year). The ship traffic has however moved further south in 2014 (NSP2) compared to 2006 (NSP). It is anticipated that the introduction of TSS Adlergrund – and division of ship traffic in two specific routes – would make the construction of NSP2 slightly safer than the construction of NSP.

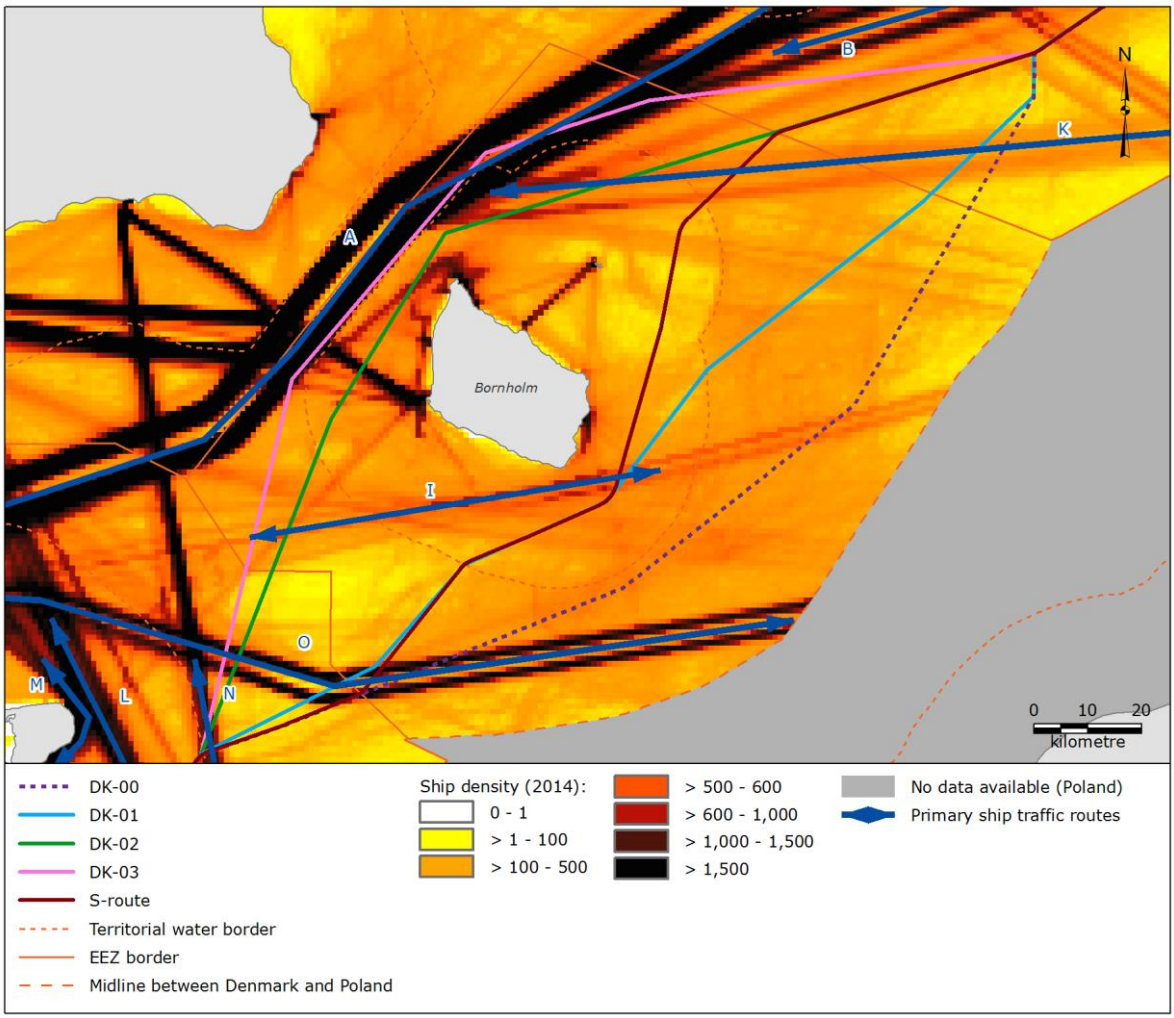

Figure 4-1 Alternative routes for NSP, shown with ship traffic density (as presented in the EIA for Nord Stream 2 in 2017)

In general it is evaluated that the ship traffic pattern have not been subject to significant changes between 2006 (NSP) and 2014 (NSP2).

4.2 CWA area

There have been no changes to the area that has restrictions on anchoring and fishing due to the potential presence of chemical munitions or CWA, see Figure 3-1 between the route selection process for NSP and the route selection process for NSP2.

It must be assumed that the risk of encountering chemical munitions is higher in this area compared to other areas. This would present health and safety concerns during construction and operation of the pipelines and has the potential to impact the marine environment.

Detailed investigations of the presence of CWA completed as part of the NSP2-project also show that the levels of CWA and thereby the risks of exposure to CWA in the area with restrictions are higher compared to areas outside the risk-zone.

The previously evaluated route DK-01 (corresponding to the RA route of NSP2) would cross the area with restrictions, whereas the S-route (corresponding to the ES route of NSP2) as well as the routes DK-00 and DK-02/03 would avoid the area.

4.3 Fishery

The evaluation method of the general fishery pattern (especially bottom-trawling) in the waters around Bornholm has changed between the evaluations for NSP and NSP2. Therefore it is not possible to make a direct quantitative comparison of possible changes in the spatial distribution of bottom trawling fishery in these waters.

Figure 4-2 shows the spatial distribution of bottom trawling in the period from 2010 to 2014 as presented in the EIA for NSP2 (2017), along with the different route alternatives for NSP.

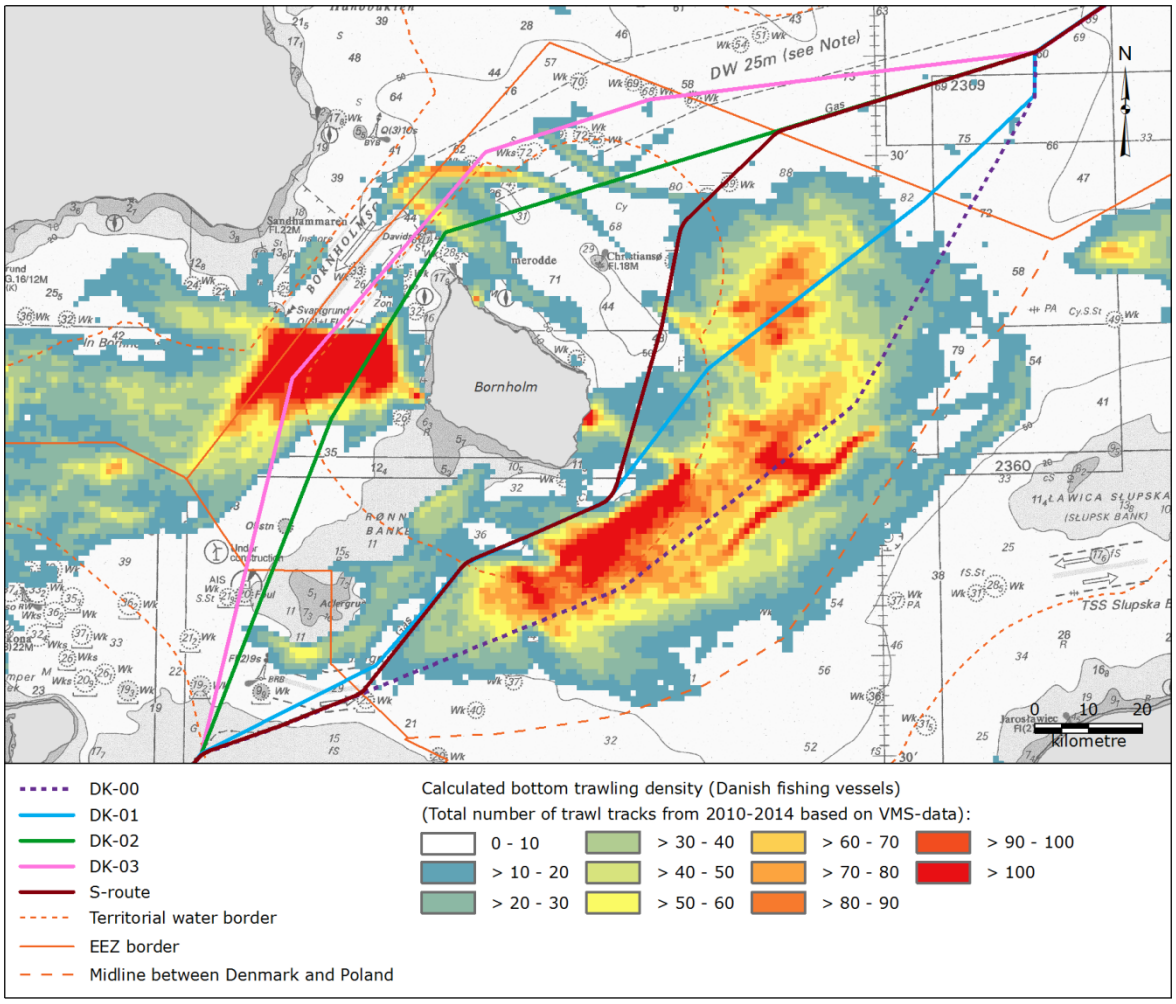

Figure 4-2 Alternative routes for NSP, shown with distribution of fishery by bottom trawling (as presented in the EIA for NSP2 in 2017)

Density plots were not produced during the planning of NSP and as mentioned above a direct comparison of the spatial distribution of fishery is not possible. In general the bottom fishery is however to a large extent dependent on the bottom bathymetry and the given environmental characteristics (e.g. oxygen concentration in the water) defining the locations of the target species. These conditions have not been subject to significant changes between the planning of NSP and the planning of NSP2 and it is therefore evaluated that the fishery pattern likewise has not been subject to significant changes in this period.

The previously investigated routes DK-02 and DK-03 would cross an area with intense bottom trawling to the west of Bornholm whereas the previously investigated route DK-00 and DK-01 would cross an area with quite intense bottom trawling activities to the east of Bornholm. The S-

route (corresponding to the ES route of NSP2) is to a large extent avoiding the areas with high intensity of bottom trawling.

4.4 Marine spatial planning and infrastructure

Spatial planning

As described in the EIA for the NSP2-project /1/, Denmark has passed legislation in 2016 on maritime spatial planning aligned to the European Directive on establishing a framework for maritime spatial planning (Directive 2014/89/EU). This new legislation will oblige NSP2 to align to the current plans.

As an example, a spatial planning pilot project was undertaken by Germany for the Arkona Basin in 2012. Outside of the formal planning purposes, a planning exercise was undertaken which resulted in a draft spatial plan. The draft spatial development plan is of strategic character and a tool for balancing the different Interests in the use of sea space, based on the sustainability principle. The draft plan is suggesting an area specifically reserved for cables and pipelines. The proposed ES route (following the S-route) follows this suggested area /23/.

Infrastructure

The majority of installations crossing the evaluated pipeline routes consist of cables of various origins, but pipelines and planned wind parks are also present, see Figure 4-3.

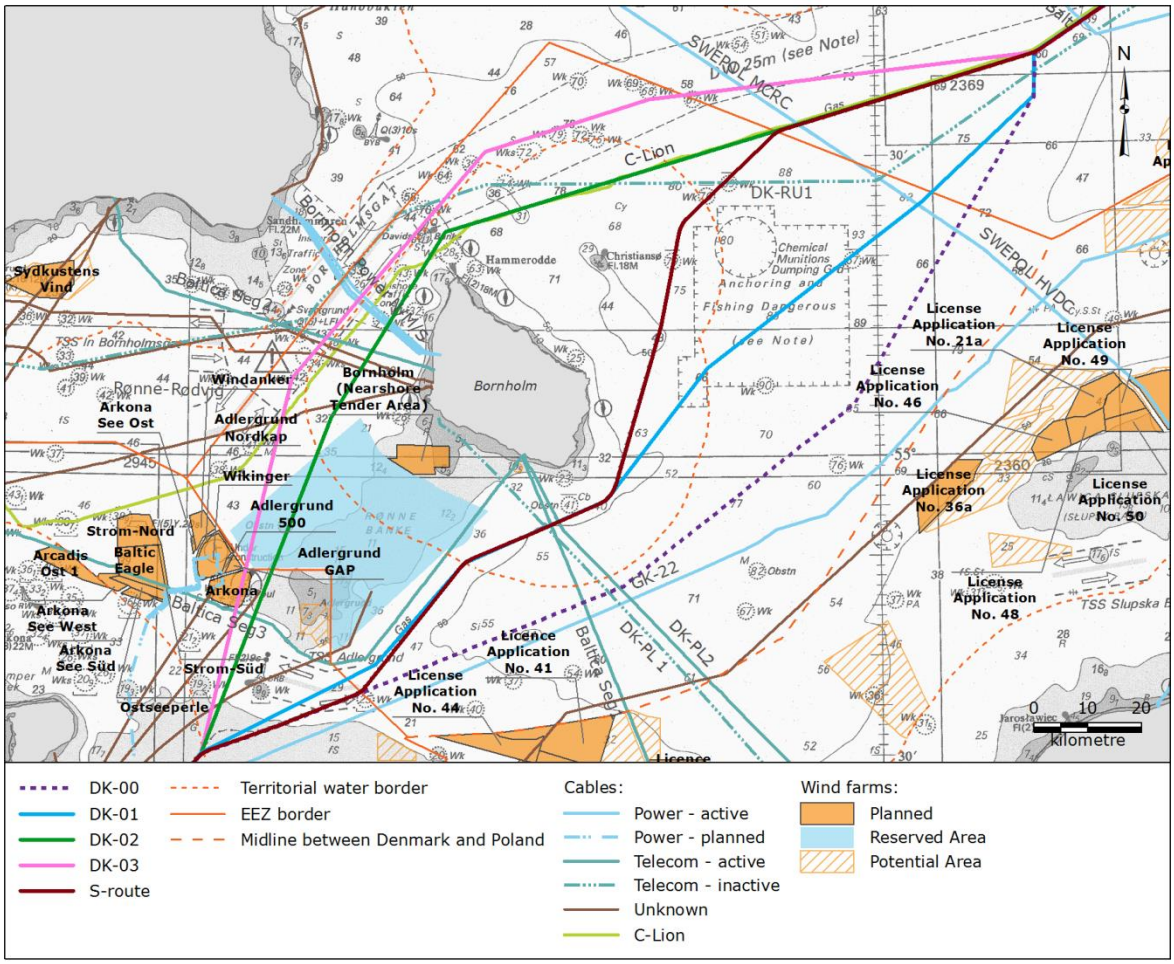

Figure 4-3 Alternative routes for NSP, shown with infrastructure (as presented in the EIA for NSP2 in 2017)

In general the previously investigated northern routes DK-02/03 would include more cable crossings and thereby preparatory intervention works than the eastern and southern route proposed for NSP2 and the previously investigated S-route and routes DK-00/01. This has not changed between the route planning of NSP and the route planning of NSP2.

However, since the construction of NSP, a new telecommunication cable has been put into operation in Danish TW and EEZ north of Bornholm, the so called C-Lion cable. In 2016 Finnish ICT solutions provider Cinia Group thus completed the construction of its C-Lion, a 1,175 km long fibre optic cable that runs under the Baltic Sea, connecting Helsinki, Finland to Rostock, Germany. It runs through the Danish EEZ and TW on the northern side of Bornholm, see Figure 4-3. The C-Lion cable follows the same route as the previously investigated DK-02 route until it reaches the northern tip of Bornholm where it continues further to the north than the DK-02. The presence of the C-Lion would therefore conflict with the previous suggested DK-02 route. The C-Lion cable is not in conflict with the proposed route for NSP2 in Danish waters.

Furthermore, the Rønne Banke area has been identified as relevant for large offshore windfarms since the planning and construction of NSP. The area is reserved and any windfarm project inside this area will have to be won in a government-led tender. The area must be suitable for offshore windfarm installation after 2020. The previously investigated DK-02 and DK-03 routes (the two routes to the north of Bornholm) are crossing this area. The area is not in conflict with the proposed route for NSP2 in Danish waters.

4.5 Military areas

In the Danish EEZ and TW, there are a number of military practice areas, see Figure 4-4.

Since the construction of the NSP pipelines, new/updated submarine exercise areas used by the NATO military are located to the east of Bornholm. Furthermore, two Safe Bottoming Areas are located in the most eastern part of the Danish EEZ, see Figure 4-4. The previously evaluated DK-00 and DK-01 routes would have the potential to result in a disturbance to military activities in this area. The proposed route for NSP2 will not conflict with the activities in the submarine exercise area.

Furthermore, relevant German military authorities were contacted in relation to the overall route-evaluation for NSP2 and the German Navy advised against using the area for the pipeline route in relation to the evaluation of the RA-route for NSP2 (which is similar to the route DK-01) /24/.

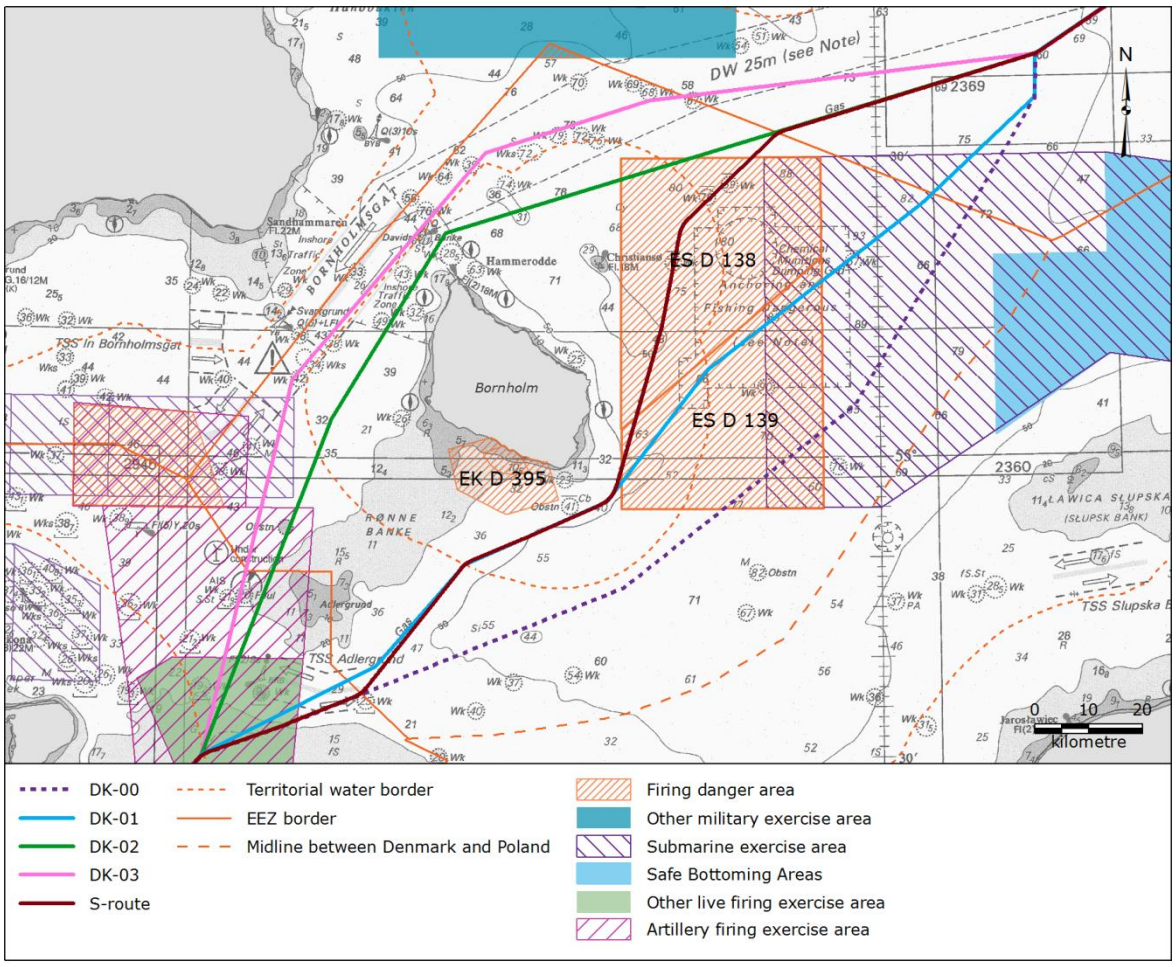

Figure 4-4 Alternative routes for NSP, shown with military areas (as presented in the EIA for NSP2 in 2017)

4.6 Extent of intervention works during construction

Besides the actual pipe-lay, the construction activities in Danish waters would include preparation for cable crossings, post-lay trenching and/or rock placement which are defined as intervention works.

The previously investigated routes DK-00 and DK-01 as well as the RA route for NSP2 are expected to include less intervention works than the rest of the considered route options since the seabed is softer in the eastern part of Danish waters and therefore greater natural embedment is foreseen in this area.

In general it is evaluated that the seabed characteristics have not been subject to changes between the route selection process of NSP and the route selection process of NSP2 that would change the previous evaluations in relation to the extent of intervention works needed for the different route options. Detailed engineering surveys would be required to give further evaluation of the need of intervention work for the specific routes.

However, based on experience from the construction of NSP, impacts from intervention works are not expected to be significant. The differences between the route options in relation to the impacts from intervention works are therefore considered to be relatively small.

4.7 Impacts on biological environment – Natura 2000

Natura 2000 areas are considered to be of outstanding international significance and important to maintaining biodiversity in the EU. The purpose of Natura 2000 is to maintain or restore the favourable conservation status of habitats and species in their natural range.

The Natura 2000 network comprises:

- SPA - areas for the conservation of bird species listed in the Birds Directive as well as migratory birds
- SAC - areas for the conservation of habitat types and animal and plant species listed in the Habitats Directive

Figure 4-5 shows the Natura 2000 sites as of 2016 as presented in the EIA for NSP2 (2017), along with the route alternatives for NSP.

Changes in Natura 2000 sites have taken place in Danish waters. A new Natura 2000 site Adlergrund has been designated south-west of Bornholm. This site was however already proposed as Natura 2000 during NSP, and is included in the EIA for NSP. The route alternative DK-02 crosses the area, and the route alternative DK-03 passes close by. The proposed route for NSP2 does not cross or pass near by the area.

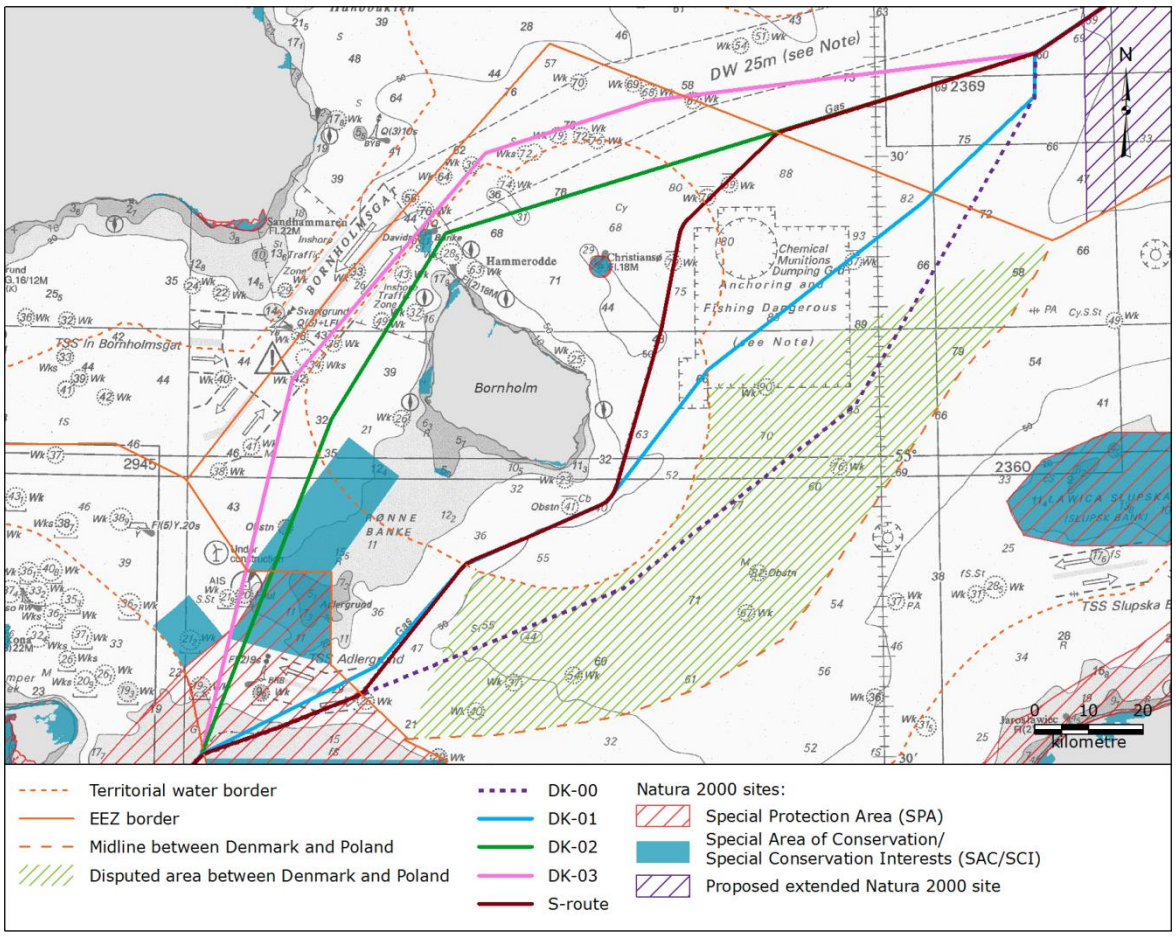

Figure 4-5 Alternative routes for NSP, shown with Natura 2000 sites (as presented in the EIA for NSP2 in 2017).

5. CONCLUSION

The assessments conducted as part of the EIA report for the NSP2-project has been performed for the construction and operation of a pipeline system following the ES route running in parallel to the existing Nord Stream pipeline system (the S-route). The ES route was chosen based on previous planning and experience from NSP and supplemented with new route surveys and sea-bed investigations as presented in the EIA for NSP2.

The process of selecting the preferred route for NSP was completed in close collaboration with the Danish authorities in the period from 2006 to 2009. And as mentioned in the information provided by the then Minister for Climate and Energy to the European Affairs Committee of the Danish Parliament in November 2009 the chosen route (S-route) was deemed the most optimal route in Danish waters /7/.

[Quotation translated: *Based on an overall assessment, it is the opinion of the involved Danish authorities that the permitted route is the optimal one in Danish waters of the Baltic Sea at Bornholm, and that this route has been found after investigating other possible routes in the area.*]

Based on the EIA's for NSP and NSP2 respectively it has been evaluated to which extent changes have occurred within relevant biological and socio-economic aspects between the route selection processes for NSP and NSP2 in Danish waters.

In general it is evaluated that no significant changes have occurred within relevant biological and socio-economic aspects between the route selection processes for NSP and the route selection for NSP2.

A comparison of the different route options is given in Table 5-1.

Table 5-1 Comparison of the considered routes for NSP2

Risk issue	Route preference			
	ES route (NSP2) and S-route (NSP)	RA route (NSP2) and route DK-01 (NSP)	Route DK-00 (NSP)	Route DK-01/02 (NSP)
Maritime safety	++	++	-	--
Chemical Warfare Agents (CWA)	+	--	+	++
Fishery	+	-	-	-
Marine spatial planning and infrastructure	++	-	-	--
Military practice areas	+	-	--	+
Intervention works	-	+	+	--
Biological environment	+	+	+	-

"-" and "--" represents a route which is considered less preferable with "--" being the least preferable

"+" and "++" represents a route which is considered preferable with "++" being the most preferable

It can be concluded that the ES route (corresponding to the S-route of NSP) is considered the most optimal and preferred route for the NSP2 pipelines in Danish waters. This conclusion is based on the following key considerations:

- The ES route avoids areas with the highest intensity of shipping thereby reducing risks related to maritime safety;

- The ES route avoids the CWA-risk area east of Bornholm as well as areas extensively used for fishery west and south-east of Bornholm;
- The ES route reflects positive aspects of marine spatial planning (NSP and NSP2 run parallel and the number of cable crossings are minimal);
- The ES route avoids areas used by the military for submarine exercises, including Safe Bottoming Areas;
- Existing knowledge and experience from the construction and monitoring of NSP makes the ES route preferable in respect to technical feasibility. However, the soft seabed for the more southern and eastern routes is considered to entail less intervention work and thereby minimising the potential environmental impacts. This however, does not prevail the overall preference of the ES route.

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