



# ATLAS

Environmental Impact Assessment, Denmark  
South-eastern route

Nord Stream 2

April 2019

W-PE-EIA-PDK-DWG-805-DA0200EN-07

## **OFFSHORE PIPELINES THROUGH THE BALTIC SEA**

# **ATLAS**

Environmental Impact Assessment, Denmark  
South-eastern route

Nord Stream 2

April 2019

Prepared by: Rambøll A/S  
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Date: April 2019

## Introduction

**Nord Stream 2** is a pipeline 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 twin approximately 1,230 kilometre subsea pipelines will have the capacity to supply 55 billion cubic metres of gas per year in an economic, 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, which has been recognised for its high environmental and safety standards, green logistics, open dialogue and public consultation.

## Atlas maps

This Atlas is part of the Environmental Impact Assessment (EIA) for the Danish section of the planned NSP2 pipeline system. The EIA and the Atlas maps include both the combination of the proposed NSP2 route with V1 and the combination of the proposed NSP2 route with V2, both of which are considered feasible route options in Danish waters.

The purpose of this Atlas is to describe the general geographical distribution of physical, chemical and biological parameters in the Baltic Sea around the planned offshore pipelines.

When reading the text part of the Environmental Impact Assessment there will be references to the Atlas. The individual Atlas maps are presented in a sequence that reflects the structure of the report.

The maps that are presented in the Atlas are based on information from authorities, organisations and international databases and data gained from the existing Nord Stream pipeline project. The references used are shown in the Atlas maps' legends.

Please be aware that the marked routes of the pipeline on the maps are not representative of the actual pipeline width. They serve merely as an indication of the placement of the routes.

An overview of the topics covered by the Atlas and of the individual Atlas maps is shown overleaf.

### Note:

General references on all Atlas maps:

- Limits of Exclusive Economic Zones (EEZ) and Territorial Waters: IBRU May 2010
- Agreement between the Republic of Poland and the Kingdom of Denmark concerning the delimitation of maritime zones in the Baltic Sea, signed in Brussels on 19 November 2018
- Background sea charts are "Not to be used for navigation"
- Background sea chart; © Crown Copyright and/or database rights. Reproduced by permission of the Controller of Her Majesty's Stationery Office and the UK Hydrographic Office ([www.ukho.gov.uk](http://www.ukho.gov.uk))

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Map SH-01-D Primary ship traffic routes  
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#### **Noise modelling**

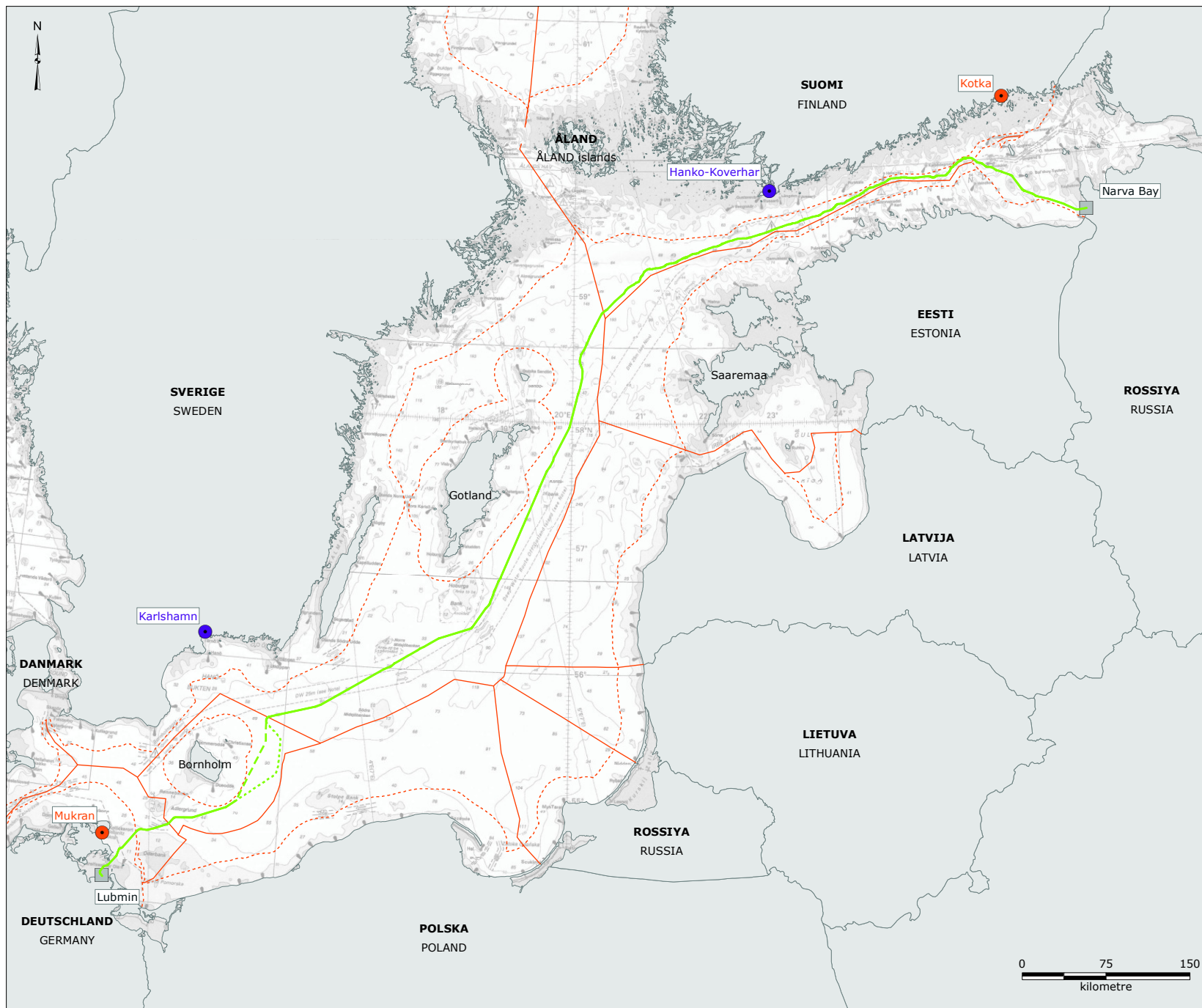
Map NM-01 Baltic Sea underwater soundscape  
Map NM-02-D Airborne noise propagation modelling results  
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#### **Sediment modelling**

Map SM-01-D Suspended sediments – trenching and rock placement

# PROJECT DESCRIPTION

DESCRIPTION OF THE PROJECT AND ALTERNATIVES



#### Legend:

- NSP2 route
- NSP2 route V1
- NSP2 route V2
- - - Territorial water border
- - - EEZ border
- Landfall

#### Storage yards:

- Pipe coating plant / pipe storage site
- Pipe storage site

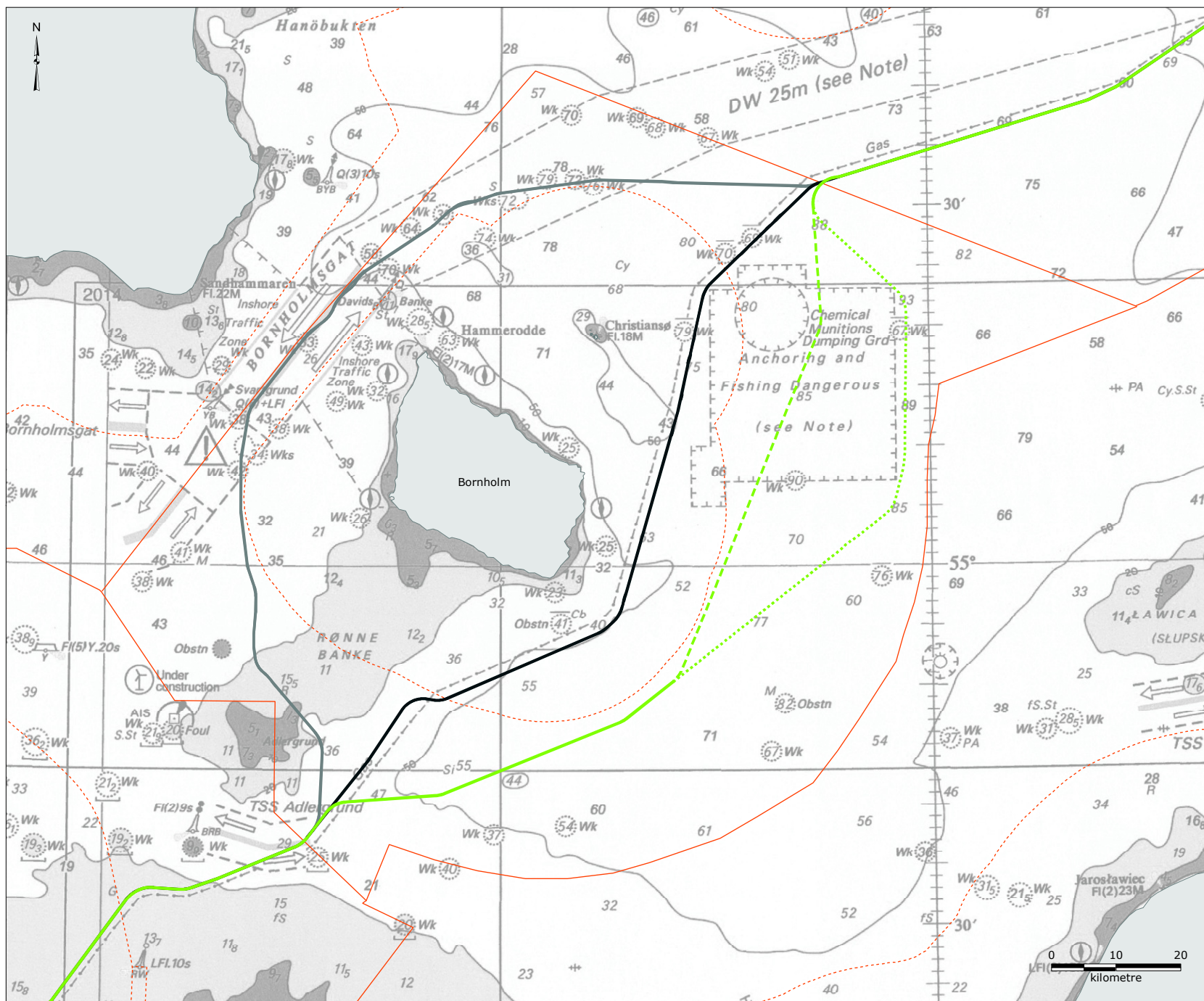
Version: 05  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK/CASO

**PR-01**

#### NSP2 pipeline route and onshore facilities

**RAMBOLL**

0 75 150  
kilometre



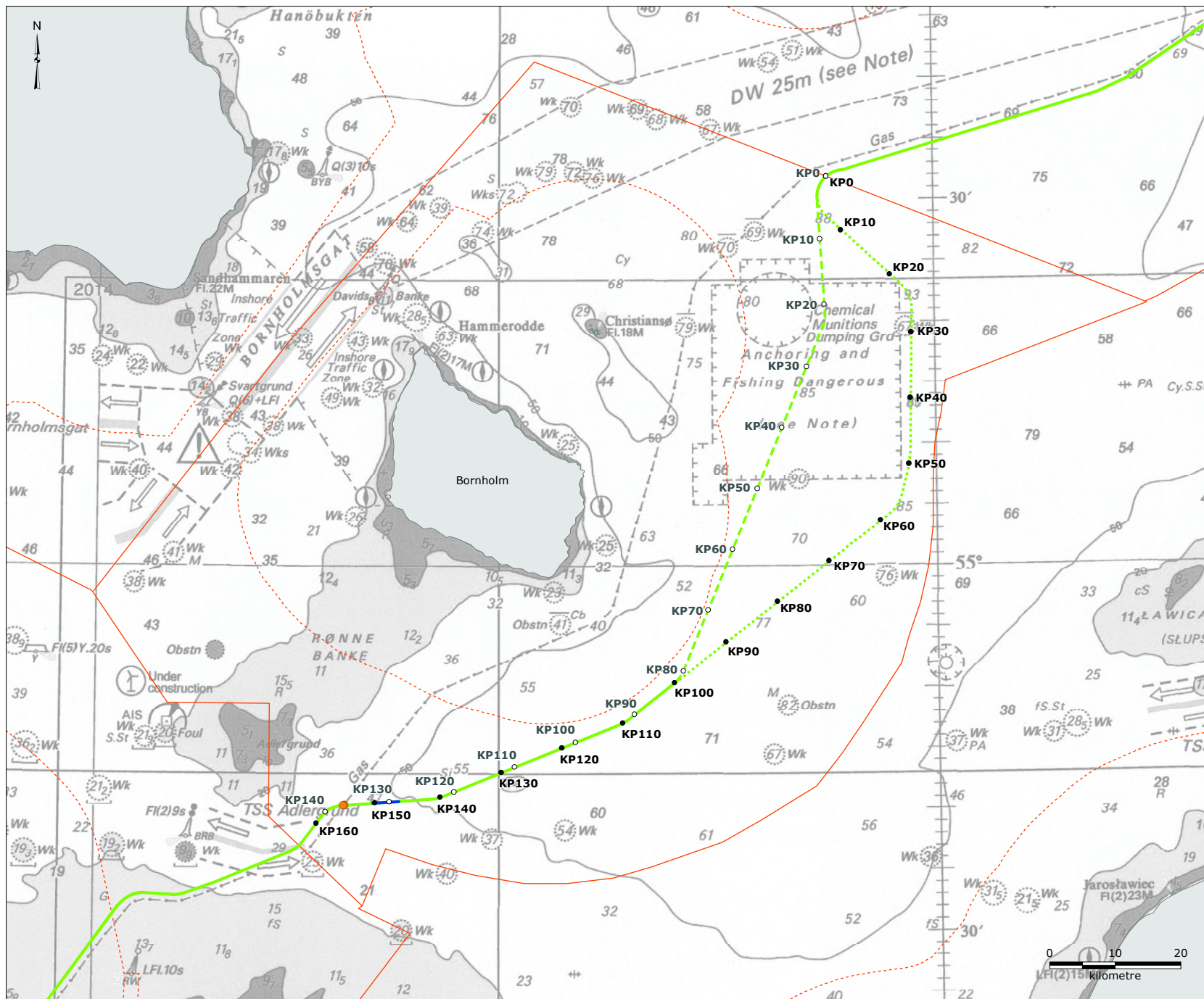
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 Prepared: MRIH  
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**PR-02-D**

### Alternative pipeline routes







#### Legend:

- NSP2 route
- - - NSP2 route V1
- . . . NSP2 route V2
- - - Territorial water border
- EEZ border
- Post-lay trenching or rock placement
- Spot rock placement, pipeline crossing
- KP (kilometre point) - NSP2 route V1
- KP (kilometre point) - NSP2 route V2

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**PR-03-D**

**NSP2 pipeline route  
and anticipated seabed  
intervention works**

**RAMBOLL**

## PHYSICAL-CHEMICAL ENVIRONMENT

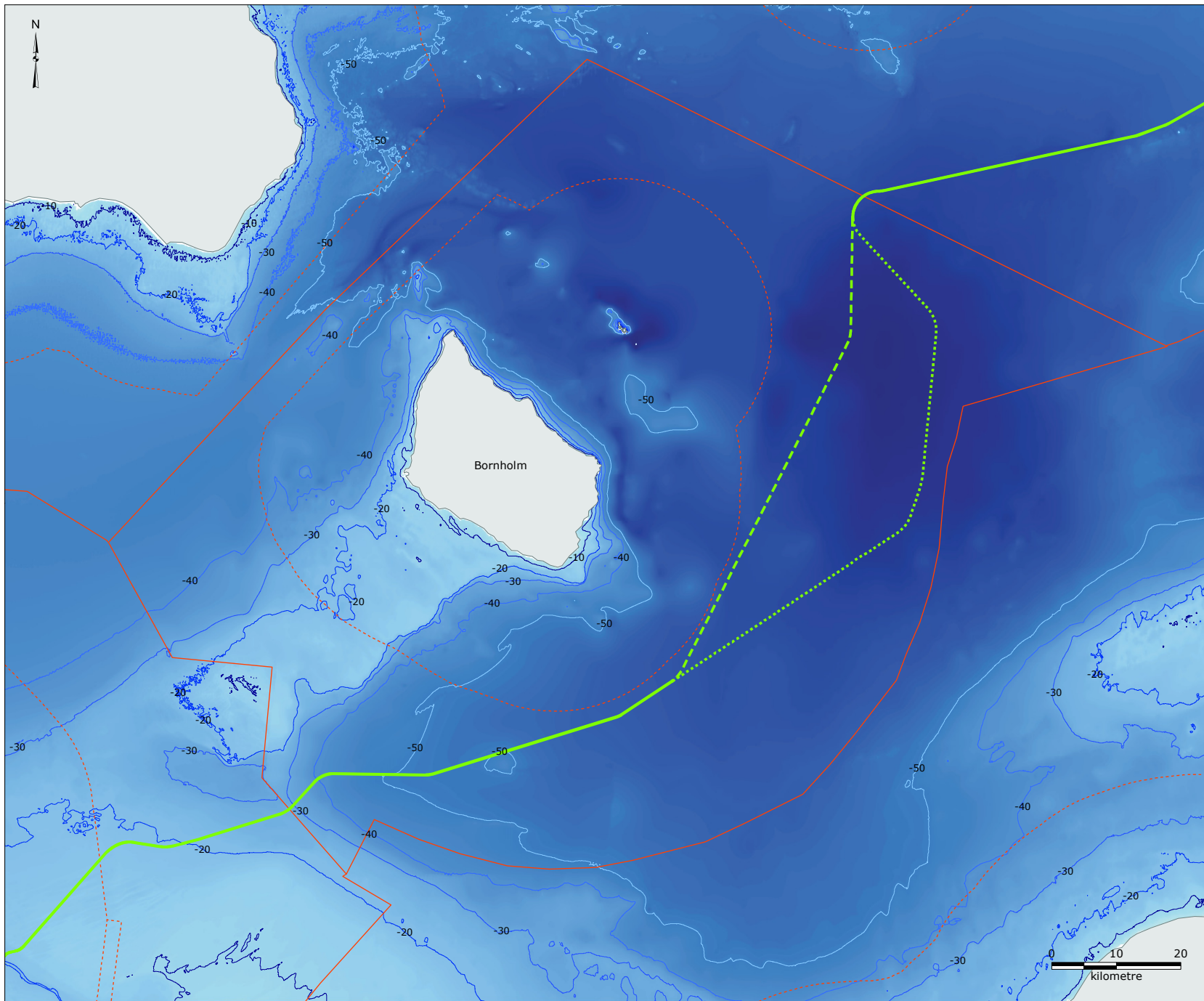
BATHYMETRY AND HYDROGRAPHY

WATER QUALITY

GEOLOGY AND SEABED

CLIMATE





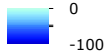
# Legend:

- NSP2 route
- NSP2 route V1
- NSP2 route V2
- Territorial water border
- EEZ border

## Depth contour (m):

- 10
- 20
- 30
- 40
- 50
- 100

## Bathymetry [depth (m)]:



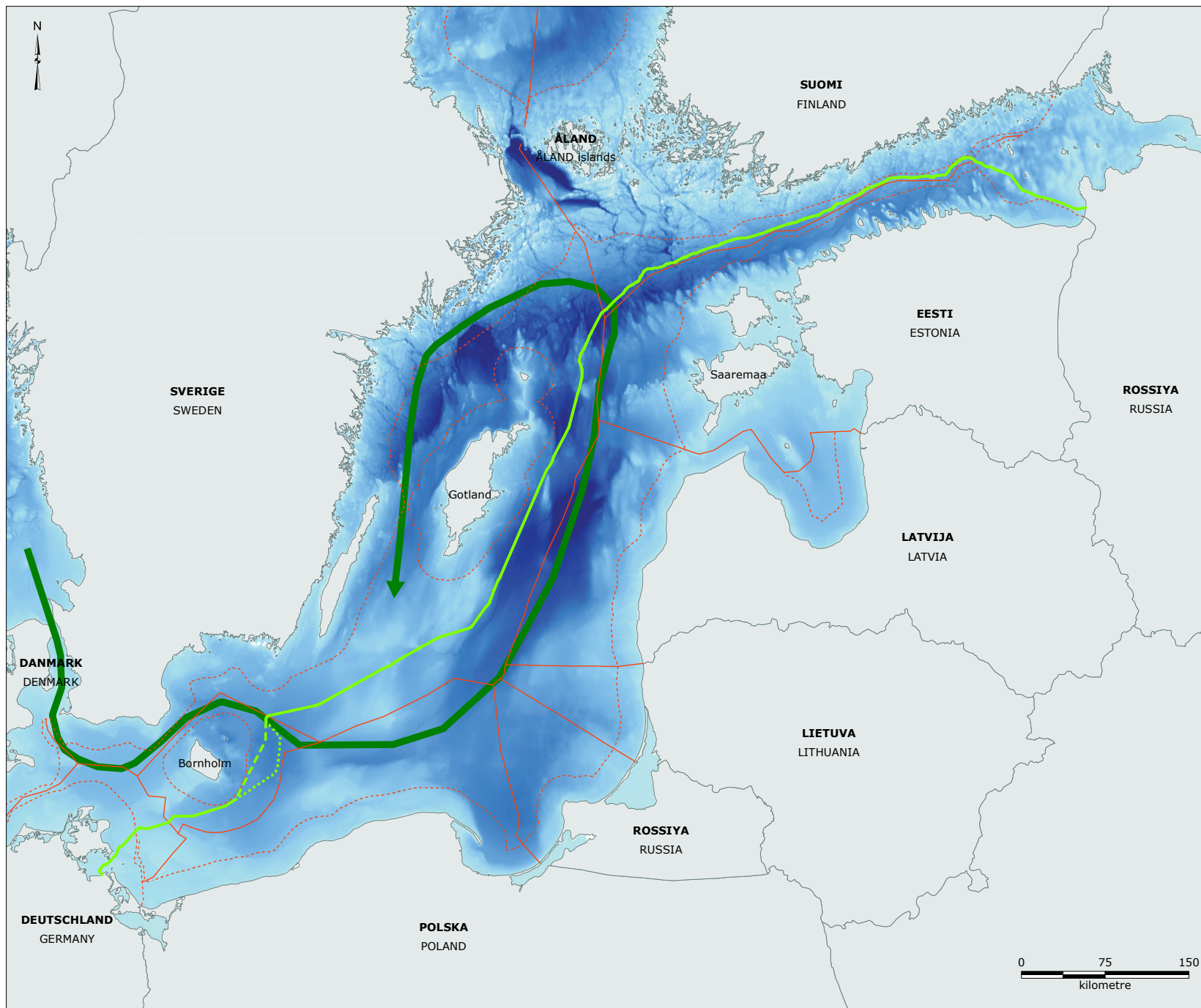
Reference:  
-EMODnet, 2018,  
<http://portal.emodnet-bathymetry.eu/?menu=19>,  
Date accessed: 2019-01-23

Version: 05  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: KEBS

**BA-01-D**

## Bathymetry

**RAMBOLL**



#### Legend:

- NSP2 route
- - - NSP2 route V1
- · · NSP2 route V2
- - - Territorial water border
- EEZ border
- Inflow of oxygen-rich water

#### Bathymetry [depth (m)]:

- High : 0
- Low : -200

References:  
 - Binczewska, A., Moros, M., Asteman, I. P., Slawinska, J., Bak, M., 2017, Changes in the inflow of saline water into the Bornholm Basin (SW Baltic Sea) during the past 7100 years - evidence from benthic foraminifera record. Boreas 47, 297-310.  
 - EMODnet, 2018, <http://portal.emodnet-bathymetry.eu/?menu=19>, Date accessed: 2019-01-23

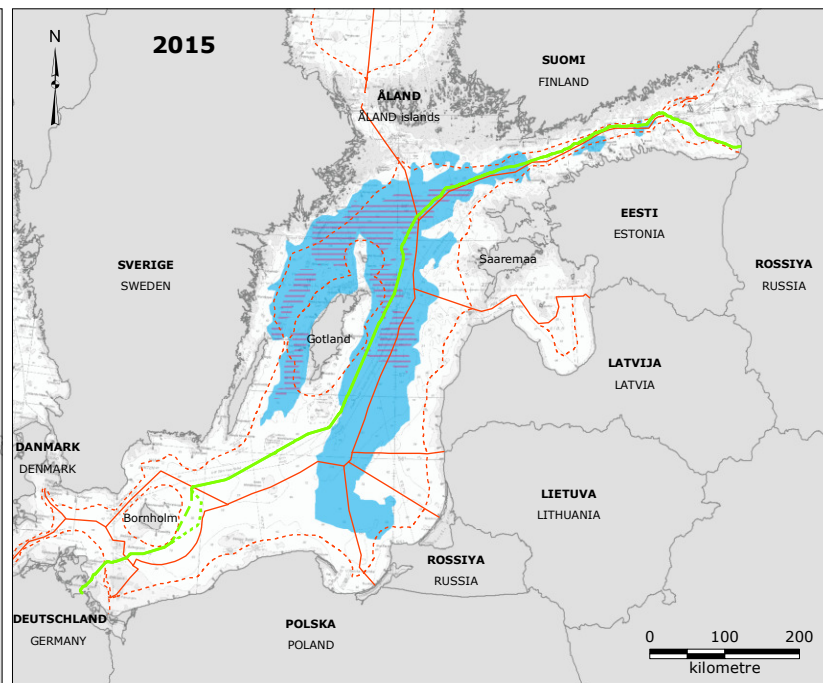
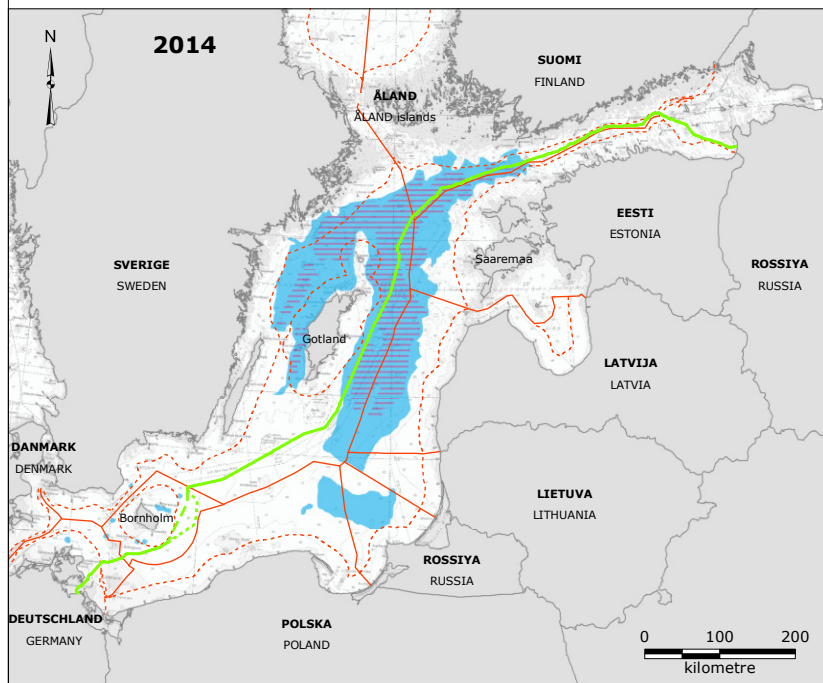
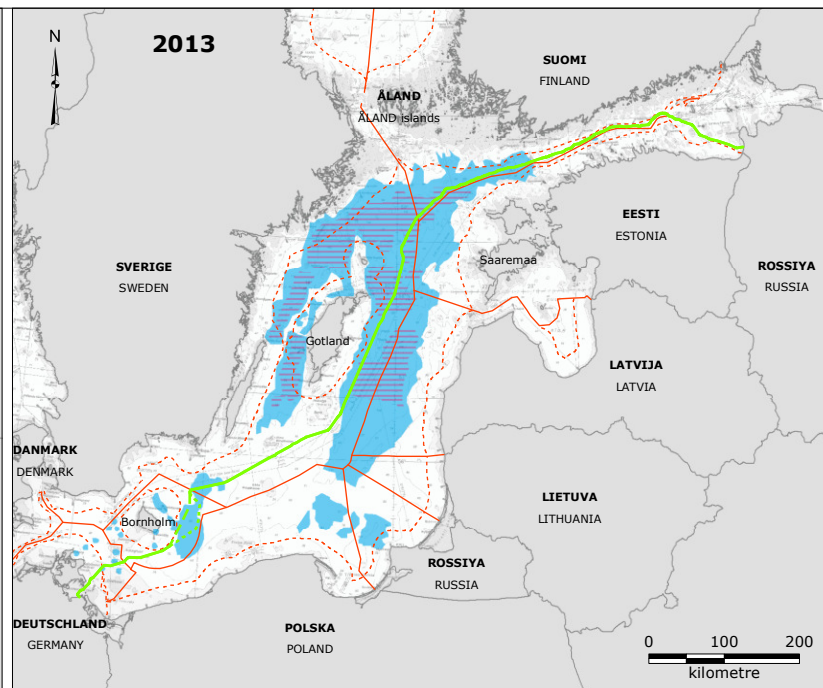
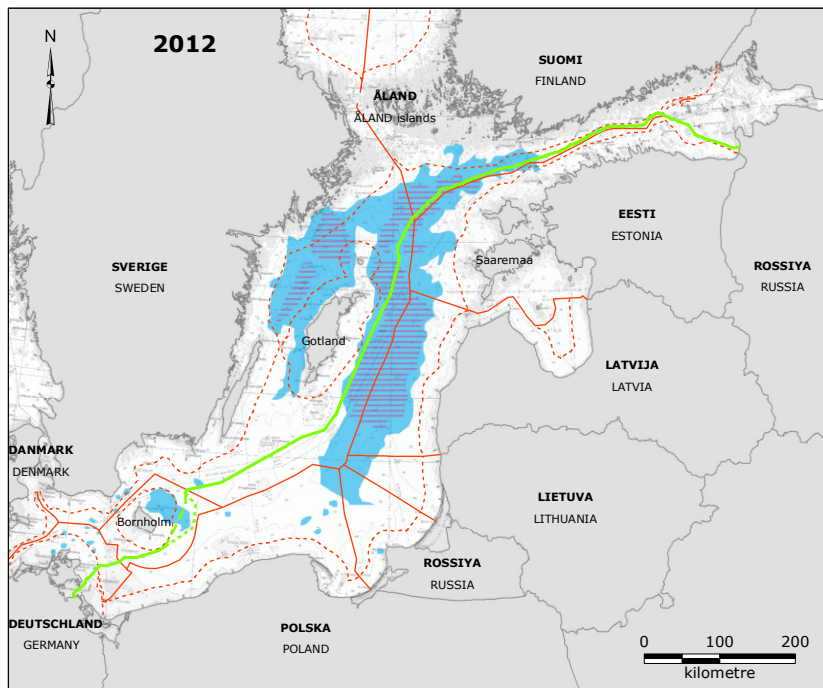
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 Controlled: KEBS

**BA-02**

### Inflow of oxygen-rich water to the Baltic Sea

0 75 150  
 kilometre

**RAMBOLL**



**Legend:**

- NSP2 route
- - - NSP2 route V1
- · · NSP2 route V2
- - - Territorial water border
- EEZ border
- Hypoxic (oxygen content  $\leq 2$  mg/l)
- Anoxic (oxygen content = 0 mg/l)

Note:  
- Anoxic and hypoxic areas in the Baltic Sea, Autumn 2012, 2013, 2014 and 2015

References:  
- SMHI, 2013, "Oxygen Survey in the Baltic Sea, 2013 - Extent of Anoxia and Hypoxia, 1960-2013". SMHI Report Oceanography No. 49  
- SMHI, 2015, "Oxygen Survey in the Baltic Sea, 2015 - Extent of Anoxia and Hypoxia, 1960-2015". SMHI Report Oceanography No. 53

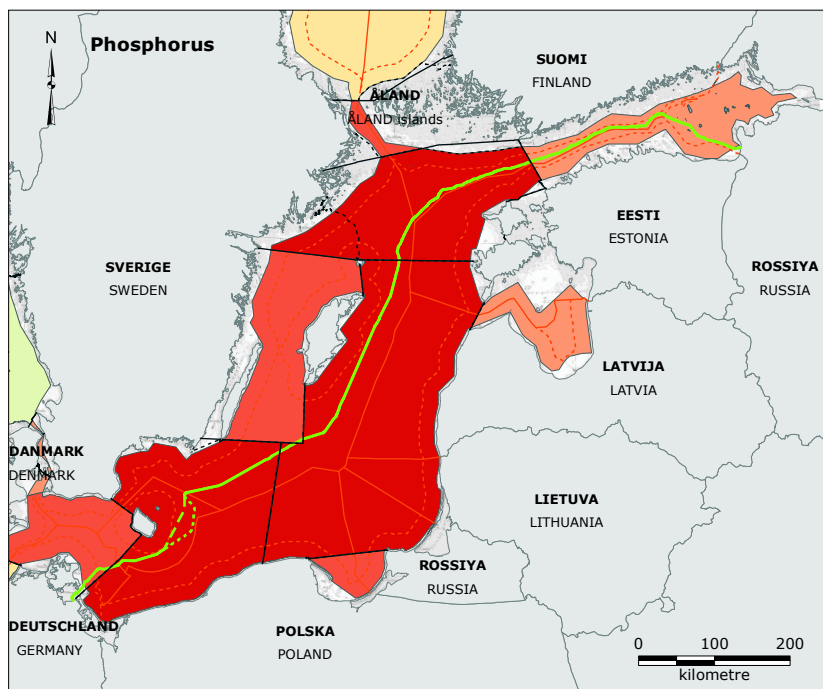
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**WA-01**

**Anoxic and hypoxic areas**

**RAMBOLL**

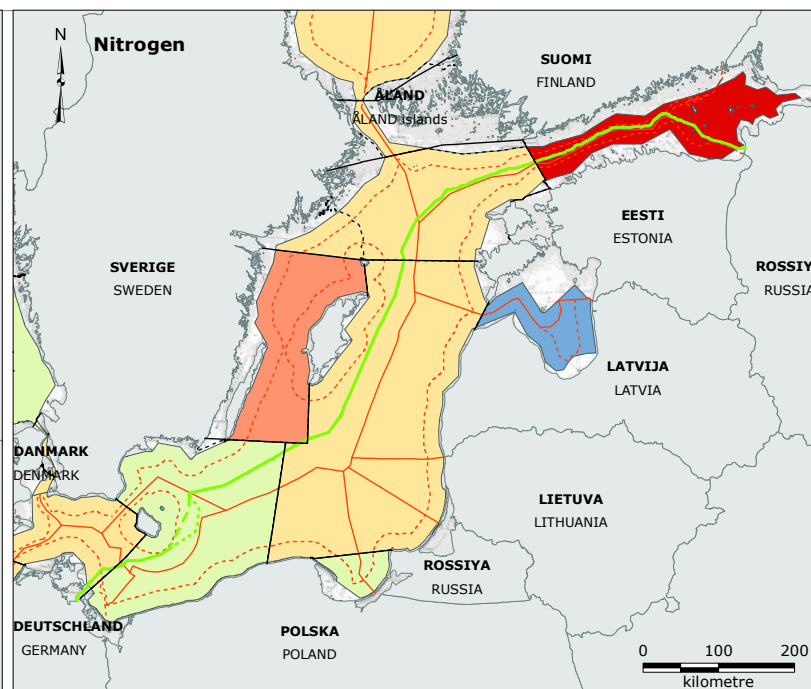
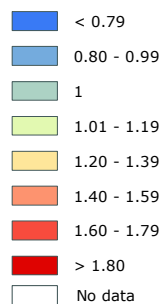




#### Legend:

Phosphorus status 2007-2011:

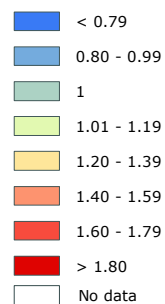
(Eutrophication Ratio)



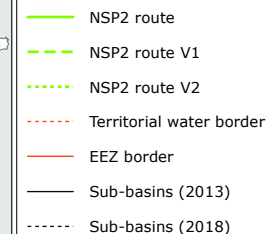
#### Legend:

Nitrogen status 2007-2011:

(Eutrophication Ratio)



#### Legend:



#### Note:

- Left: Eutrophication Ratio: Concentration of Dissolved Inorganic Phosphorus (DIP) in surface water (0-10 m) as winter average 2007-2011, relative to target concentration of Good Environmental status (GES). The GES-boundary is set at  $ER \leq 1.00$ .
- Right: Eutrophication Ratio: Concentration of Dissolved Inorganic Nitrogen (DIN) in surface water (0-10 m) as winter average 2007-2011, relative to target concentration of Good Environmental Status (GES). The GES-boundary is set at  $ER \leq 1.00$ .
- Phosphorus and nitrogen data are presented in relation to HELCOM sub-basins as designated in 2013. However, as HELCOM has updated its sub-basin designations in 2018, these boundaries are also shown.

#### References:

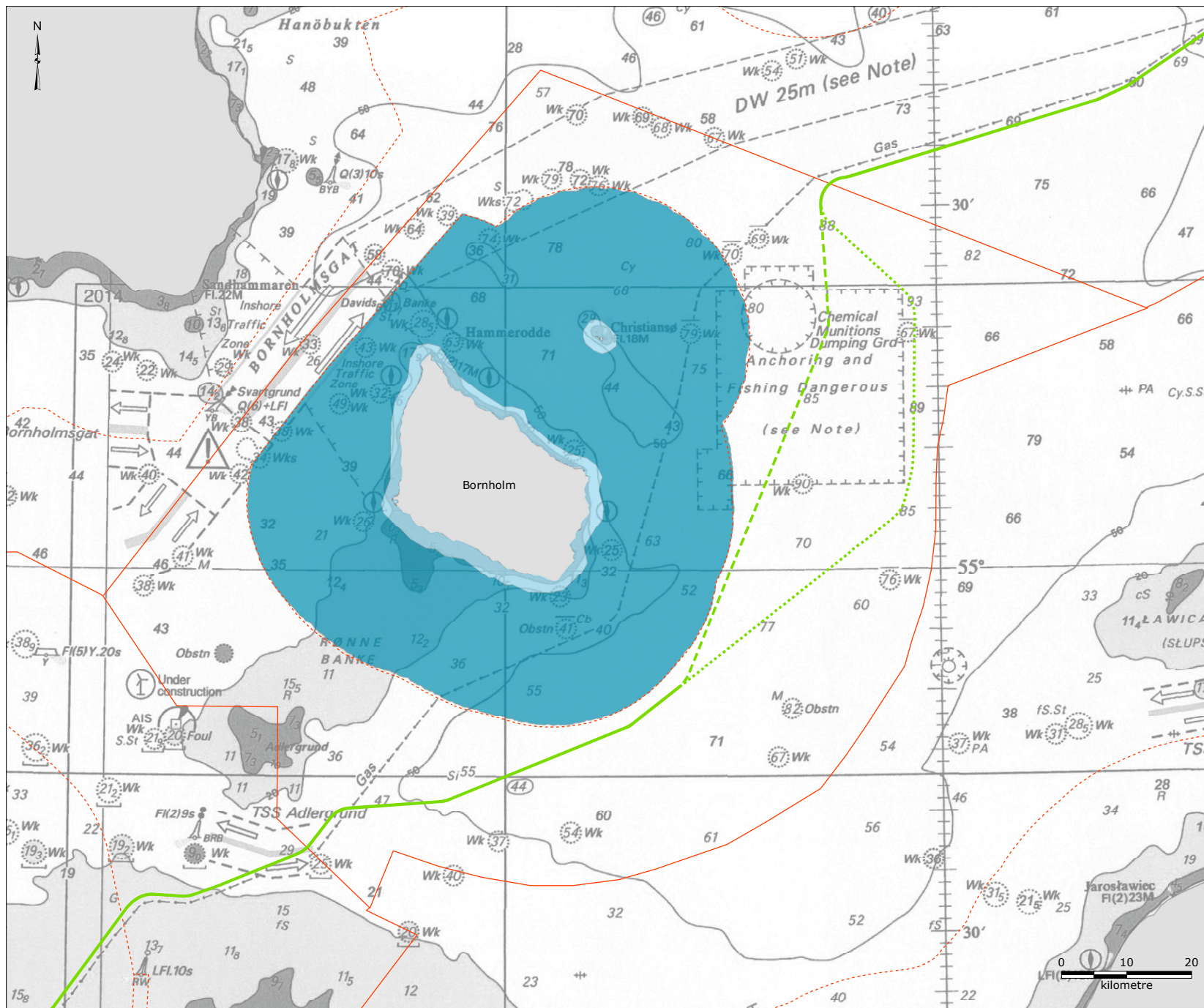
- HELCOM, 2018, "HELCOM subbasins"  
<http://maps.helcom.fi/website/mapservice/index.htm>,  
Date accessed: 2019-03-05
- HELCOM, 2013, "HELCOM subbasins",  
<http://maps.helcom.fi/website/mapservice/index.html>,  
Date accessed: 2016-3-30
- HELCOM, 2017, "Phosphorus status distance to target 2007-2011",  
<http://maps.helcom.fi/website/mapservice/index.html>,  
Date accessed: 2019-03-05
- HELCOM, 2017, "Nitrogen status distance to target 2007-2011",  
<http://maps.helcom.fi/website/mapservice/index.html>,  
Date accessed: 2019-03-05

Version: 06  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: KEBS

**WA-02**

## Eutrophication





#### Legend:

- NSP2 route
- NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- EEZ border

Water management plans - Denmark:

- 1 nm areas
- 12 nm areas

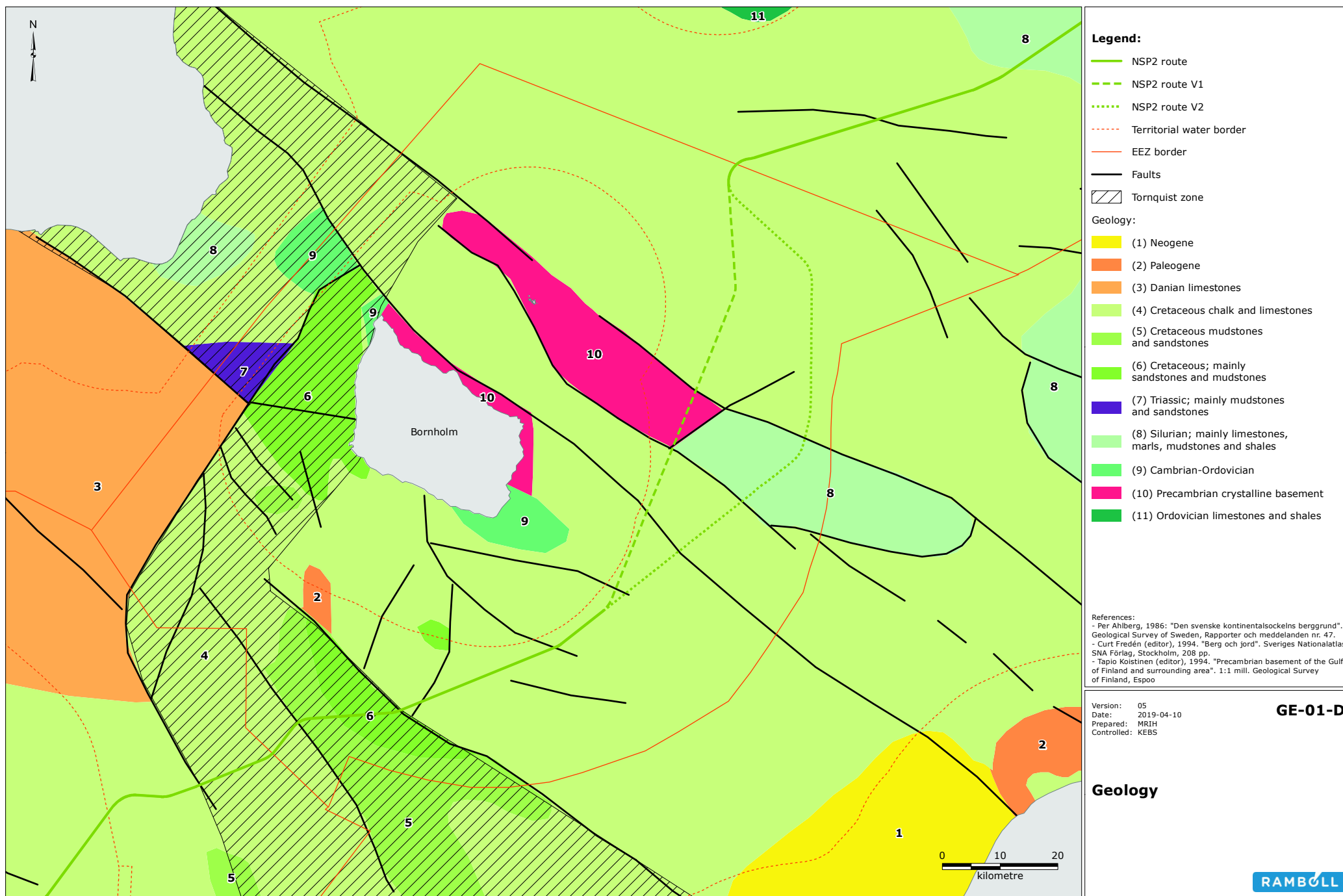
Reference:  
 - The Danish Environmental Protection Agency, 2016,  
 "Water management plans 2015-2021",  
<https://mst.dk/service/miljoegis/vandplaner/>,  
 Date accessed: 2019-05-06

Version: 01  
 Date: 2019-05-06  
 Prepared: MRIH  
 Controlled: KEBS

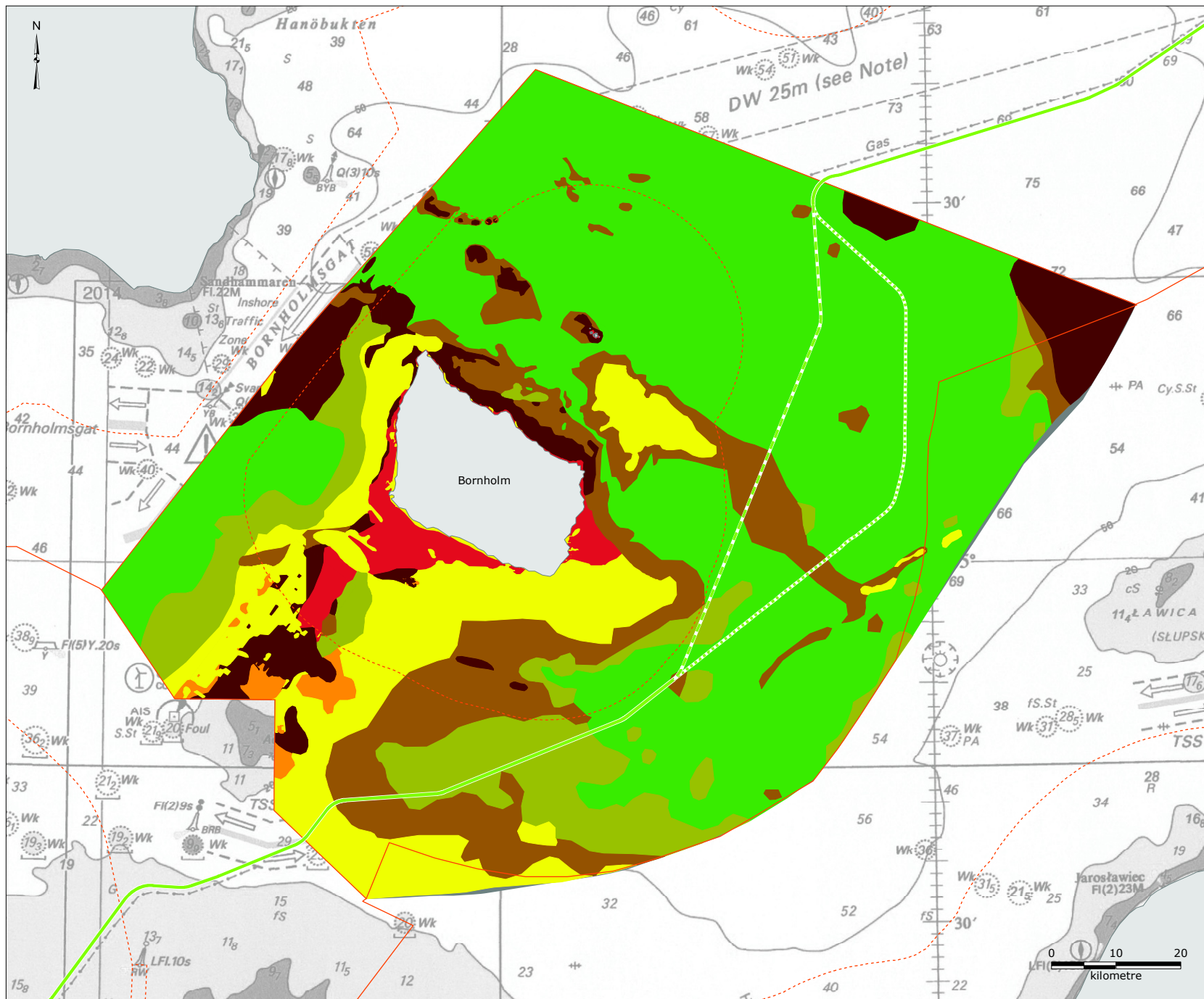
**WA-03-D**

#### Water management plans

**RAMBOLL**







#### Legend:

- NSP2 route
- NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- EEZ border

#### Sediment types:

- Mud and sandy mud
- Muddy sand
- Sand
- Gravel and coarse sand
- Till/diamicton
- Quaternary clay and silt
- Sedimentary rock
- No data available

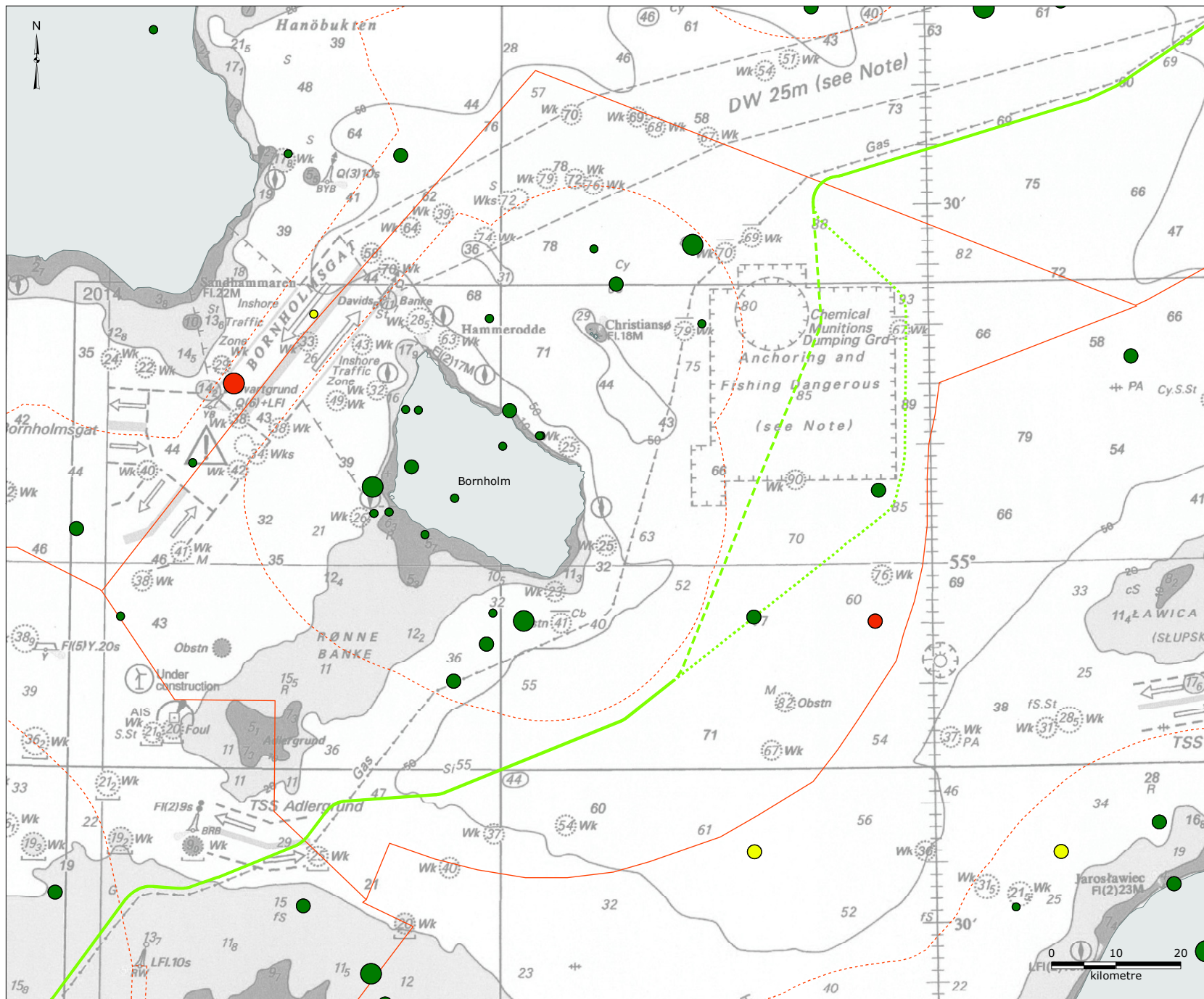
Reference:  
- GEUS, 2014, "Danmarks digitale  
havbunds-sedimentkort 1:250.000", Denmark,  
Date accessed: 2019-03-05

Version: 06  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK/CASO

**GE-02-D**

#### Seabed sediments

**RAMBOLL**



#### Legend:

- NSP2 route
- NSP2 route V1
- NSP2 route V2
- - - Territorial water border
- EEZ border

Magnitude of earthquakes (Richter scale):

- 0 - 1
- > 1 - 2
- > 2 - 3

Depth of earthquakes (km):

- 0 - 35
- > 35 - 70
- > 70 - 150

Note:  
- Seismic activity (epicenter of earthquake) measured in 2000-2018

Reference:  
- GEUS, 2019, "Registrerede jordskælv",  
<https://www.geus.dk/natur-og-klima/jordskaelv-og-seismologi/registerede-jordskaelv-i-danmark/>,  
Date accessed: 2019-03-05

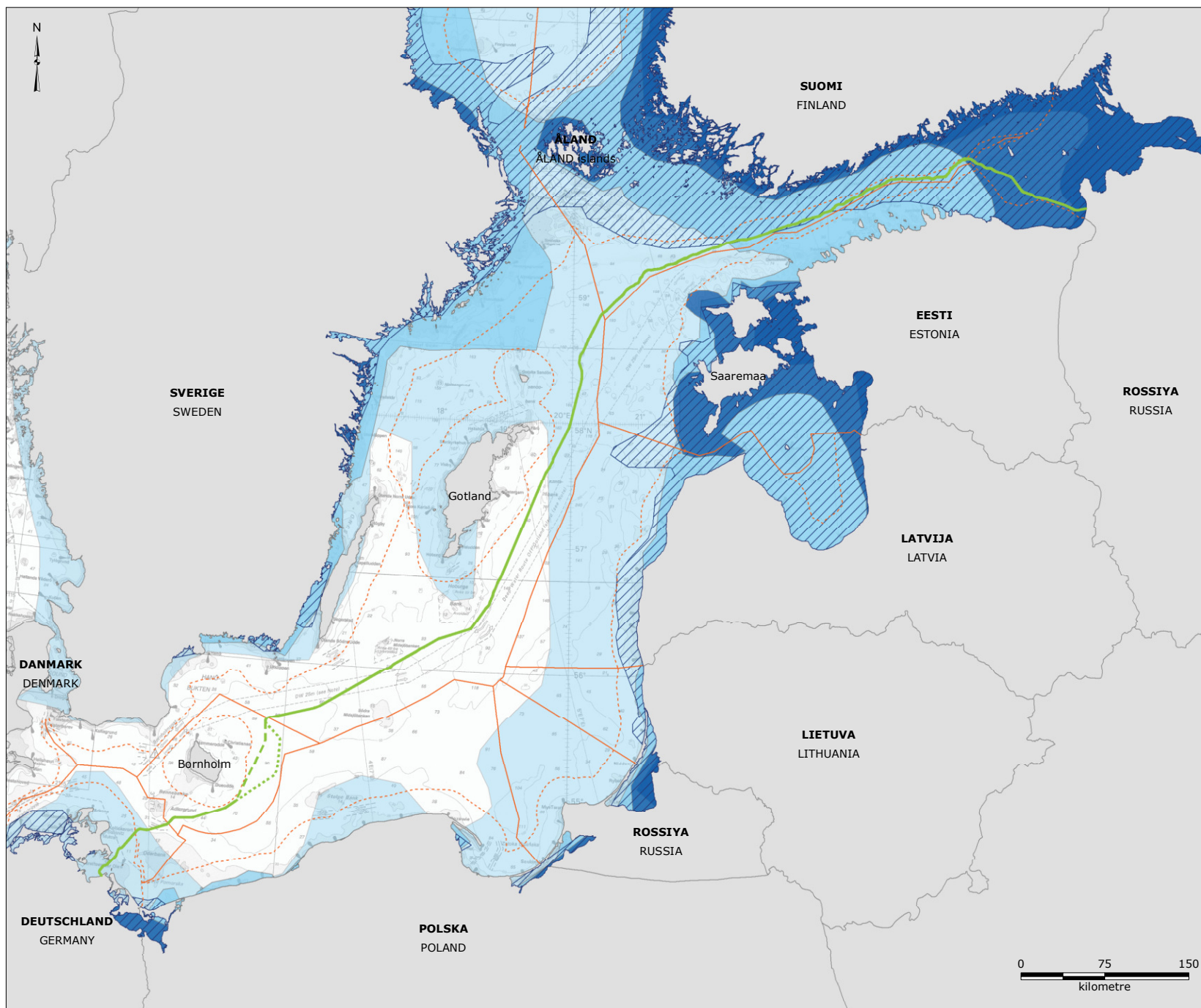
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**GE-03-D**

#### Seismic activity

**RAMBOLL**





#### Legend:

- NSP2 route
- - - NSP2 route V1
- . . . NSP2 route V2
- - - Territorial water border
- EEZ border
- Ice cover in 2017-2018 (average winter)
- Ice cover in 2016-2017 (mild winter)
- Ice cover in 2014-2015 (mild winter)
- Ice cover in 2012-2013 (average winter)
- Ice cover in 2010-2011 (severe winter)

Reference:  
- Finnish Meteorological Institute (FMI),  
<http://ilmatieteenlaitos.fi/jaatalvet>,  
Date accessed: 2019-03-08

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Date: 2019-04-10  
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**CL-01**

#### Ice cover

**RAMBOLL**

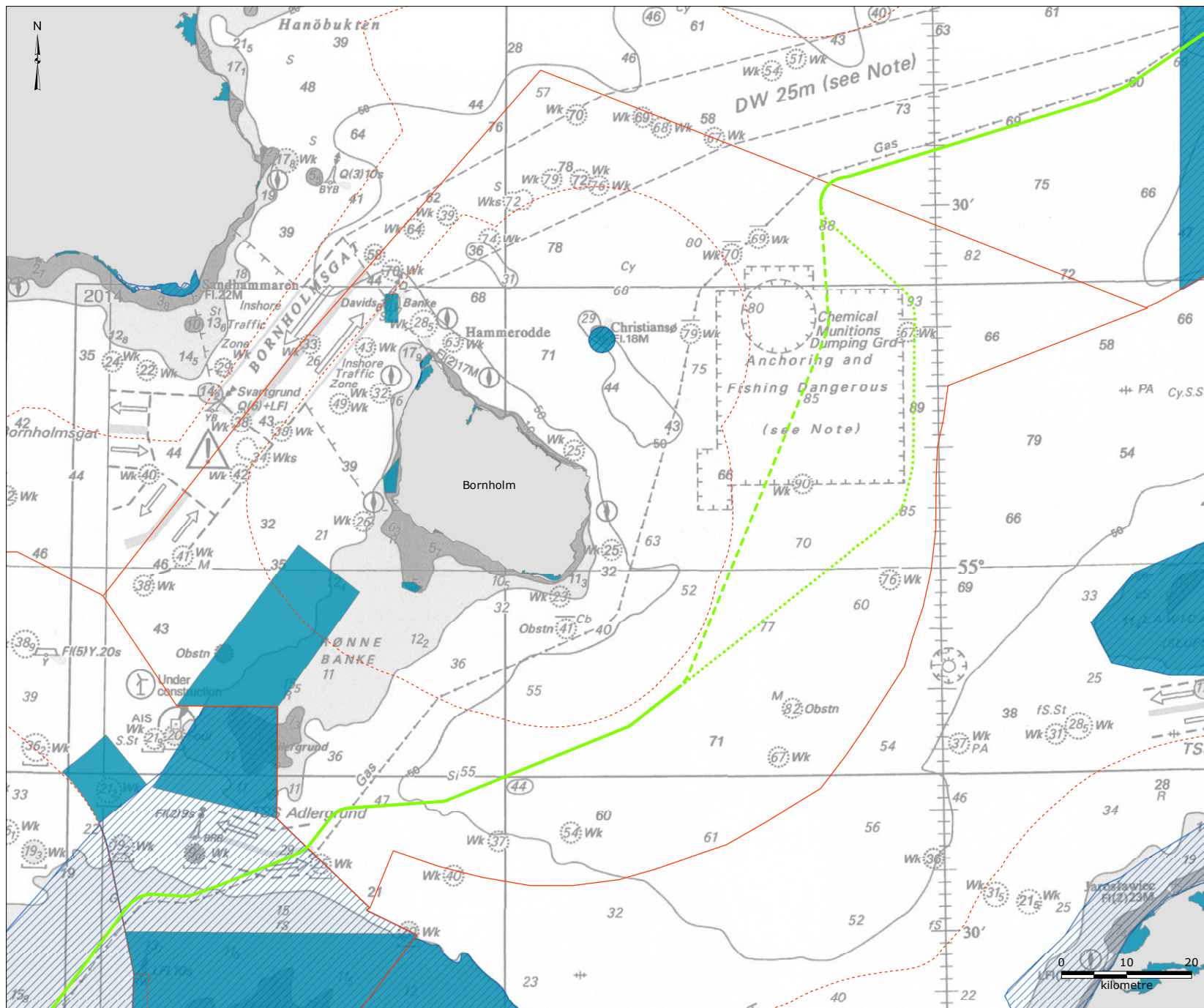
## BIOLOGICAL ENVIRONMENT

PROTECTED AREAS

FISH

MARINE MAMMALS

BIRDS



#### Legend:

- NSP2 route
- NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- EEZ border

#### Natura 2000 sites:

- Special Protection Area (SPA)
- Special Area of Conservation/ Special Conservation Interests (SAC/SCI)

#### References:

- European Environment Agency, 2017, "Natura 2000 data - the European network of protected sites", <https://www.eea.europa.eu/data-and-maps/data/natura-9>, Date accessed: 2019-03-05
- The Danish Environmental Protection Agency, 2018, "Applicable Natura 2000 sites as of 2018-11-01", <http://miljoegis.mim.dk/spatialmap?profile=natura2000-afgransning-nov2018gaeldende>, Date accessed: 2019-03-05

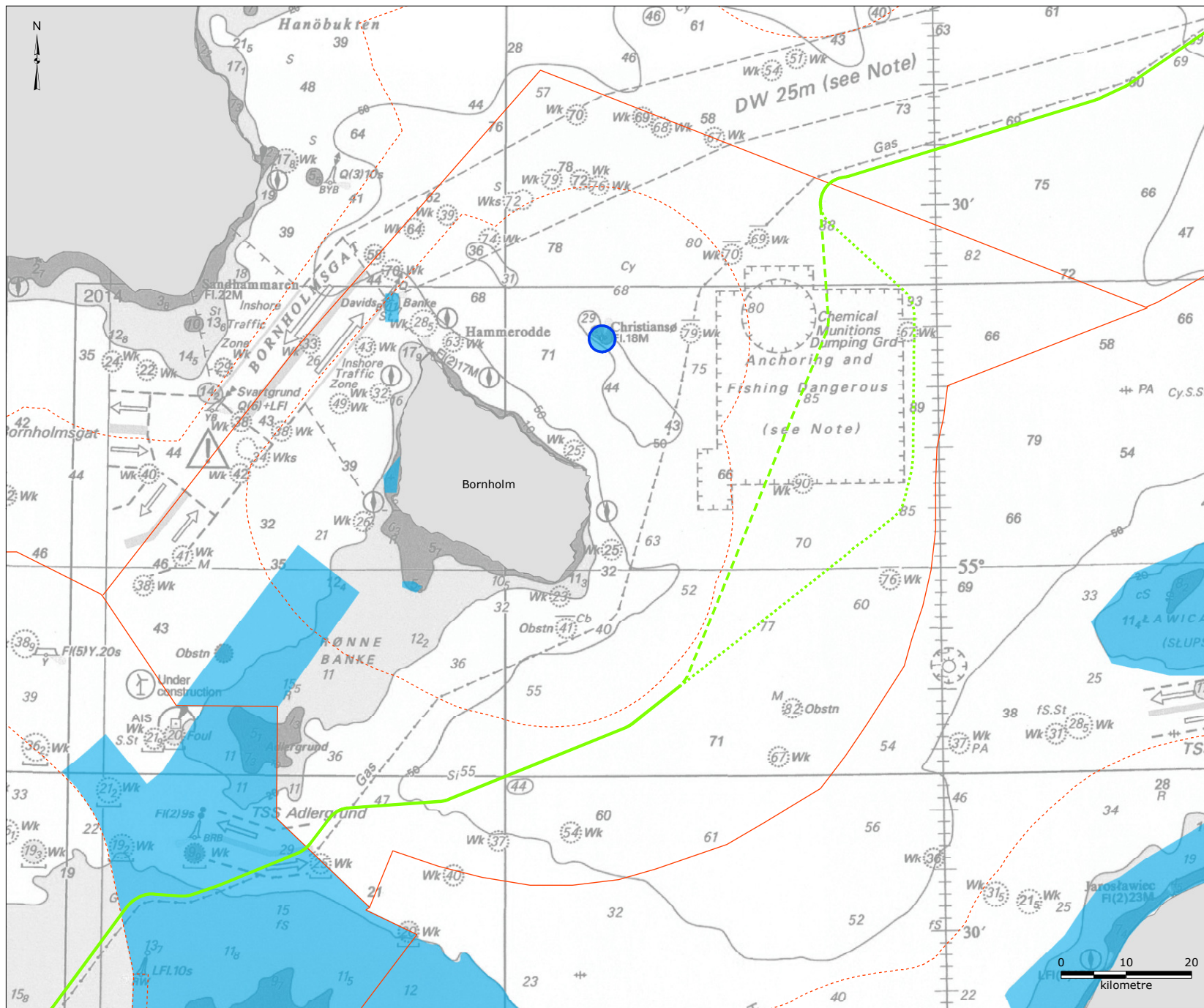
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**PA-01-D**

#### Natura 2000 sites

**RAMBOLL**





#### Legend:

- NSP2 route
- - - NSP2 route V1
- · · NSP2 route V2
- - - Territorial water border
- EEZ border
- Ramsar site
- HELCOM MPA

References:  
 - HELCOM, 2017, "Ramsar sites",  
<http://maps.helcom.fi/website/mapservice/index.html>,  
 Data accessed: 2019-03-05  
 - HELCOM, 2019, "HELCOM MPAs",  
<http://maps.helcom.fi/website/mapservice/index.html>,  
 Date accessed: 2019-03-05

Version: 05  
 Date: 2019-04-10  
 Prepared: MRIH  
 Controlled: MJK/CASO

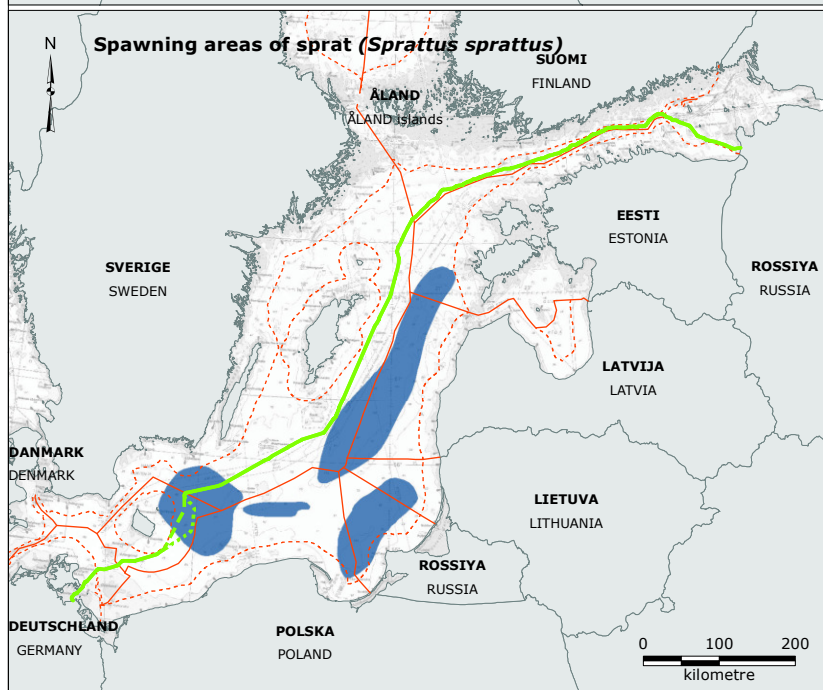
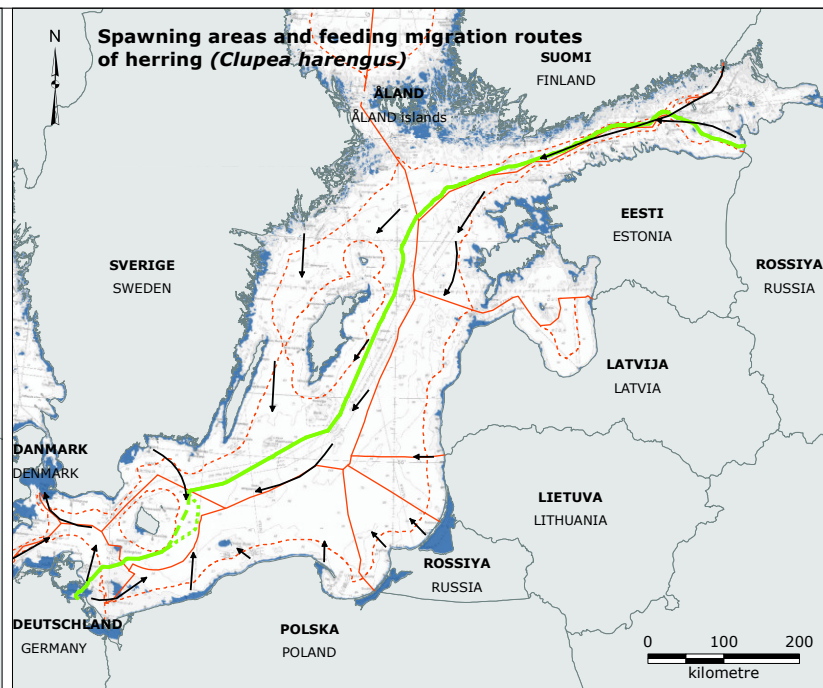
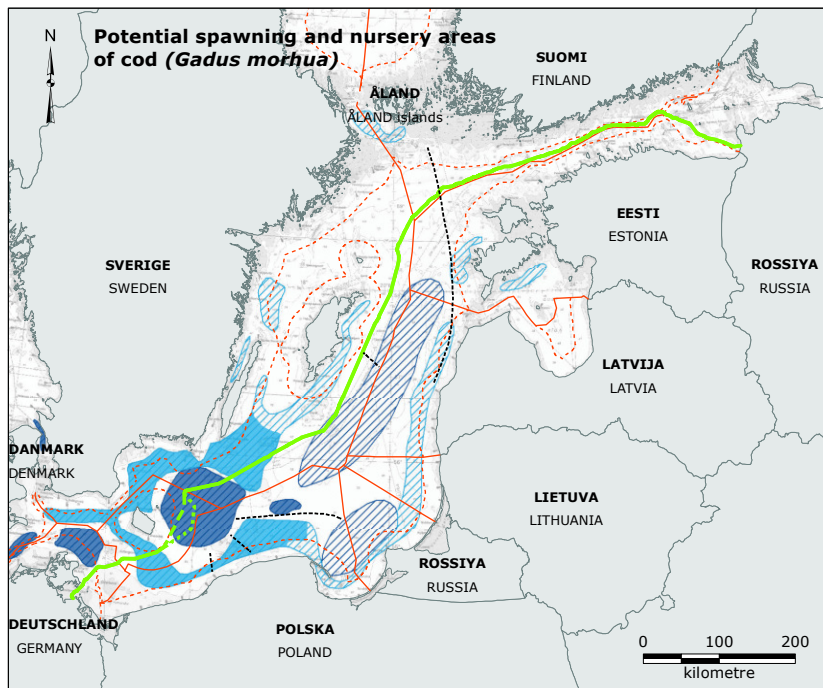
**PA-02-D**

#### Ramsar sites and Marine Protected Areas (MPAs)

0 10 20  
 kilometre

**RAMBOLL**





**Legend:**

- NSP2 route
- NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- - - EEZ border
- Nursery area
- Spawning area
- ▨ Previous nursery area
- ▨ Previous spawning area
- Spawning migration
- Migration routes to feeding areas

Note:

- Spawning migration: Movement of individual fish from non-spawning to spawning site
- Where areas are referred to as 'previous', this refers to up to the year 2000 /ICES 2012/

References:

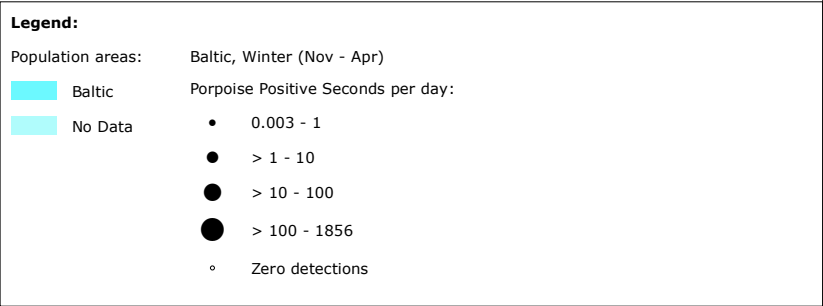
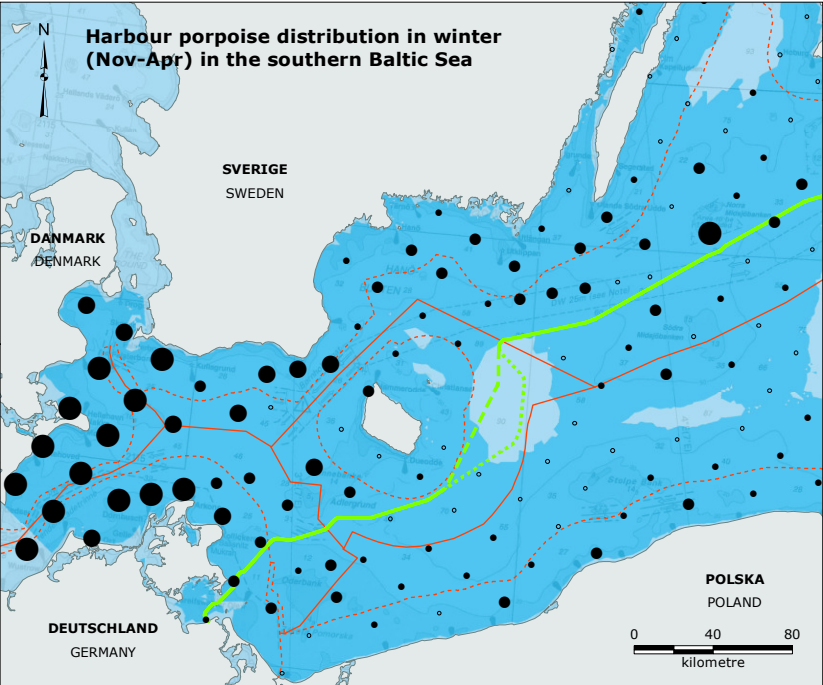
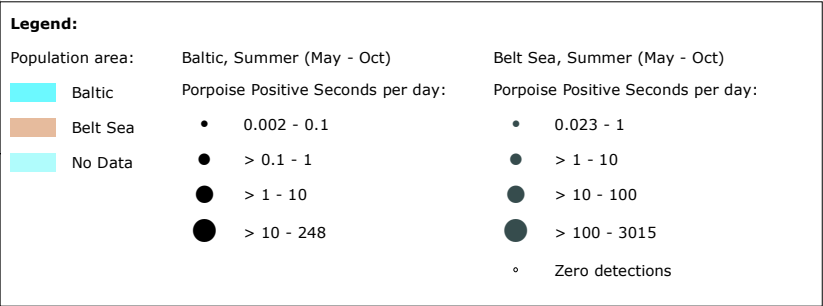
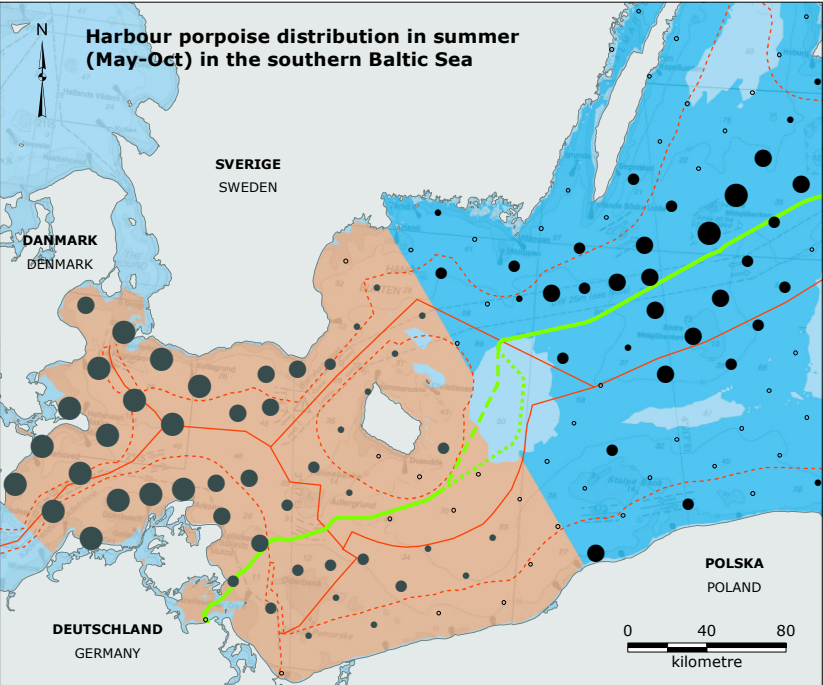
- Bagge, O., Thurov, F., Steffensen, E., Bay, J. 1994. "The Baltic Cod", Dana, 10, pp. 1-28
- Cardinale, M., Svedång, H., 2011. "The beauty of simplicity in science: Baltic cod stock improves rapidly in "cod hostile" ecosystem state". Marine Ecology Progress Series, 425, pp. 297-301
- ICES, 2012, "Report of the ICES Advisory Committee". ICES advice 2012, Book 8. ICES, Copenhagen.
- ICES, 2006. "ICES advice. Book 9. Widely distributed and Migratory stocks".
- Pliks and Aleksjevs, 1998. "Latvijas baba". Riga
- Aro, E., 2000. "The spatial and temporal distribution patterns of cod (*Gadus morhua callarias*) in the Baltic Sea and their dependence on environmental variability implications for fishery management". Academic dissertation. University of Helsinki and Finnish Game and Fisheries Research Institute. Helsinki, 2000

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Prepared: MRIH  
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**FI-01**

**Spawning areas of cod, herring and sprat**

**RAMBOLL**



**Legend:**

- NSP2 route
- NSP2 route V1
- NSP2 route V2
- Territorial water border
- EEZ border

**Notes:**

- Harbour porpoise (*Phocoena phocoena*) distribution in winter (Nov-Apr) and summer (May-Oct)
- It is only possible to separate the Baltic Sea and Belt Sea harbour porpoise populations in summer
- Porpoise Positive Seconds is the encounter rate, measured as proportion of click positive seconds per second
- Data collected by CPDs under the Static Acoustic Monitoring of the Baltic Sea Harbour Porpoise project

**References:**

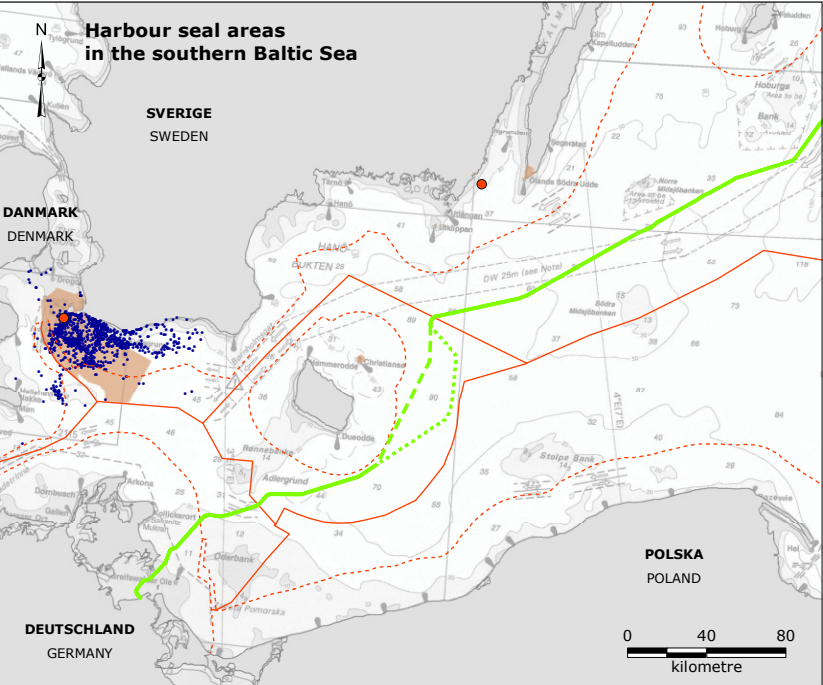
- SAMBAH, 2016, "Static Acoustic Monitoring of the Baltic Sea Harbour Porpoise (SAMBAH). Final report under the LIFE+ project LIFE08 NAT/S/000261", Kolmårdens Djurpark AB, SE-618 92 Kolmården, Sweden. 81pp.
- DCE, 2018, "Marine mammals report, NSP2 alternative route"

Version: 05  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK

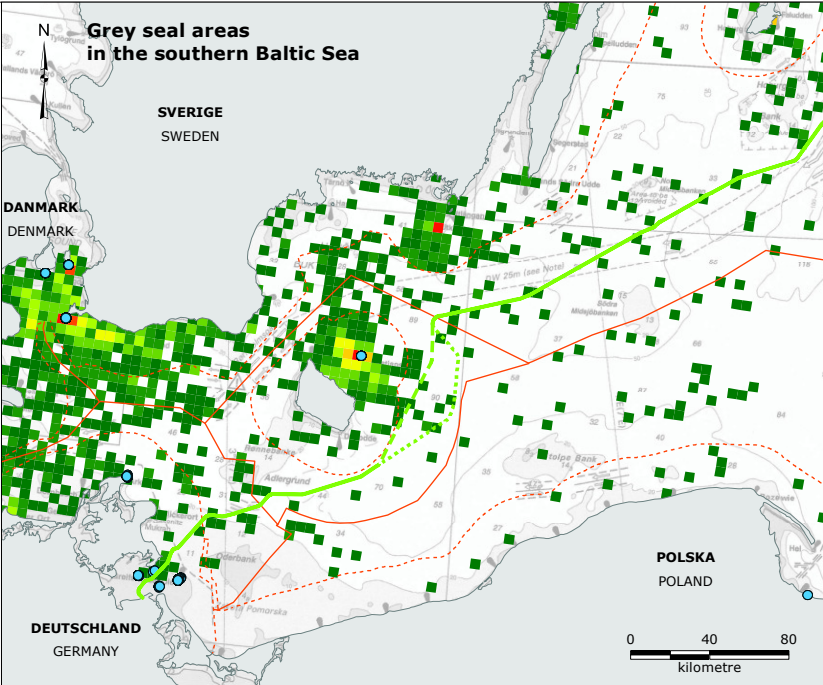
**MA-01**

**Harbour porpoise distribution**





- Legend:**
- Harbour seals (*Phoca vitulina*):
- Satellite tracking location
  - Harbour seal haul out
  - Natura 2000 site designated for harbour seal



- Legend:**
- Grey seals (*Halichoerus grypus grypus*):
- Grey seal colony
- Grey seal distribution:  
(Number of observations)
- |         |           |
|---------|-----------|
| 1 - 2   | 18 - 25   |
| 3 - 6   | 26 - 45   |
| 7 - 11  | 46 - 77   |
| 12 - 17 | 78 - 113  |
|         | 114 - 432 |

- Legend:**
- NSP2 route
  - NSP2 route V1
  - NSP2 route V2
  - - - Territorial water border
  - - - EEZ border

Note:

- Satellite tracking based on number of tagged seals
- Regular occurrence represents maximum tagging distance from colony

References:

- HELCOM, BALSAM, 2015, BALSAM\_GreySeal\_5KGrid", <http://maps.helcom.fi/website/mapservice/index.html>, Date accessed: 2018-07-10
- DCE, 2018, "Marine mammals report, NSP2 alternative route"

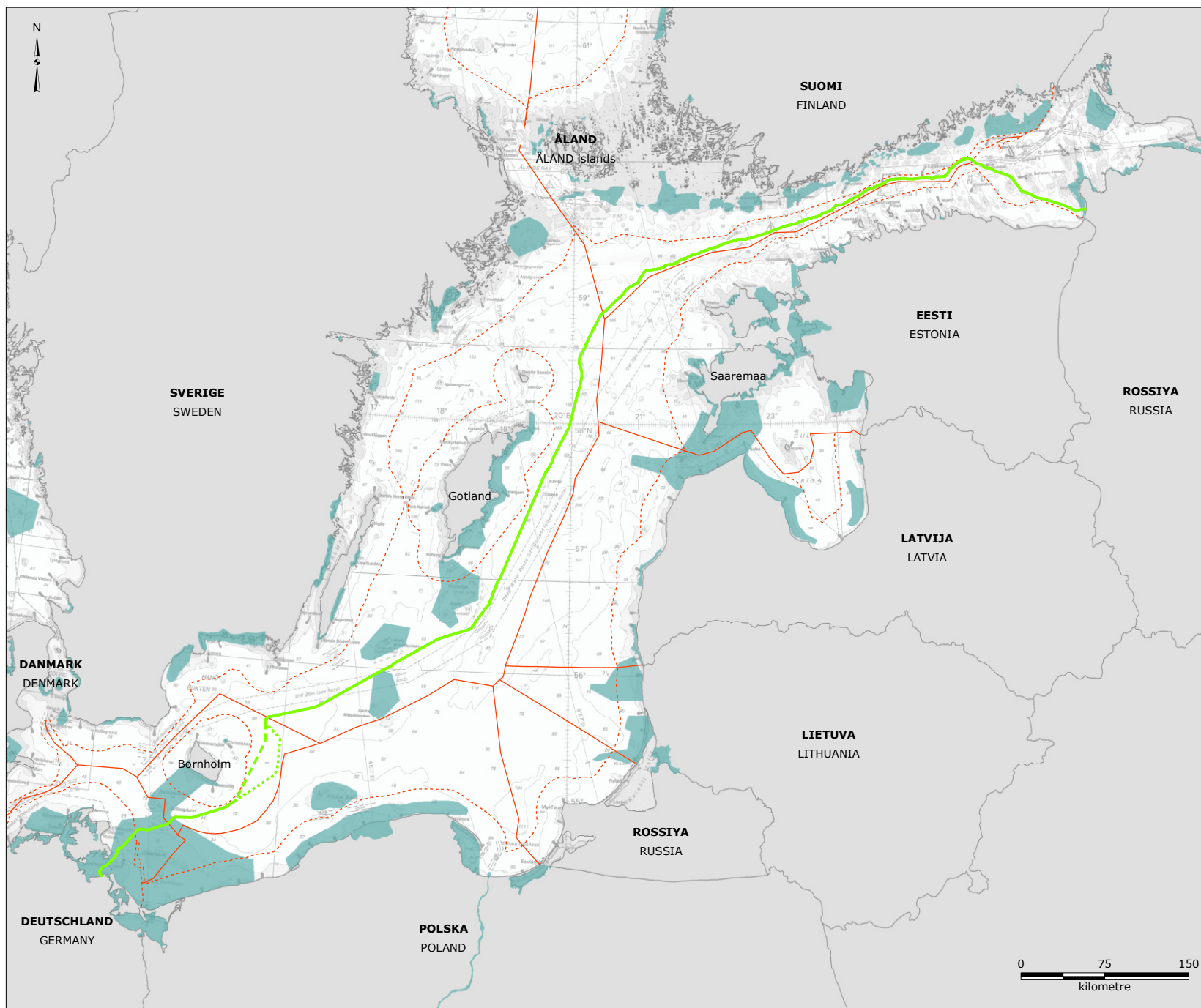
Version: 05  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK

**MA-02**

**Harbour seal and  
grey seal areas**

**RAMBOLL**





#### Legend:

- NSP2 route
- - - NSP2 route V1
- · · NSP2 route V2
- - - Territorial water border
- EEZ border
- Important Bird and Biodiversity Areas (IBA)

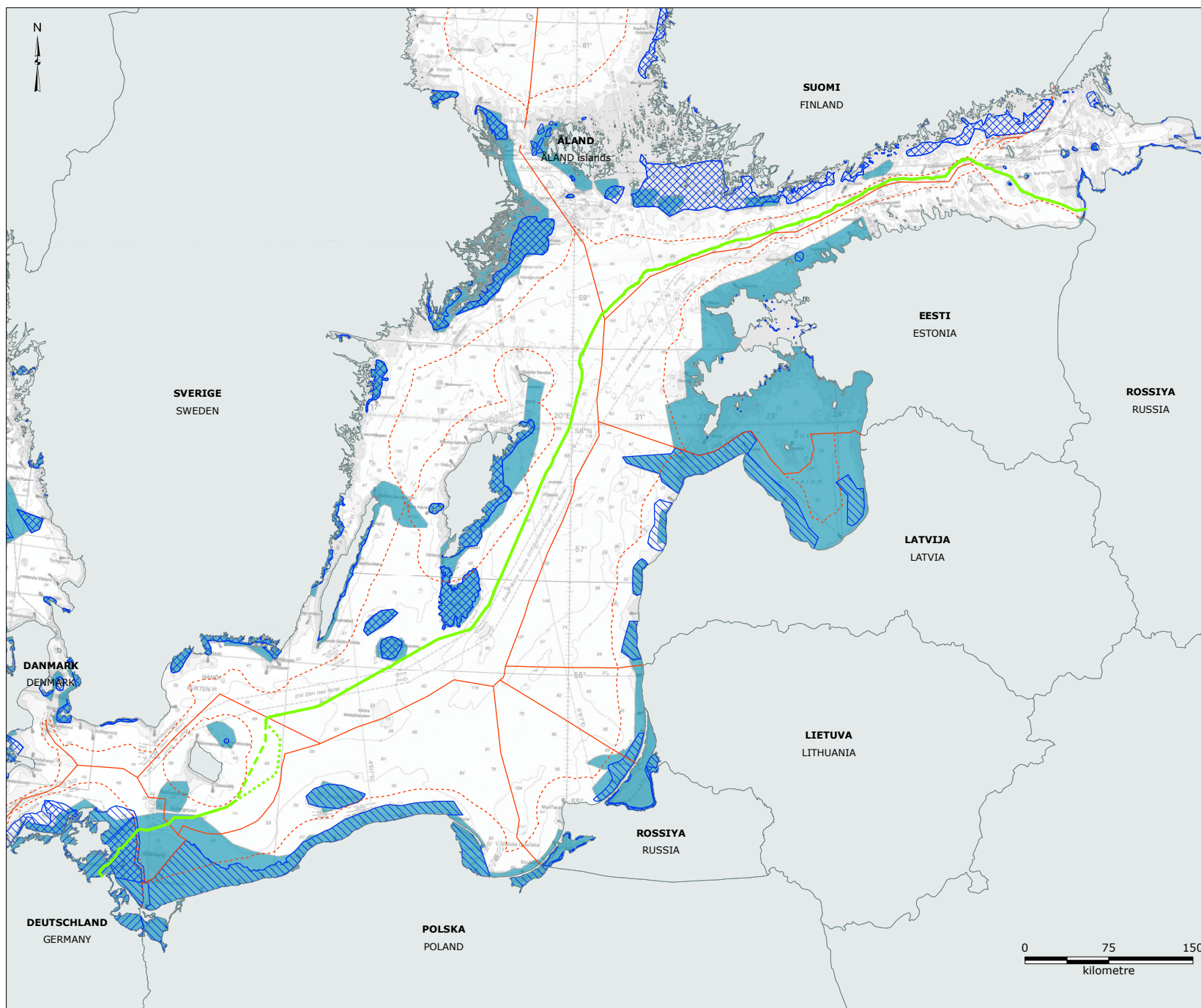
References:  
 - BirdLife International, 2016, "Marine IBA e-atlas",  
<http://maps.birdlife.org/marineIBAs/default.html>,  
 Date accessed: 2016-03-01  
 - BirdLife Finland, 2016, <http://www.birdlife.fi/suojelu/paikat/iba/iba-suomen-tarkeat-lintaluuet.shtml>,  
 Date accessed: 2016-09-15  
 - HELCOM, 2003, "Important Bird Areas - digital map",  
<http://maps.helcom.fi/website/Biodiversity/index.html>,  
 Date accessed: 2015-06-11

Version: 06  
 Date: 2019-04-10  
 Prepared: MRIH  
 Controlled: MJK/CASO

**BI-01**

### Important Bird and Biodiversity Areas (IBAs)

**RAMBOLL**



#### Legend:

- NSP2 route
- - - NSP2 route V1
- · · NSP2 route V2
- - - Territorial water border
- EEZ border
- Waterbirds during migration (spring and autumn)
- Waterbirds during breeding season (spring and summer)
- Wintering areas for sea and shore birds in the Baltic Sea

References:  
 - HELCOM, 2017, "Staging areas migrating sea shore birds (BRISK)", <http://maps.helcom.fi/website/mapservice/index.html>, Date accessed: 2019-03-05  
 - HELCOM, 2017, "Breeding areas birds region (BRISK) ", <http://maps.helcom.fi/website/mapservice/index.html>, Date accessed: 2019-03-05  
 - HELCOM, 2017, "Wintering areas sea and shore birds (BRISK) ", <http://maps.helcom.fi/website/mapservice/index.html>, Date accessed: 2019-03-05

Version: 06  
 Date: 2019-04-10  
 Prepared: MRIH  
 Controlled: MJK/CASO

**BI-02**

#### Bird wintering and staging areas during migration

**RAMBOLL**

## **SOCIO-ECONOMIC ENVIRONMENT**

MILITARY AREAS

INFRASTRUCTURE

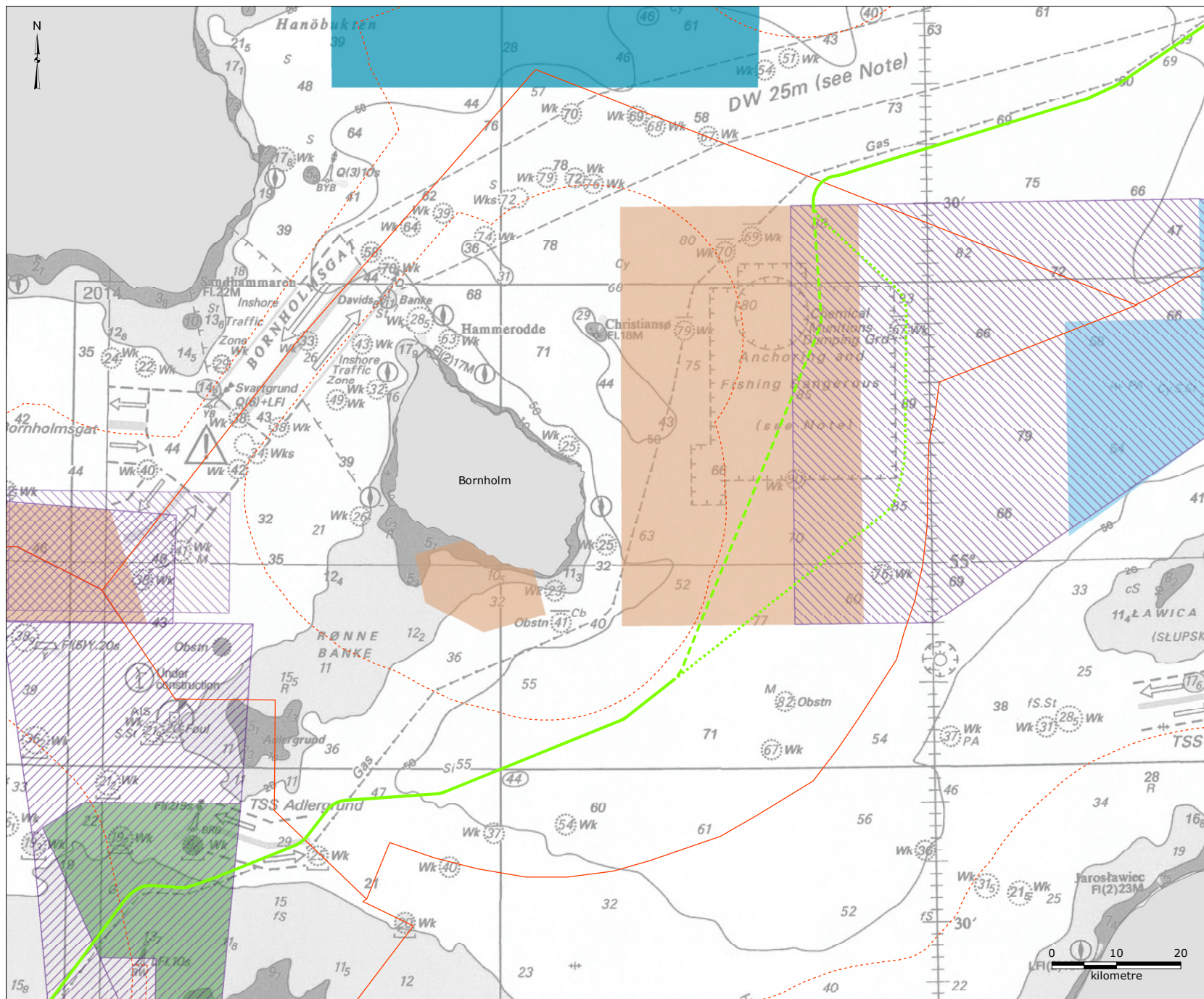
MUNITIONS, CONVENTIONAL/CHEMICAL

FISHERY

SHIP TRAFFIC

TOURISM





#### Legend:

- NSP2 route
- - - NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- EEZ border
- Other military exercise area
- Submarine exercise area
- Safe Bottoming Areas
- Firing danger area
- Other live firing exercise area
- Artillery firing exercise area

References:

- Forsvarsmakten, 2015, "Redovisning av riksintressen och områden av betydelse för totalförsvarets militära del enligt 3 kap 59 Miljöbalken i Kalmar Län", Sweden
- Letter from Federal Office for Infrastructure, Environmental Protection and Services of The German Armed Forces, 23 March 2016
- Ramboll, 2013, "E-mail from Forsvarets Byggnings- & Etablissementstjeneste, Denmark", Received: 2013-06-27
- Ramboll, 2017, "E-mail from IfAO GmbH, Germany", Received: 2017-03-01
- UKHO, 2007, "British Admiralty Nautical Chart 2816: Baltic Sea, Southern Sheet", United Kingdom Hydrographic Office

Version: 05  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MIJ/CASO

**MI-01-D**

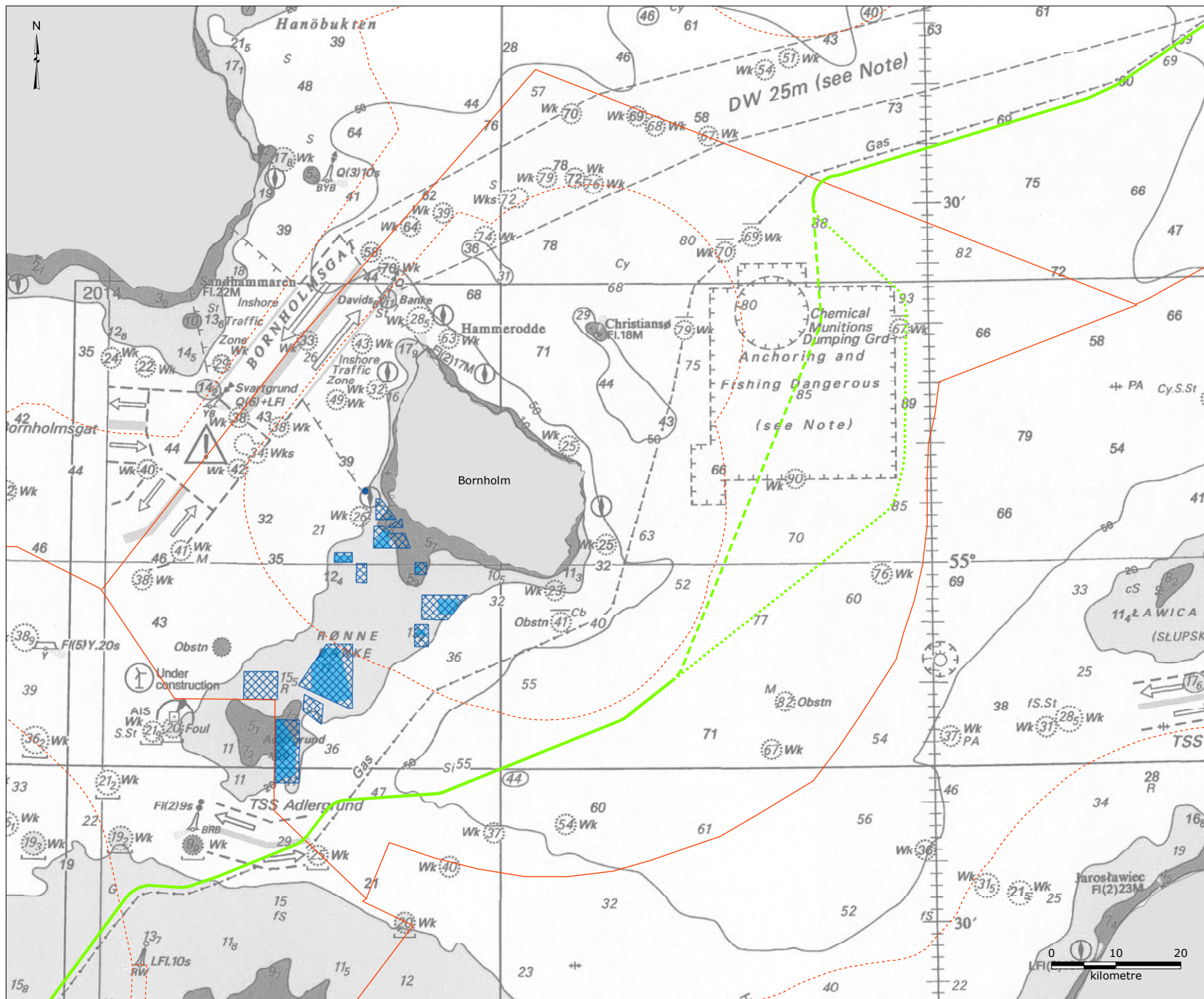
#### Military practice areas

**RAMBOLL**









#### Legend:

- NSP2 route
- - - NSP2 route V1
- . . . NSP2 route V2
- - - Territorial water border
- EEZ border
- Potential area reserved for extraction of raw materials
- Area reserved for extraction of raw materials
- Sediment dumping site

References:

- Naturstyrelsen, 2019, "Restriktive områder-Klapplader", <http://miljoegis.mim.dk/cbkort?profile=miljoegis-raastofferhavet>, Miljøministeriet, Date accessed: 2019-03-05
- Naturstyrelsen, 2019, "Råstofindvinding på havet-Fællesområder", <http://miljoegis.mim.dk/cbkort?profile=miljoegis-raastofferhavet>, Miljøministeriet, Date accessed: 2019-03-05
- Naturstyrelsen, 2019, "Råstofindvinding på havet - Potentielle Fællesområder", <http://miljoegis.mim.dk/cbkort?profile=miljoegis-raastofferhavet>, Miljøministeriet, Date accessed: 2019-03-05

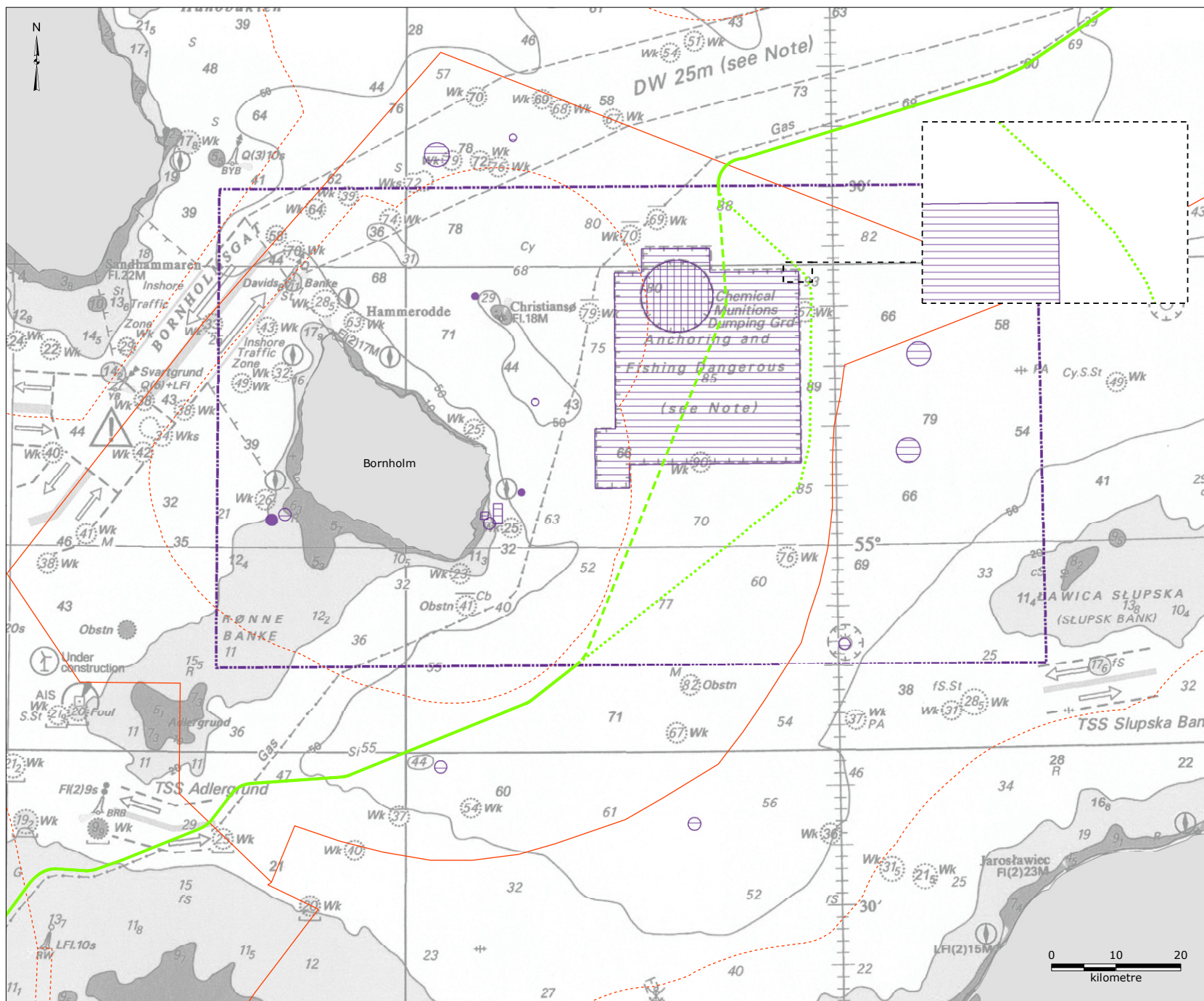
Version: 05  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: CASO

**IN-02-D**

#### Resource extraction areas

**RAMBOLL**





#### Legend:

- NSP2 route
- NSP2 route V1
- ... NSP2 route V2
- Territorial water border
- EEZ border
- Emergency dumping area
- Chemical munitions dumping site
- Bottom trawling, anchoring and seabed intervention works discouraged
- Risk area in which fishing vessels are required to have first aid gas equipment on board

References:

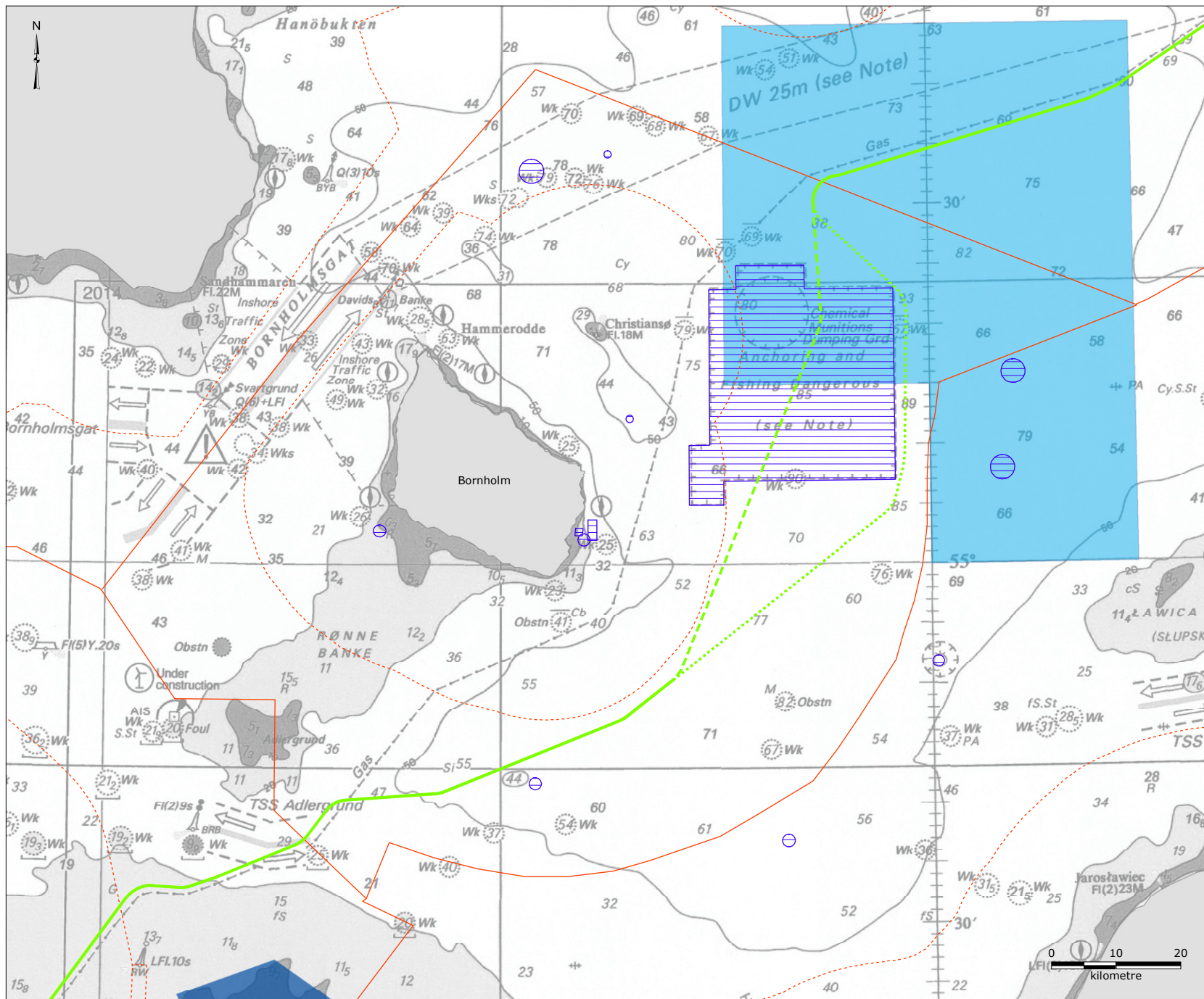
- Fiskeriministeriet, 2012, "Fiskeriårbogen 2012 (årgang 119)", Iver C. Weibach & co.
- Kort og Matrikelstyrelsen, 2010, "Ny udgave af kort 188 - Østersøen omkring Bornholm, 5th edition
- Ministry of Business and Growth, 2005, "Bekendtgørelse om forbud mod sejls, ankring og fiskeri mv. i visse områder i danske farvande", BEK nr. 135 af 04/03/2005

Version: 05  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK

**MU-01-D**

#### Areas with chemical munitions

**RAMBOLL**



#### Legend:

- NSP2 route
- - - NSP2 route V1
- · · NSP2 route V2
- - - Territorial water border
- EEZ border
- Bottom trawling, anchoring and seabed intervention works discouraged
- Area closed to cod (*Gadus morhua*) fishery from May 1 to October 31
- Area permanently closed to fisheries with active gear year around

Note:  
- Closed for fishery in order to enable undisturbed spawning conditions for the eastern cod population /ICES 2014/

References:  
- Council Regulation (EC) No 1098/2007 of 18 September 2007 establishing a multiannual plan for the cod stocks in the Baltic Sea and the fisheries exploiting those stocks, amending Regulation (EEC) No 2847/93 and repealing Regulation (EC) No 779/97  
- Council Regulation (EC) No 2187/2005 of 21 December 2005 for the conservation of fishery resources through technical measures in the Baltic Sea, the Belts and the Sound, amending Regulation (EC) No 1434/98 and repealing Regulation (EC) No 88/98  
- Fiskeriministeriet, 2007, "Fiskeriårbogen 2007 (årgang 114)", Iver C. Wellbach & co, pp. 944  
- HELCOM, 2017, "Baltic Sea fisheries closure" <http://maps.helcom.fi/website/mapservice/index.html>, Data accessed: 2019-03-03  
- HELCOM, 2017, "Cod fisheries closures" <http://maps.helcom.fi/website/mapservice/index.html>, Data accessed: 2019-03-03  
- ICES, 2014, "Report of the Baltic Fishery Assessment Working Group (WGBFAS)", April 2014, ICES HQ, Copenhagen, Denmark. ICES CM 2014/ACOM:10  
- Kort og Matrikelstyrelsen, 2010, "Ny udgave af kort 188 - Østersøen omkring Bornholm, 5th edition  
- Ministry of Business and Growth, 2005, "Bekendtgørelse om forbud mod sejlad, ankring og fiskeri mv. i visse områder i danske farvande", BEK nr. 135 af 04/03/2005

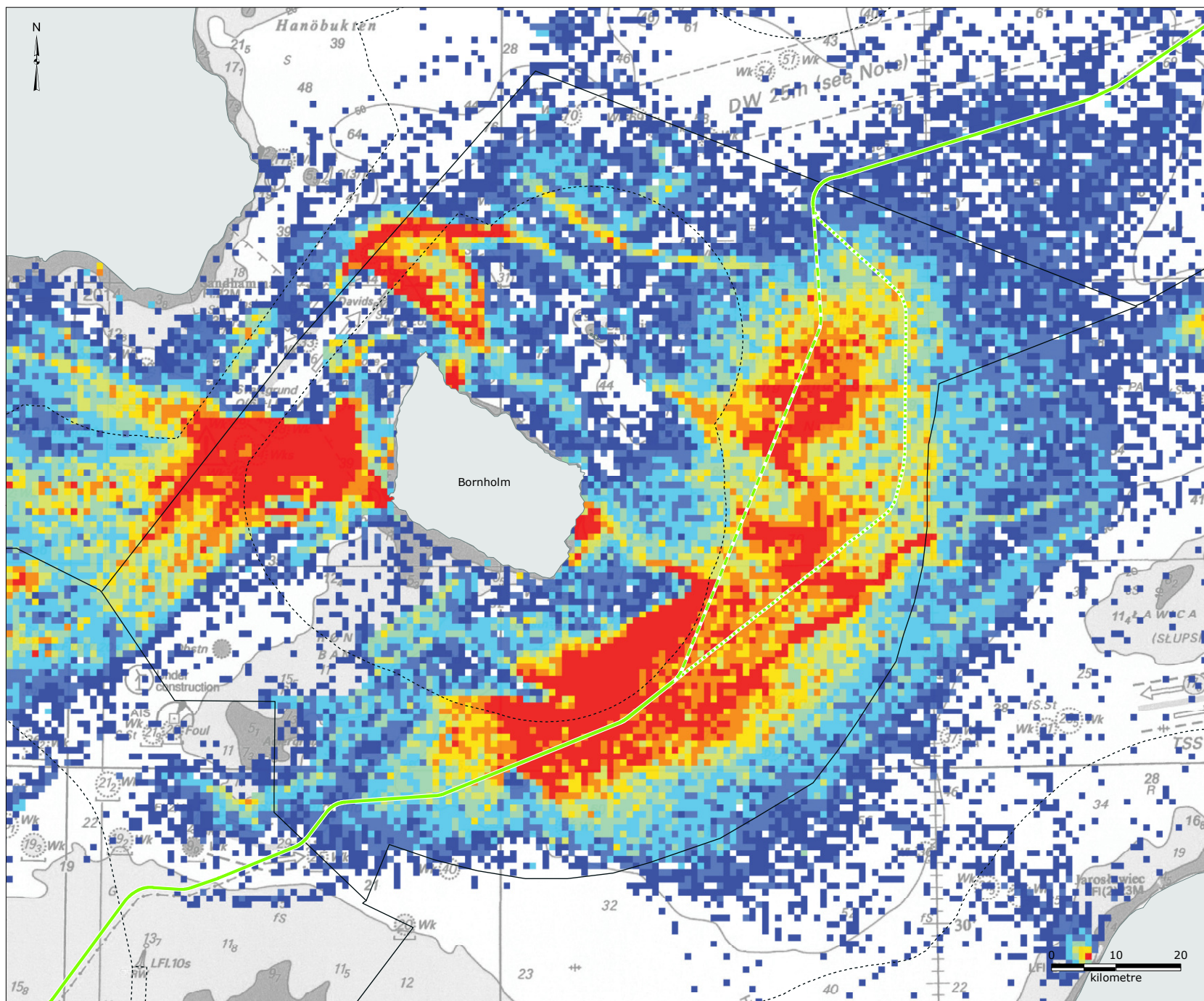
Version: 06  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK/CASO

**FC-01-D**

**Areas where commercial fishery is prohibited**

**RAMBOLL**





#### Legend:

- NSP2 route
- - - NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- EEZ border

Bottom trawling density 2010-2016, based on VMS-data:

- 1 - 2
- 2 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 35
- > 35

Note:  
- Density data were derived from VMS data points of Danish fishing vessels fishing in the Baltic in 2010-2016. Only vessels with speed between 0-5 knots are shown, as it is estimated that bottom trawling is undertaken at this speed interval. Background data obtained from The Danish Agrifish Agency

Reference:  
- Orbicon, 2018, "Nord Stream 2 – Baltic fisheries along the pipeline transect", Note, 2018-03-05

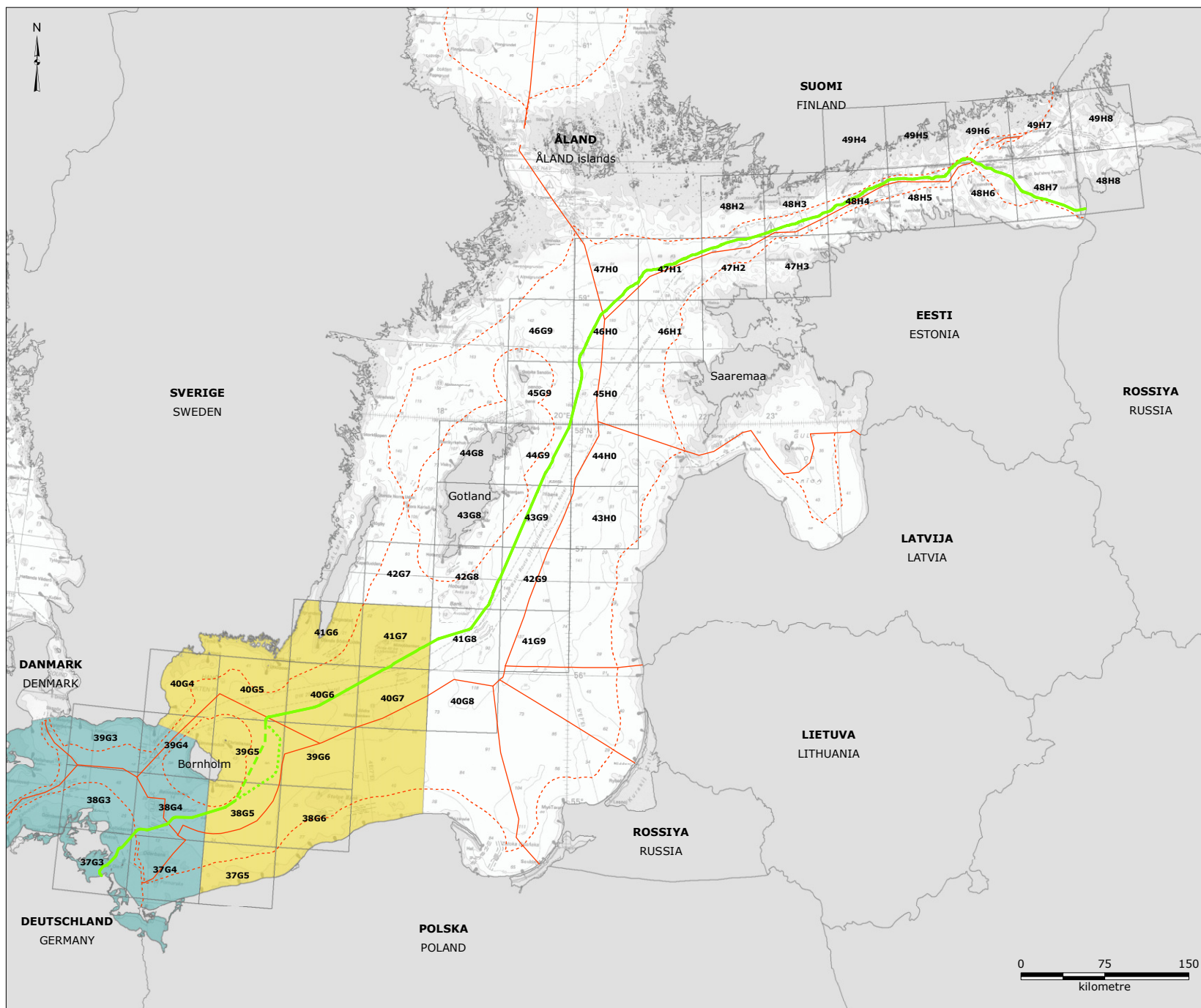
Version: 05  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK/CASO

**FC-02-D**

#### Bottom trawling density

**RAMBOLL**





### Legend:

- NSP2 route
- - - NSP2 route V1
- · · NSP2 route V2
- - - Territorial water border
- EEZ border
- ICES statistical rectangles

ICES subdivisions:

- 24
- 25

Note:  
- ICES subdivisions are only shown for Denmark

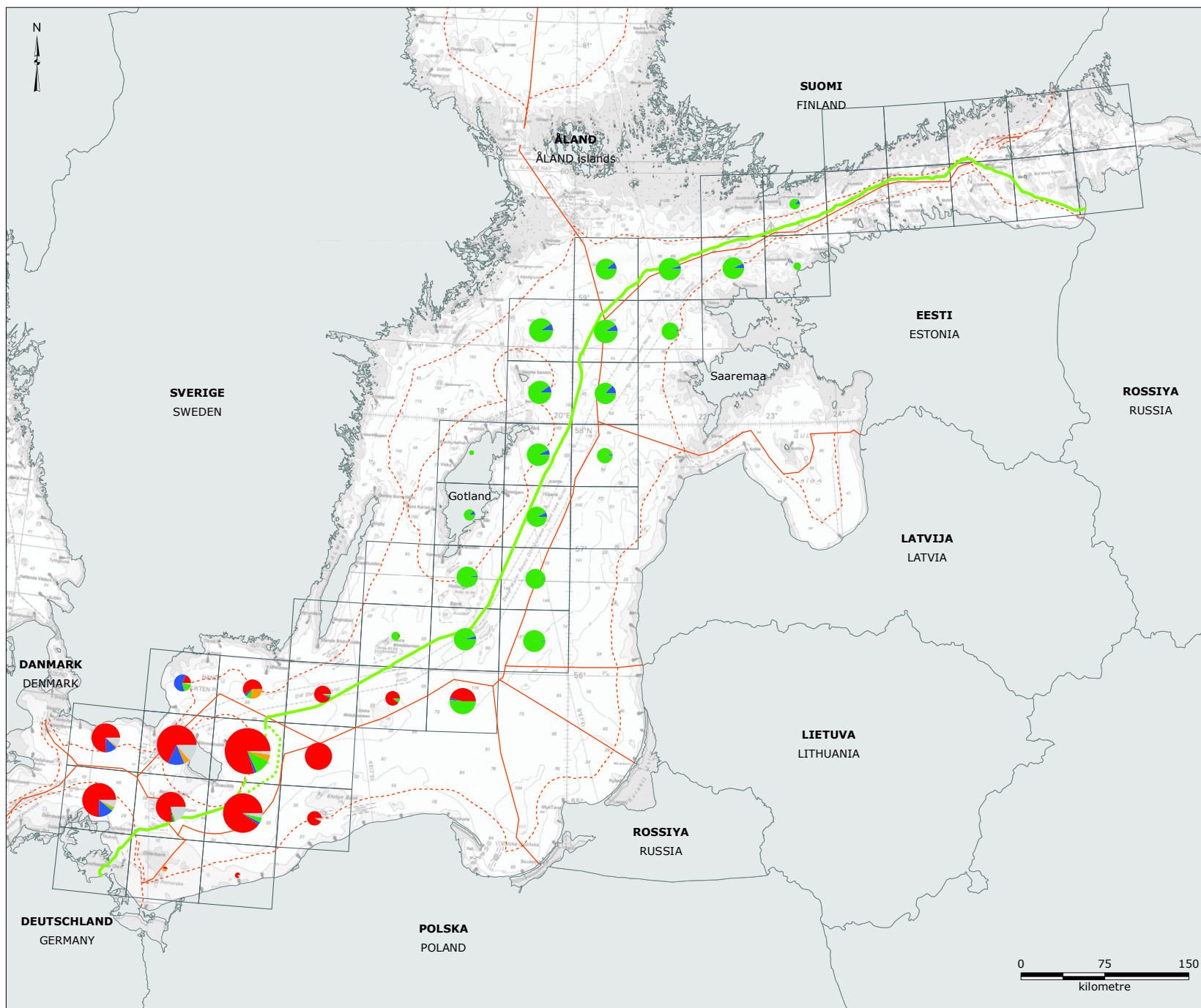
References:  
- ICES, 2018,  
<http://gis.ices.dk/sf/index.html>,  
Date accessed: 2019-03-04  
- Orbicon, 2016, "Nord Stream 2 – Baltic fisheries along the pipeline transect", Note, 2016-06-09

Version: 06  
Date: 2019-04-10  
Prepared: MRIH  
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**FC-03**

### ICES statistical rectangles and subdivisions

**RAMBOLL**



### Legend:

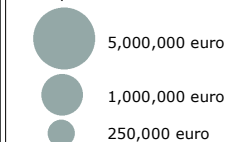
- NSP2 route
- - - NSP2 route V1
- · · NSP2 route V2
- - - Territorial water border
- EEZ border

Fishery mean value (euros):



- Cod
- Herring
- Sprat
- Flounder
- Other

Pie areas scaled according to square root of values:



Note:  
- Based on data for 2010-2016

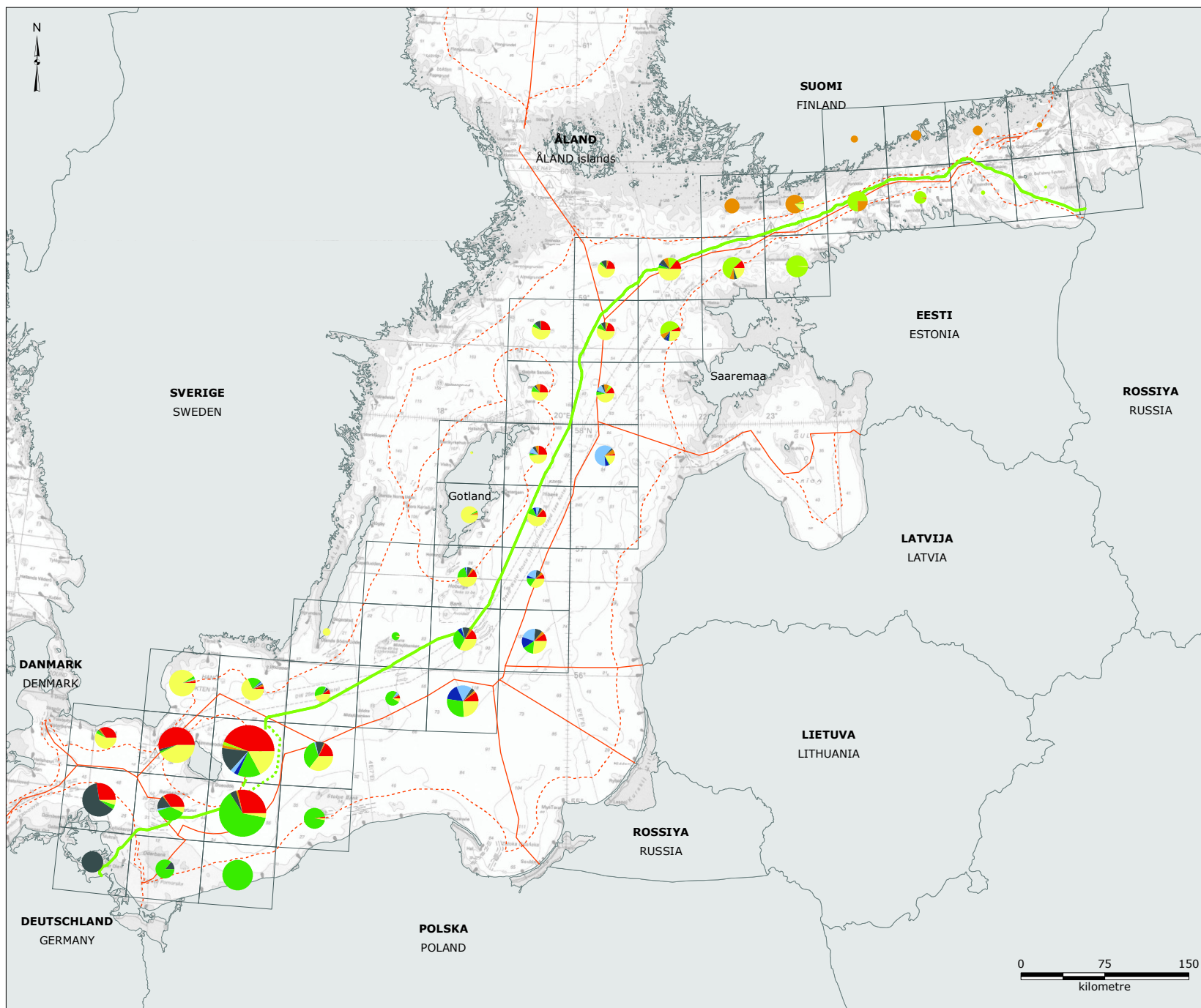
Reference:  
- Orbicon, 2018, "Nord Stream 2 – Baltic fisheries along the pipeline transect", Note, 2018-03-05

Version: 06  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK/CASO

**FC-04**

**Mean value of catches according to species by Danish fishery**

**RAMBOLL**



### Legend:

- NSP2 route
- - - NSP2 route V1
- . . . NSP2 route V2
- - - Territorial water border
- EEZ border

Fishery mean value (euro):



- Denmark
- Estonia
- Finland
- Germany
- Latvia
- Lithuania
- Poland
- Sweden

Pie areas scaled according to real values:



10,000,000 euro



5,000,000 euro



2,000,000 euro

Note:

- Based on data for 2010-2014.
- Data provided from Poland for 2009-2013
- Russia is not included (no data available)

References:

- Orbicon, 2016, "Nord Stream 2 - Baltic fisheries along the pipeline transect", Note, 2016-06-09

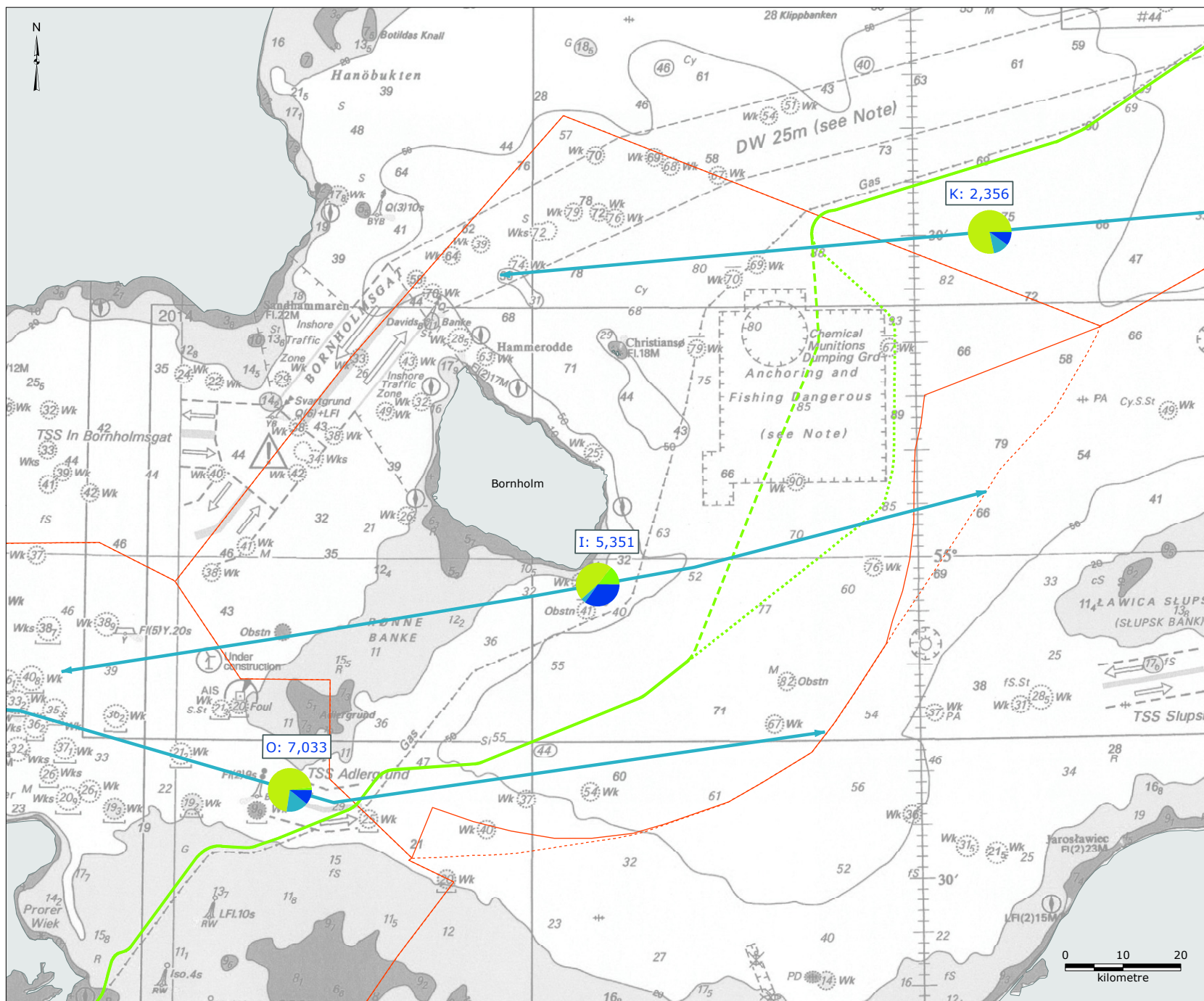
Version: 06  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK/CASO

**FC-05**

### Mean value of catches by country

**RAMBOLL**





#### Legend:

- NSP2 route
- NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- EEZ border
- Primary ship traffic route

#### Ship types:



- Passenger
- Cargo
- Tanker
- Other

Note:

- The labels show number of ship movements on primary ship traffic routes in 2014
- Letters represent the name of the location where data was measured
- Ship statistics at certain points of interest are based on data concerning ships that cross a defined line on a shipping route. The lines are drawn approximately perpendicularly to the shipping route direction.
- The relevant major/minor ship traffic routes have been selected from the Baltic area in connection to the two Nordstream pipelines.

Reference:

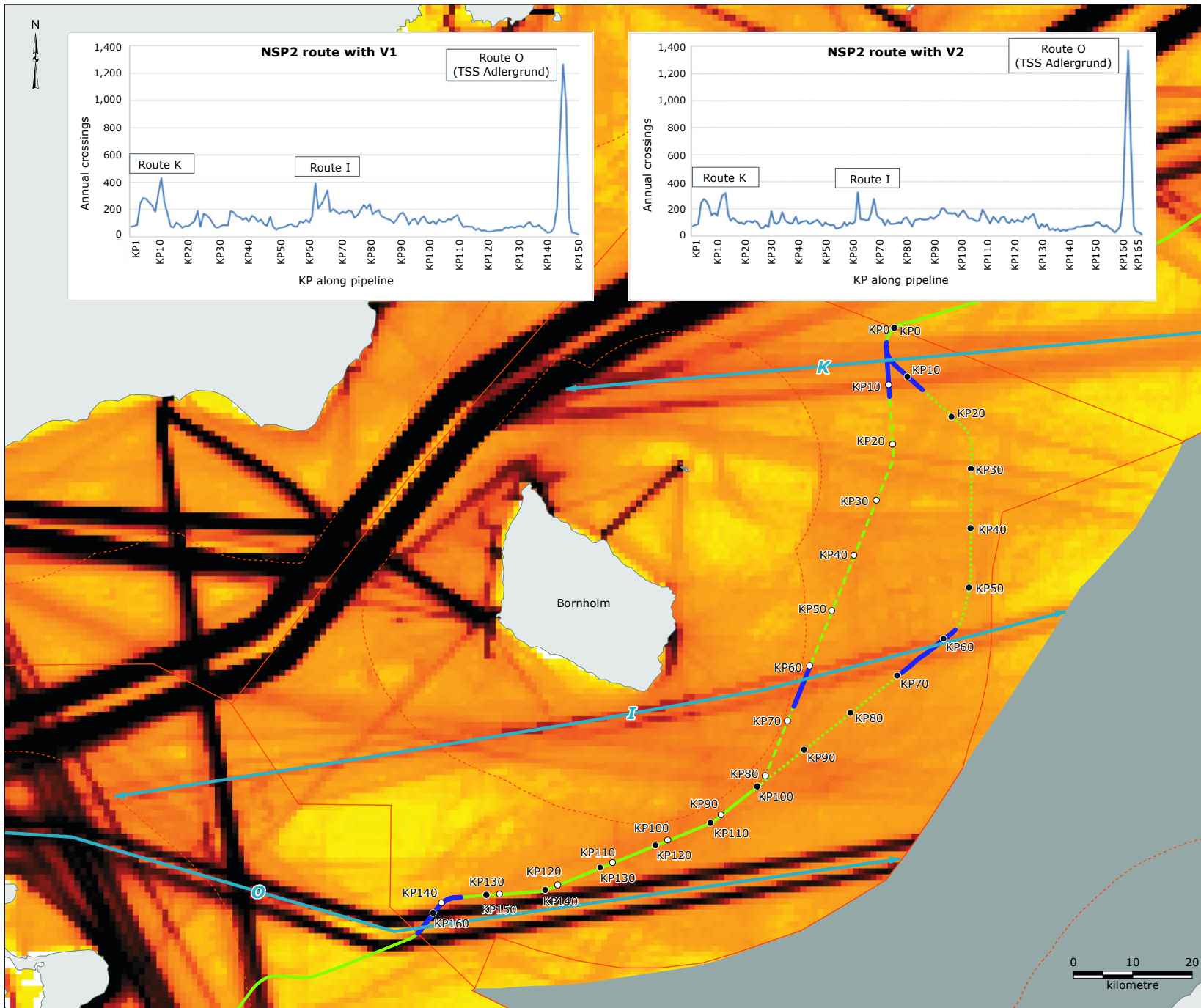
- The Danish Maritime Authority (DMA), 2014, Automatic Identification System (AIS) data 2014

Version: 05  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK/CASO

**SH-01-D**

#### Primary ship traffic routes

**RAMBOLL**



#### Legend:

- NSP2 route
- - - NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- - - EEZ border
- Primary ship traffic route
- Locations where primary ship traffic routes cross NSP2 pipelines in Danish waters

#### Ship density (2014):

- 0 - 1
- > 1 - 100
- > 100 - 500
- > 500 - 600
- > 600 - 1,000
- > 1,000 - 1,500
- > 1,500
- No data available (Poland)
- KP (kilometre point) - NSP2 route V1
- KP (kilometre point) - NSP2 route V2

Note:  
- There is no permission from Poland to show AIS data

References:  
- The Danish Maritime Authority (DMA), 2014, Automatic Identification System (AIS) data 2014.  
- Ramboll, 2016, "Ship traffic background report", W-PE-EIA-POF-REP-805-060100EN, Ramboll, Denmark

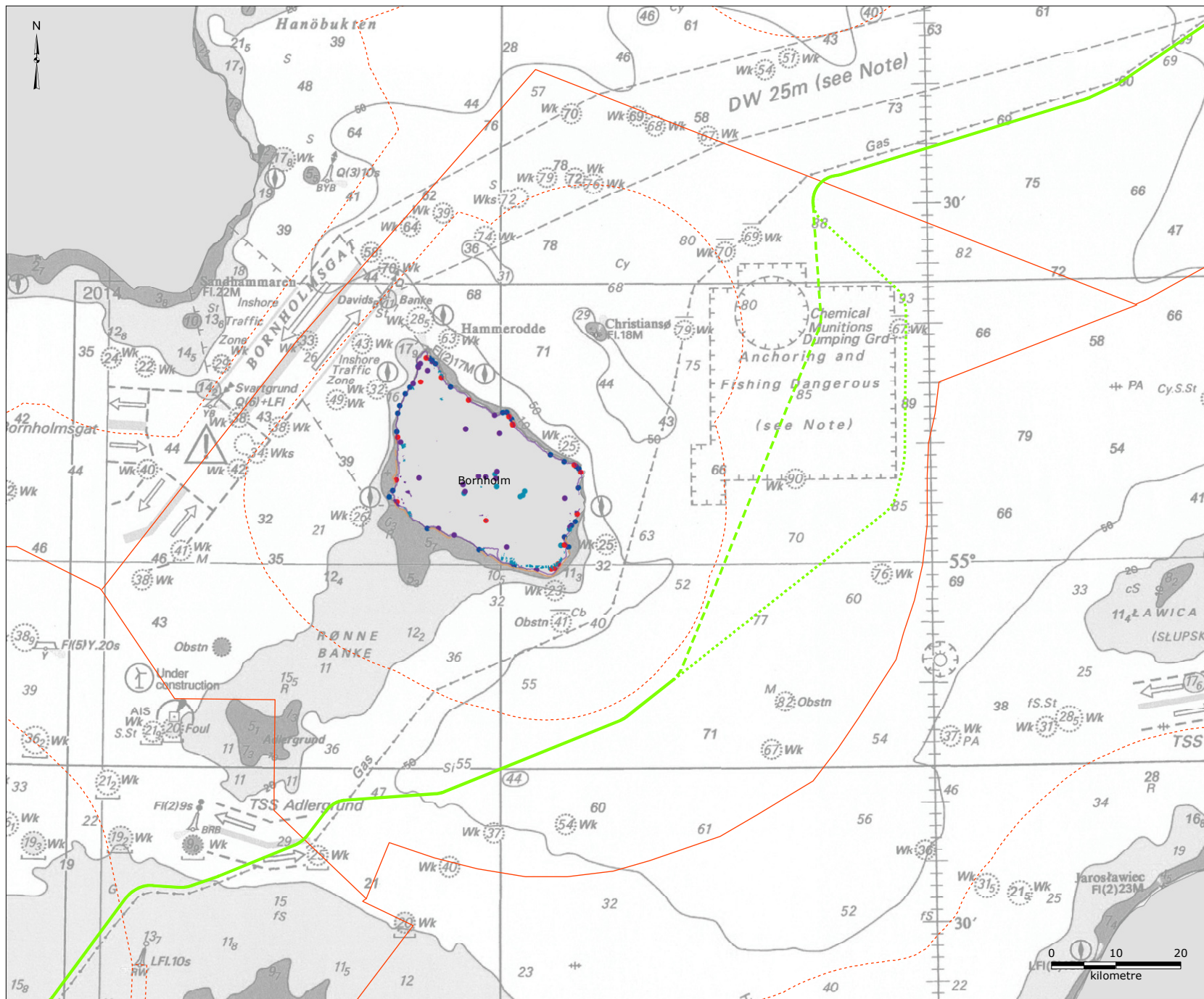
Version: 05  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK/CASO

**SH-02-D**

#### NSP2 crossings of primary ship traffic routes

**RAMBOLL**





#### Legend:

- NSP2 route
- NSP2 route V1
- NSP2 route V2
- Territorial water border
- EEZ border
- Coastal trails
- Particularly good beaches
- Recreation areas
- Summer cottage areas
- Primitive campsites and shelters
- Campsites
- Birdwatching towers
- Harbours

Note:  
Tourist facilities are only shown for Bornholm

References:  
- Ramboll, 2016, "E-mail from Bornholms Kommune, Denmark",  
Received: 2016-04-20

Version: 05  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK/CASO

**TO-01-D**

#### Tourist facilities

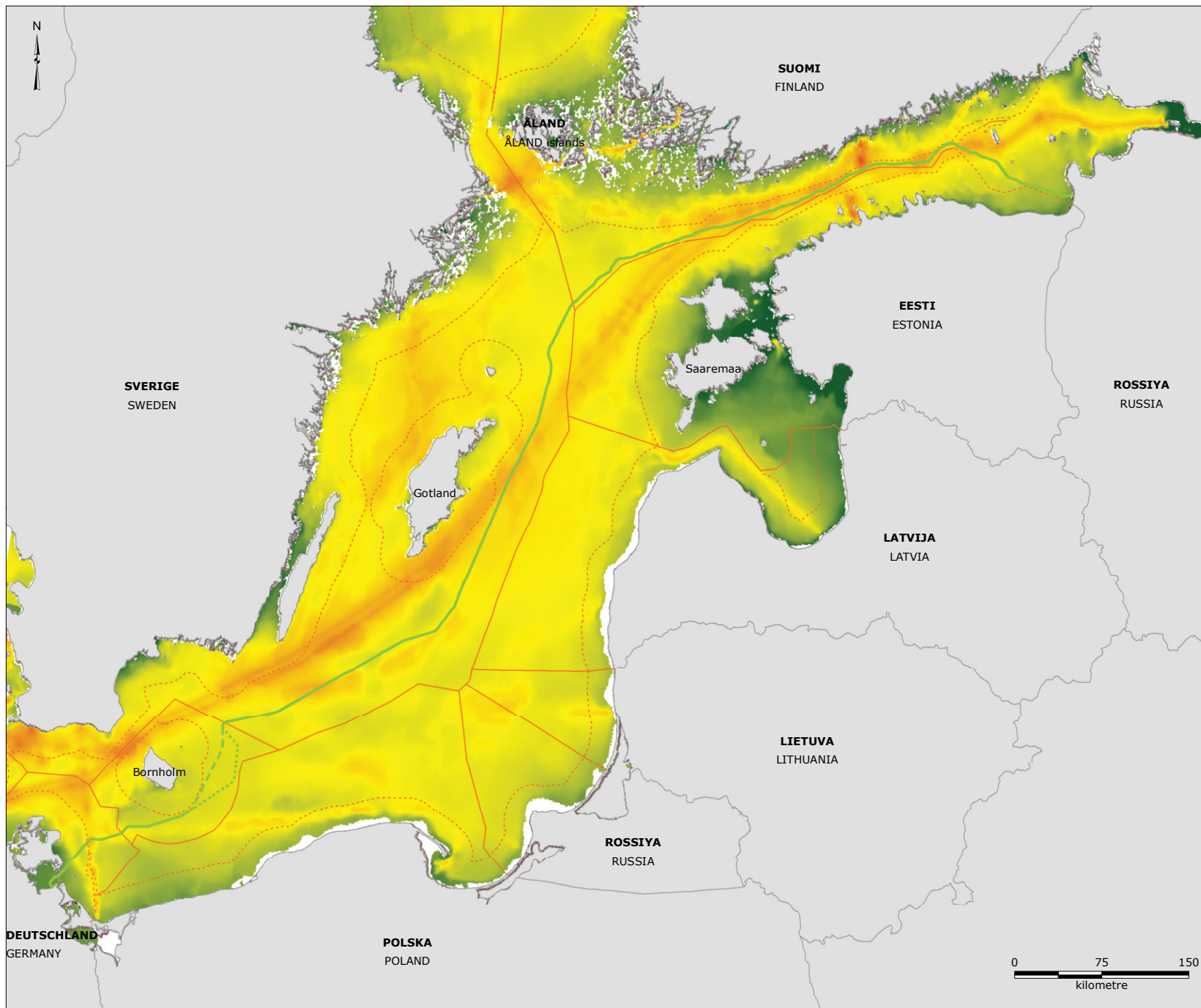
**RAMBOLL**



# MATHEMATICAL MODELLING

NOISE MODELLING

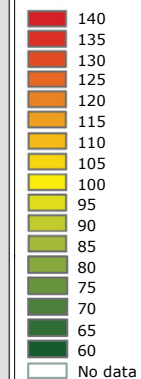
SEDIMENT MODELLING



#### Legend:

- NSP2 route
- - - NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- EEZ border

SPL (dB re 1µPa):



#### Note:

- Time period: 2014 March
- Centre Frequency: 125 Hz third octave band
- Depth interval: 0 - 15 m
- Exceeded Sound level: L10 (10% of time)
- SPL: Sound Pressure Level

- White portions along the coast are probably missing data and therefore should be treated as such.

#### Reference:

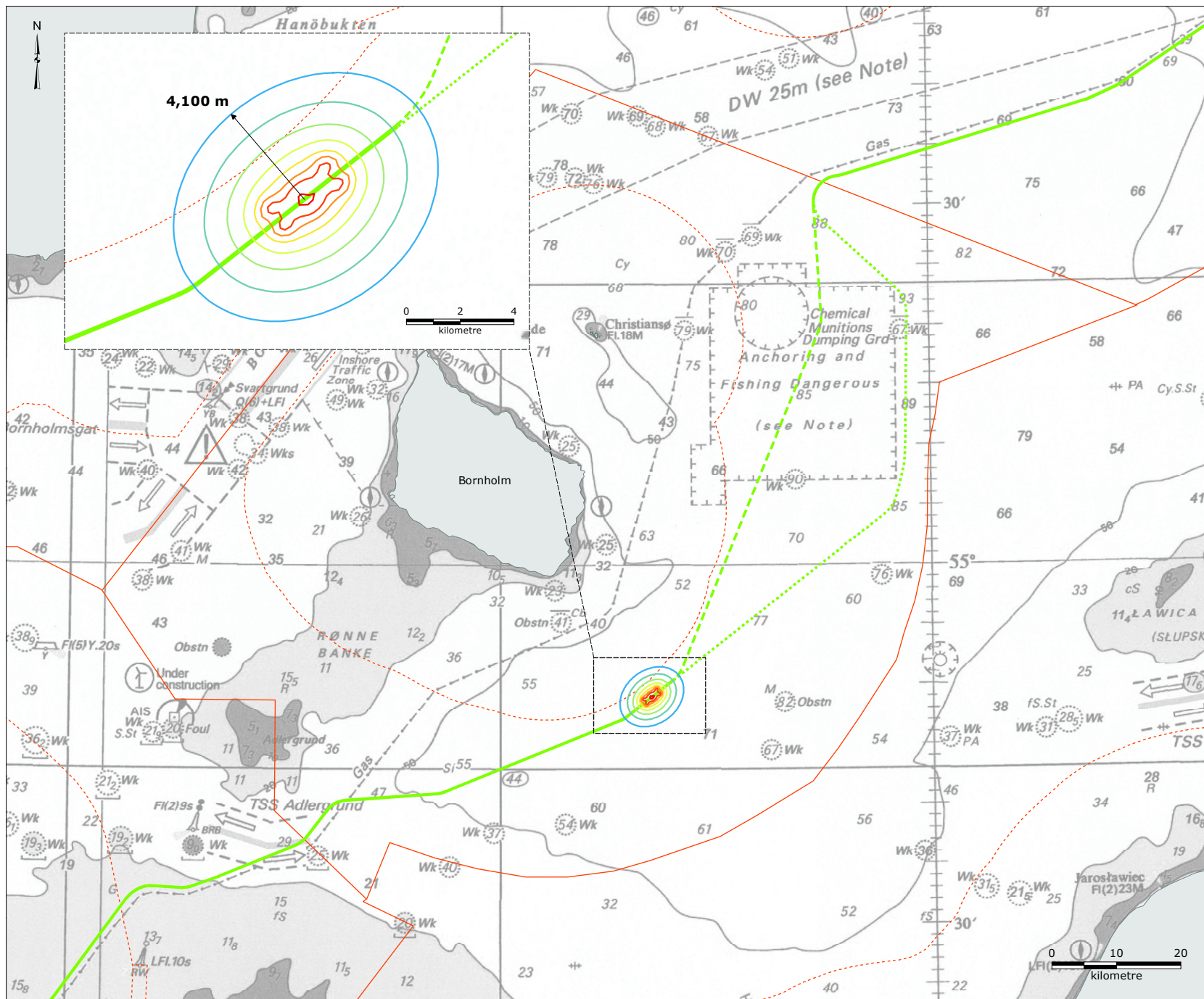
- These results have been extracted with help of the BIAS soundscape planning tool, which was prepared within the EU LIFE project Baltic Sea Information on the Acoustic Soundscape (BIAS LIFE11 ENV/SE 841); [www.bias-project.eu](http://www.bias-project.eu).

Version: 06  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK/CASO

**NM-01**

## Baltic Sea underwater soundscape

**RAMBOLL**



#### Legend:

- NSP2 route
- - - NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- EEZ border

#### Noise distribution (db):

- 33
- 36
- 39
- 42
- 45
- 48
- 51
- 57

Note:  
- Atmospheric noise modelling assuming one anchored pipe-laying vessel, one supply vessel, and four tug vessels

References:  
- Calculations according to Miljøstyrelsen, 1993, "Beregning af støj fra virksomheder. Fælles nordisk beregningsmetode", in Vejledning fra Miljøstyrelsen Nr. 5/1993  
- Nord Stream AG, 2008, Offshore pipeline through the Baltic Sea, Memo no. 4.3Q, Noise, June 2008.  
Doc. No. G-PE-PER-EIA-100-43Q00000-A

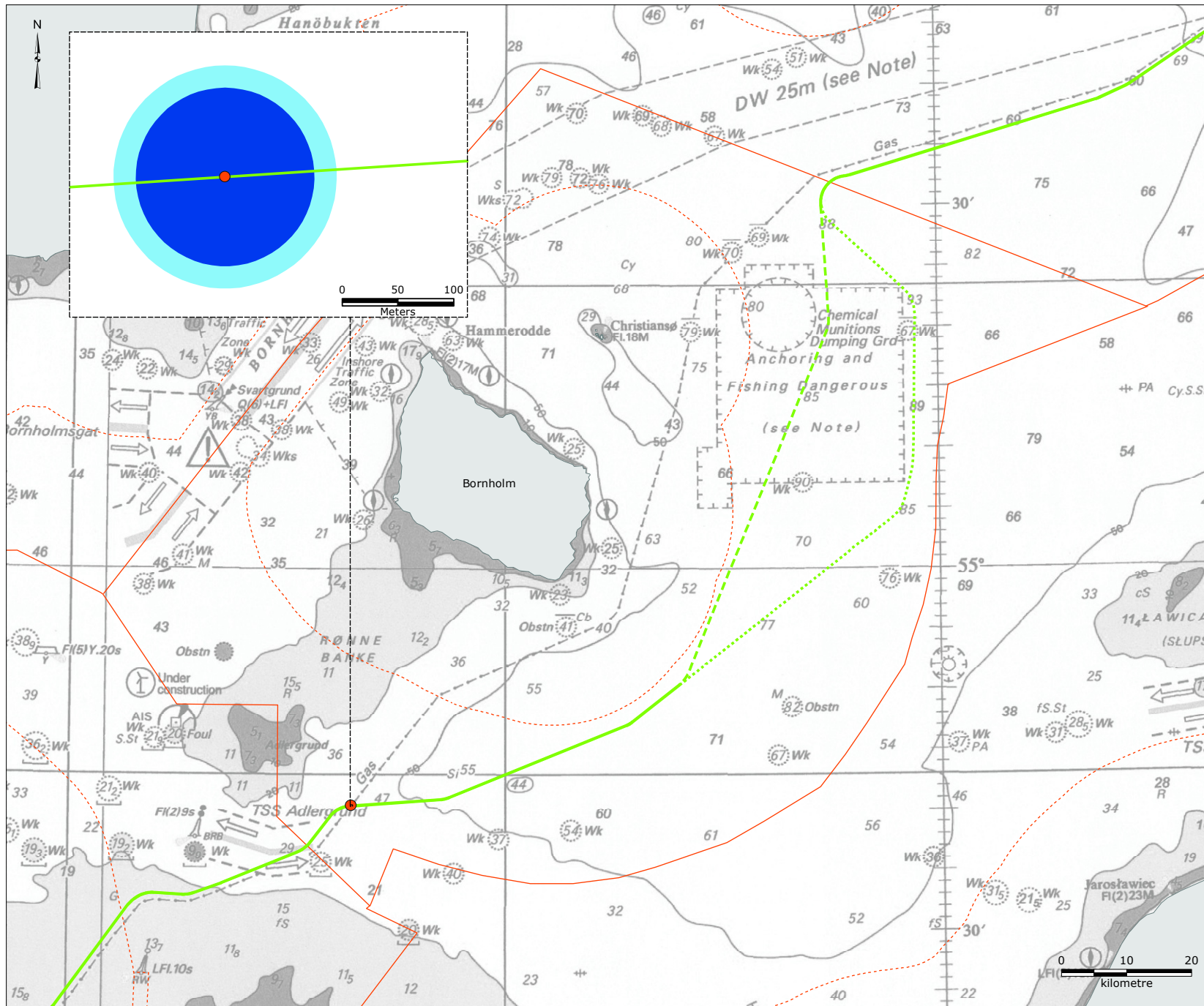
Version: 05  
Date: 2019-04-10  
Prepared: MRIH  
Controlled: MJK/CASO

**NM-02-D**

#### Airborne noise propagation modelling results

**RAMBOLL**





#### Legend:

- NSP2 route
- NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- EEZ border
- Noise modelling location

#### Rock placement, winter

Cumulative SEL (two-hour):

- Marine mammals (188 dB - TTS)
- Fish (186 dB - TTS)

Note:  
 - The cumulative SEL levels are related to threshold levels used in the assessment to evaluate impact on biological environment  
 - Underwater noise propagation from rock placement is shown for the winter conditions as the worst case scenario  
 Exposure to sound may result in permanent hearing impairments (permanent threshold shift, PTS) or temporary hearing impairments (temporary threshold shift, TTS). The modelling results show that exceedance of TTS occurs only in the vicinity of the pipeline (less than 90 m). Underwater noise from rock placement does not exceed threshold levels causing PTS.

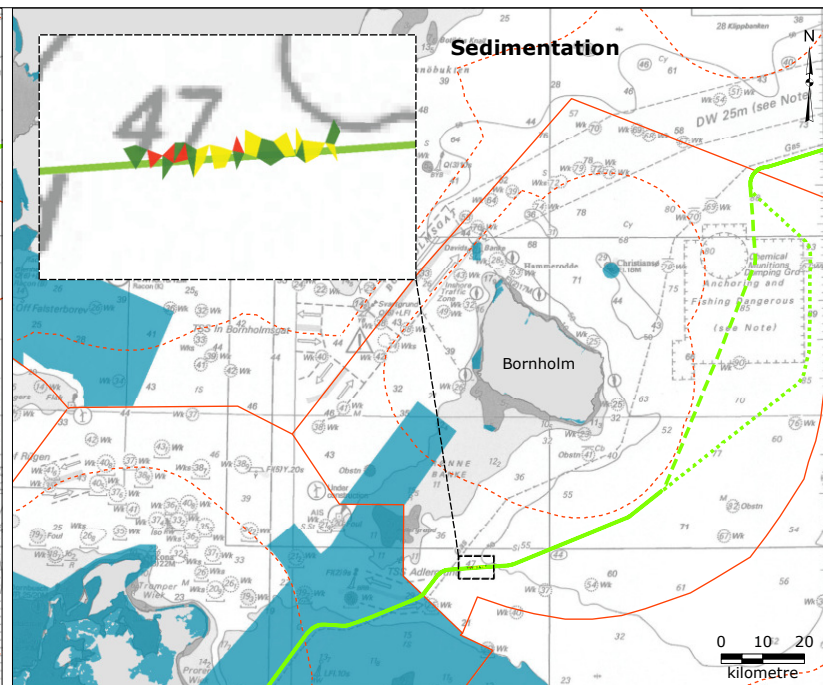
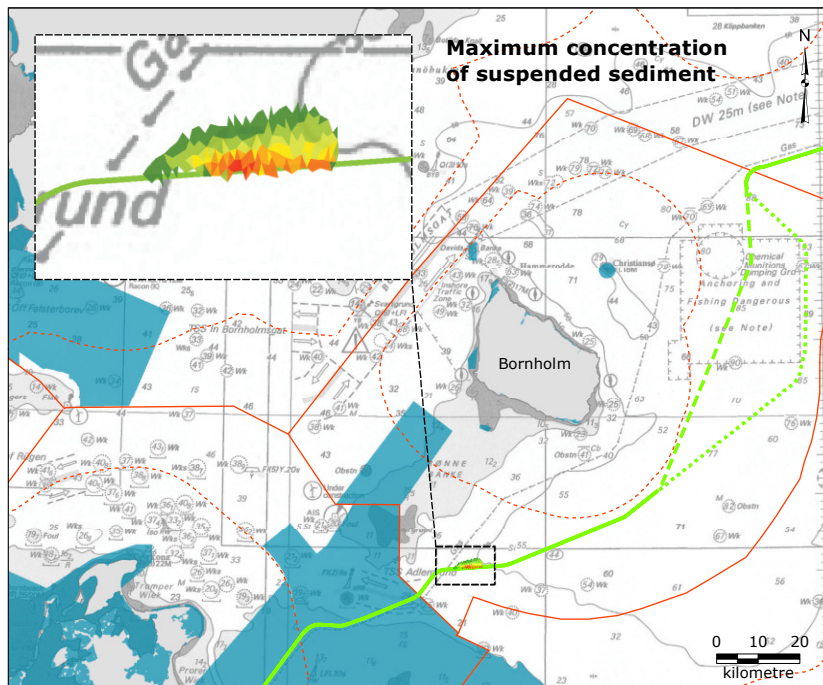
References:  
 - Ramboll, 2018, "Nord Stream 2. Underwater noise modelling"  
 Doc. No. W-PE-EIA-PDK-REP-805-DA0900EN-01

Version: 06  
 Date: 2019-04-10  
 Prepared: MRIH  
 Controlled: MJK/CASO

**NM-03-D**

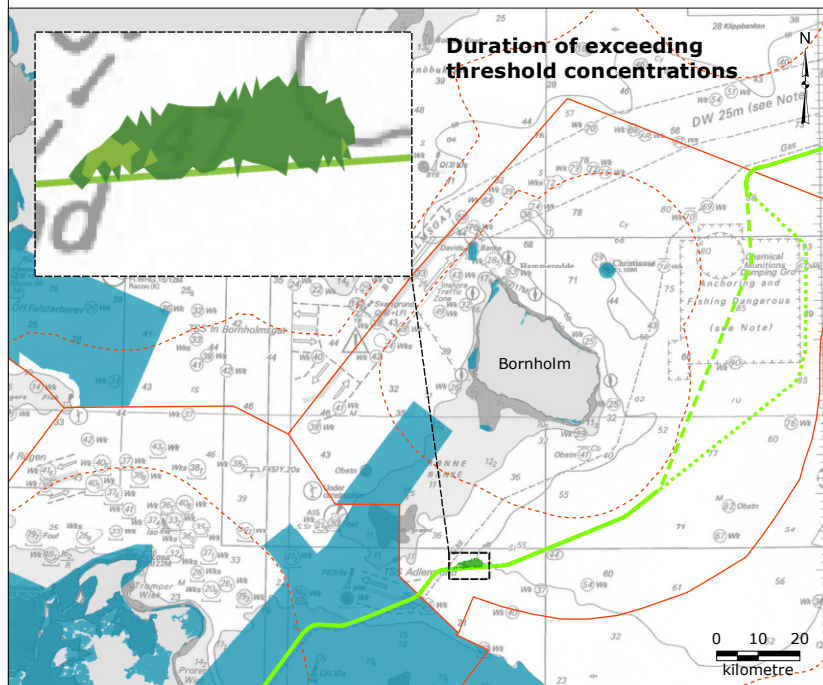
#### Sound exposure levels

**RAMBOLL**



#### Legend:

- NSP2 route
- - - NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- EEZ border
- Natura 2000 site



#### Legend:

##### Maximum concentration of suspended sediment (mg/l):

- 0 - 2
- 2 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 50
- > 50

##### Duration of exceeding threshold concentrations (2 mg/l) in hours:

- 0 - 1
- 1 - 3
- 3 - 6
- 6 - 9
- 9 - 12
- > 12

##### Sedimentation (g/m<sup>2</sup>):

- 0 - 50
- 50 - 100
- 100 - 200
- > 200

Note:

- Duration of exceeding threshold concentration is shown for 2 mg/l since concentration of 10 mg/l (avoidance reactions in fish) for rock placement would not be visible on the map
- Winter scenario refers to a period with winter hydrographic conditions with respect to flow velocities and stratification
- Redistribution of sediments for winter scenario is shown

Reference:

- European Environment Agency, 2017, "Natura 2000 data - the European network of protected sites", <https://www.eea.europa.eu/data-and-maps/data/natura-9>, Date accessed: 2019-03-05
- The Danish Environmental Protection Agency, 2018, "Applicable Natura 2000 sites as of 2018-11-01", <http://miljoegis.mim.dk/spatialmap?profile=natura2000-afgransning-nov2018gaeldende>, Date accessed: 2019-03-05
- Nord Stream 2 AG and Ramboll, 2018, "Modelling of sediment spill in Denmark - Southern", Doc. No. W-PE-EIA-PDK-REP-805-DA0800EN-01

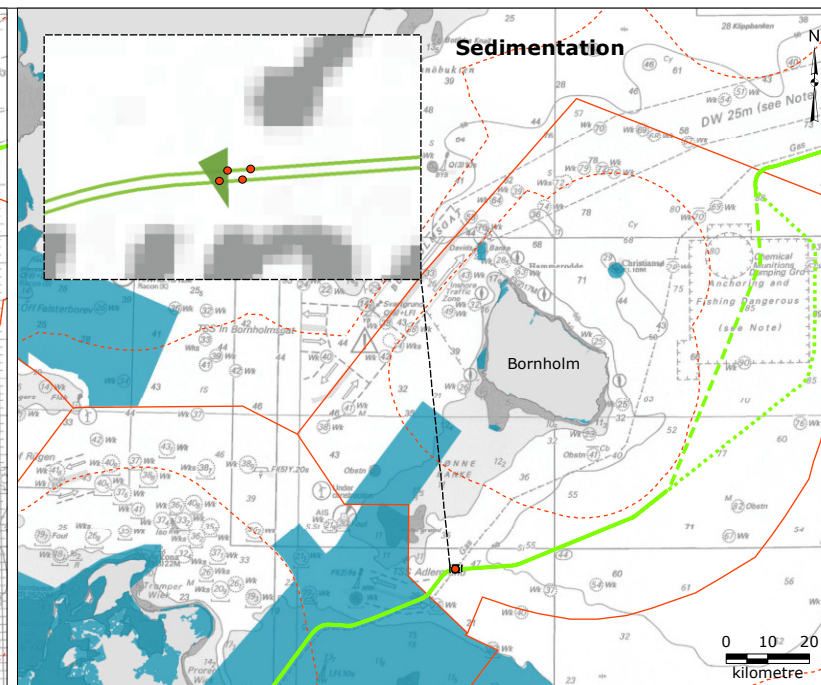
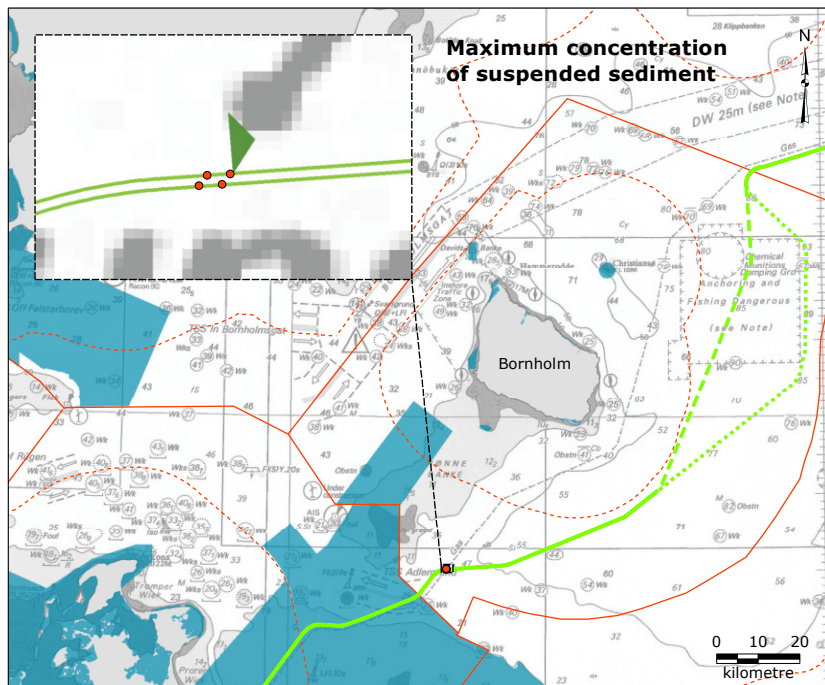
Version: 04  
Date: 2019-04-10  
Prepared: MALM/ MRIH  
Controlled: MJK/CASO

**SM-01-D**

## Suspended sediments and sedimentation – trenching

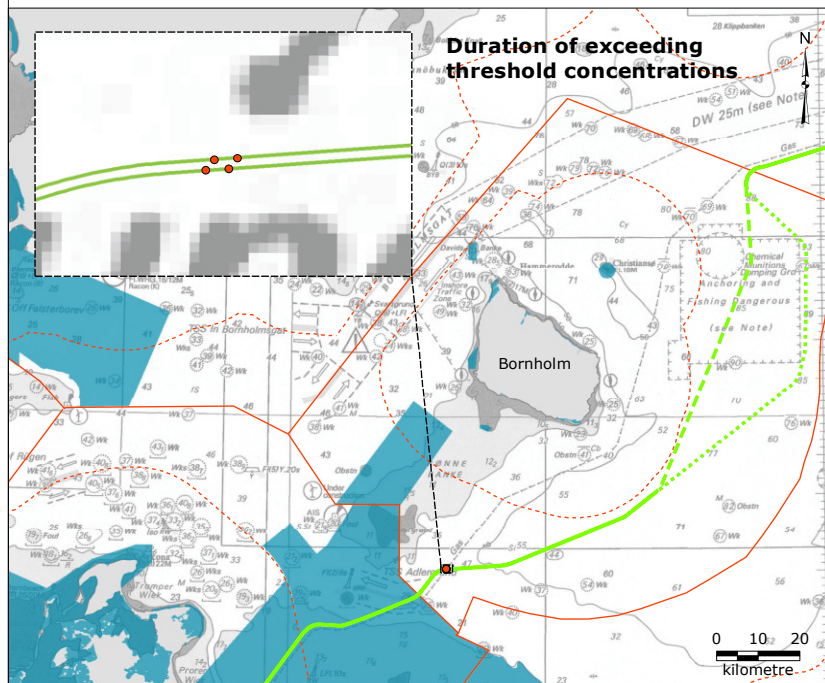
**RAMBOLL**





#### Legend:

- NSP2 route
- - - NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- EEZ border
- Natura 2000 site
- Spot rock placement, pipeline crossing



#### Legend:

##### Maximum concentration of suspended sediment (mg/l):

- 0 - 2
- 2 - 5
- 5 - 10
- 10 - 15
- 15 - 20
- 20 - 25
- 25 - 50
- > 50

##### Duration of exceeding threshold concentrations (2 mg/l) in hours:

- 0 - 1
- 1 - 3
- 3 - 6
- 6 - 9
- 9 - 12
- > 12

##### Sedimentation (g/m<sup>2</sup>):

- 0 - 50
- 50 - 100
- 100 - 200
- > 200

Note:

- Duration of exceeding threshold concentration is shown for 2 mg/l since concentration of 10mg/l (avoidance reactions in fish) for rock placement would not be visible on the map
- Winter scenario refers to a period with winter hydrographic conditions with respect to flow velocities and stratification
- Redistribution of sediments for winter scenario is shown

Reference:

- European Environment Agency, 2017, "Natura 2000 data - the European network of protected sites", <https://www.eea.europa.eu/data-and-maps/data/natura-9>, Date accessed: 2019-03-05
- The Danish Environmental Protection Agency, 2018, "Applicable Natura 2000 sites as of 2018-11-01", <http://miljoegis.mim.dk/spatialmap?profile=natura2000-afgransning-nov2018gaeldende>, Date accessed: 2019-03-05
- Nord Stream 2 AG and Ramboll, 2018, "Modelling of sediment spill in Denmark - Southern", Doc. No. W-PE-EIA-PDK-REP-805-DA0800EN-01

Version: 04  
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Prepared: MALM/ MRIH  
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**SM-02-D**

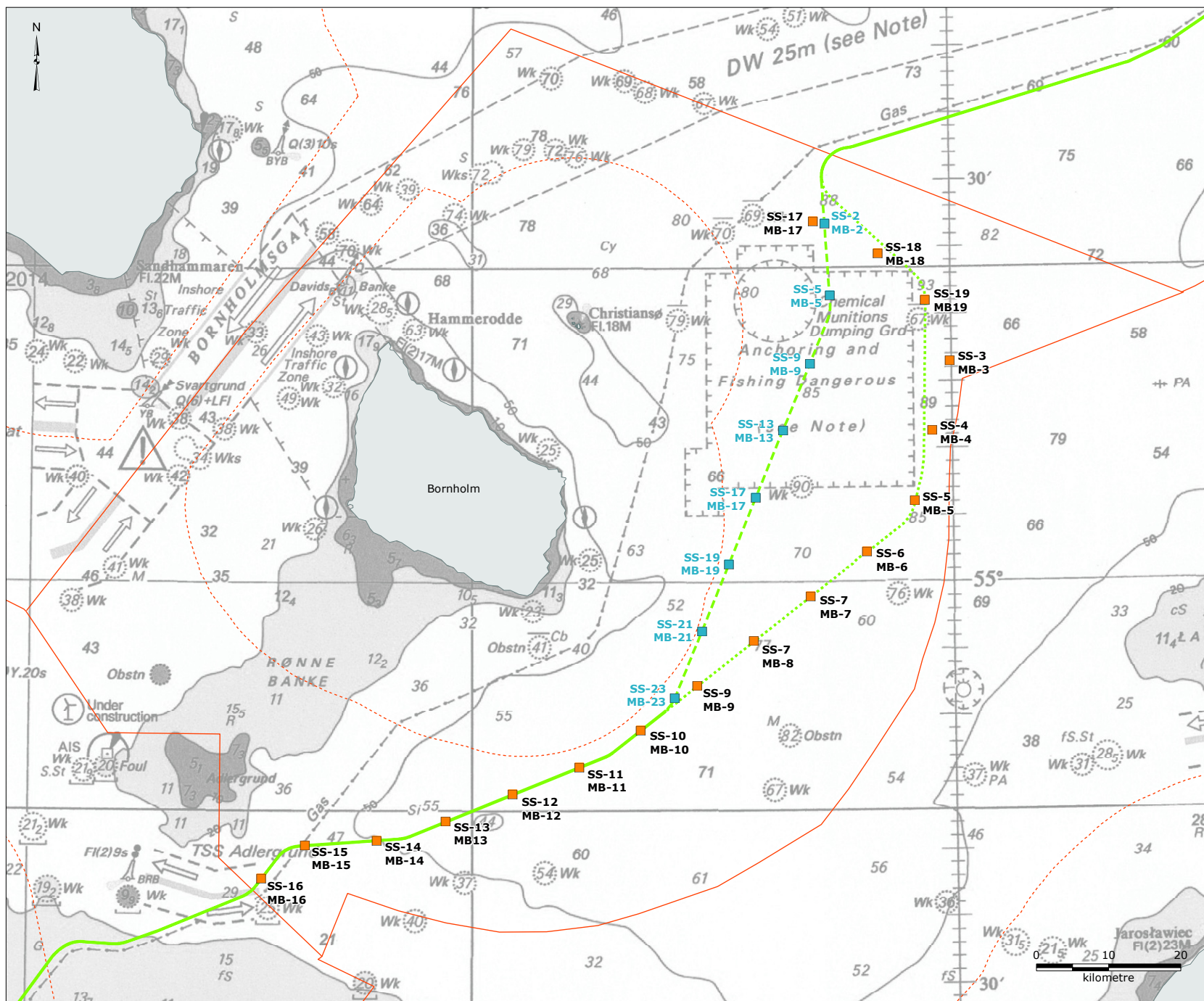
## Suspended sediments and sedimentation – rock placement

**RAMBOLL**

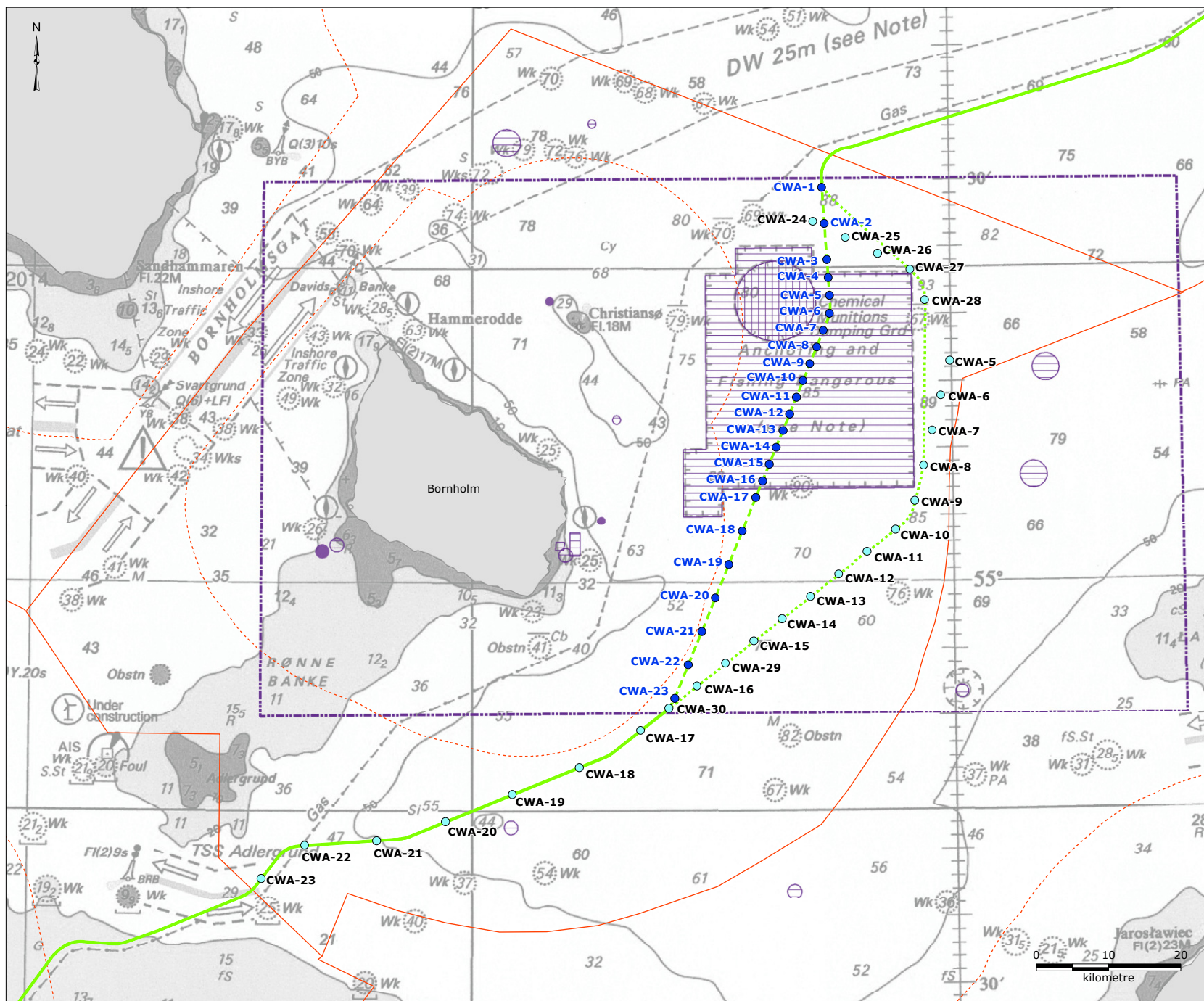


# ENVIRONMENTAL SURVEY STATIONS

ENVIRONMENTAL SURVEY STATIONS







#### Legend:

- NSP2 route
- - - NSP2 route V1
- ... NSP2 route V2
- - - Territorial water border
- EEZ border
- Emergency dumping area
- Chemical munitions dumping site
- Bottom trawling, anchoring and seabed intervention works discouraged
- Risk area in which fishing vessels are required to have first aid gas equipment on board
- CWA (chemical warfare agents) stations - 1st survey round
- CWA (chemical warfare agents) stations - 2nd survey round

Reference:  
 - Ramboll, 2018, Scope of Work for Environmental Baseline Survey in Danish Waters, Southern Route, Doc. no. W-PE-EIA-PDK-SOW-800-BLSUSREN-03  
 - Additional Scope of Work for Environmental Baseline Survey in Danish Waters W-PE-EIA-PDK-SOW-800-ADBSUEN-02

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#### Survey stations for chemical warfare agents

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