



Nord Stream 2 Natural Gas Pipeline construction and operation in the Finnish EEZ Environmental and Technical Monitoring Quarterly Report Q4 2018

Date	22.3.2019
Project	PO 17-5149
Client	Nord Stream 2 AG
Document ID	W-PE-EMO-PFI-RQU-892-RQU418EN-06

Summary

The report presents results and preliminary findings of the environmental and technical monitoring for construction activities of Nord Stream 2 Gas Pipeline in the Finnish EEZ for the fourth quarter 2018. Monitoring is based on the report Natural Gas Pipeline Route through the Baltic Sea – Environmental Monitoring Programme, Finland by Nord Stream 2 (W-PE-EMS-PFI-REP-805-032300EN-11). The programme has been approved on 12.4.2018 within the water permit decision (Nro 53/2018/2, Dnro ESAVI/9101/2017).

Sitowise Oy prepared this report based on data and reports provided by Nord Stream 2 AG and monitoring contractors. All findings are preliminary and final conclusions will be reported in the annual report for 2018 to be published in May 2019.

The construction activities during the fourth quarter were rock placement, mattress installation, and pipelay of Line A.

During the Q4, environmental monitoring focused on water quality monitoring at three monitoring sites. The Sandkallan monitoring site was also equipped with current meters measuring flow speed and direction. No effects of construction activities were detected in water quality at control stations Sandkallan, Control 1 and Control 2 during Q4.

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1 Introduction

The report presents preliminary results of the environmental and technical monitoring for the construction activities of Nord Stream 2 Gas Pipeline in the Finnish EEZ for the fourth quarter (Q4) of 2018.

Nord Stream 2 AG has started construction activities for a new two-pipeline offshore natural gas system from Russia to Germany through the Baltic Sea (Figure 1). The length of the corridor is approximately 1,200 km. Parallel pipelines pass through the territorial waters and/or Exclusive Economic Zones (EEZ) of Russia, Finland, Sweden, Denmark and Germany. In the Finnish EEZ the route follows the existing Nord Stream gas pipe route. The length of the route in the Finnish sector is approximately 374 km. Pipelay of Line A started on September 5, 2018 and Pipelay of Line B is scheduled to start in 2019. Both lines are planned to be finished by the end of 2019, after which the pipelines are planned to be taken into operation.

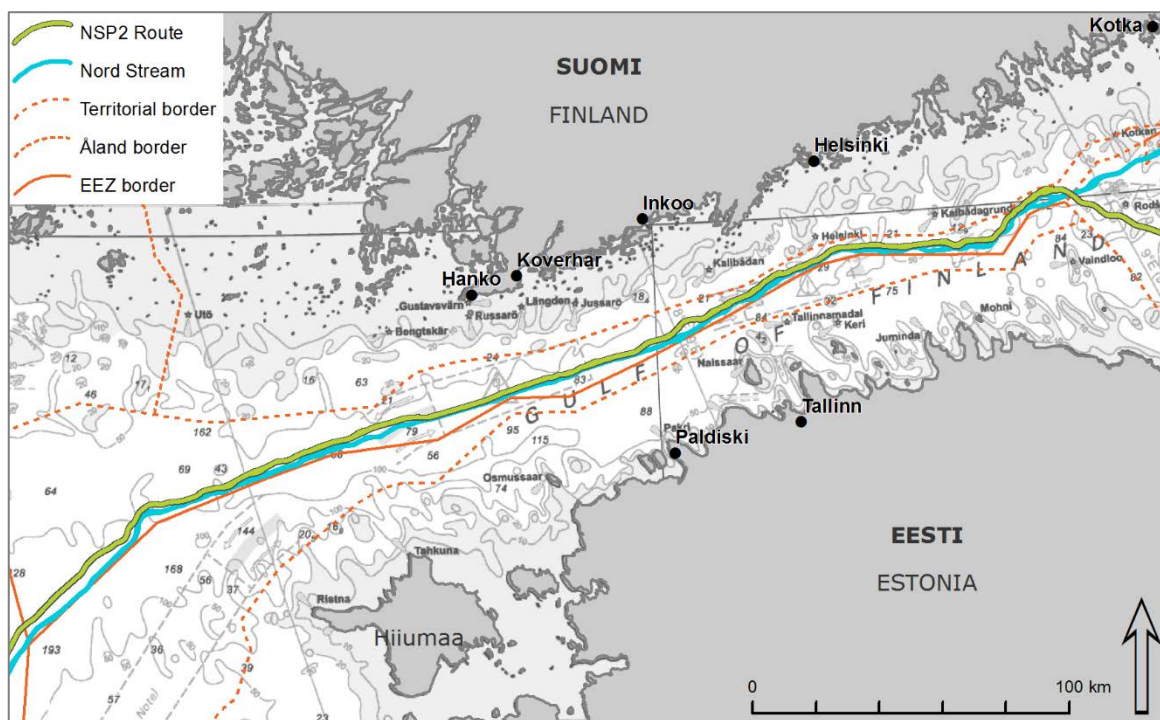


Figure 1. Nord Stream 2 route passes through the Finnish EEZ.

Nord Stream 2 AG is responsible for environmental monitoring and reporting during construction and operation of the pipelines. The content of monitoring is presented in the report Natural Gas Pipeline Route through the Baltic Sea – Environmental Monitoring Programme, Finland (W-PE-EMS-PFI-REP-805-032300EN-11, Ramboll 1.2.2018). The programme has been approved within the water permit decision 12.4.2018 (N:o 53/2018/2, Dnro ESAVI/9101/2017).

Monitoring is most intensive during the construction phase (Table 1).

Table 1. General schedule for monitoring activities 2018–2023 in the Finnish EEZ (based on Ramboll 2018, modified).

Monitoring target	Construction		Operation			
	2018	2019	2020	2021	2022	2023
Underwater noise	X					
Water quality and currents	X	X				
Commercial fishery					X	
Cultural heritage	X		X			

The supervising authorities for monitoring of underwater noise, currents and water quality are the regional ELY-Centres (The Centres for Economic Development, Transport and the Environment). For fishery monitoring, the supervising authority is Southwest Finland ELY-Centre. For cultural heritage, the supervising authority is National Board of Antiquities.

Quarterly reports will be provided three months after the end of the quarter during the construction period, and annual reports by the end of May the following year during construction and operation.

Quarterly reporting aims at presenting the main results from technical and environmental monitoring to authorities. For this reason, they are concise and focused on results. Annual reports will include further data analysis, comparisons to the impact assessments presented in the EIA Report and the permit application and more thorough discussion on the observed impacts.

2 Environmental conditions during the fourth quarter

In October, November and December temperatures were higher than typical seasonal temperatures in Southern and Central Finland. Precipitation remained below the average in Southern Finland in October as well as in December and was exceptionally low in November.

In late October, the weather was windy in Southern Finland and caused wind damages. In late November strong southwest wind created storms in the Gulf of Finland. Winds were quite strong at the end of the year 2018.

According to the Finnish Meteorological Institute's open data, during 1.10.–31.12.2018, wave height varied between 0.1 and 3.1 m (Figure 2). The observation data was collected from an open seas wave buoy located in the Gulf of Finland (59°58' N 25°14' E, Annex 1) approximately six kilometres north of GKP 185.

Stratification conditions will be discussed in more detail in the annual report 2018.

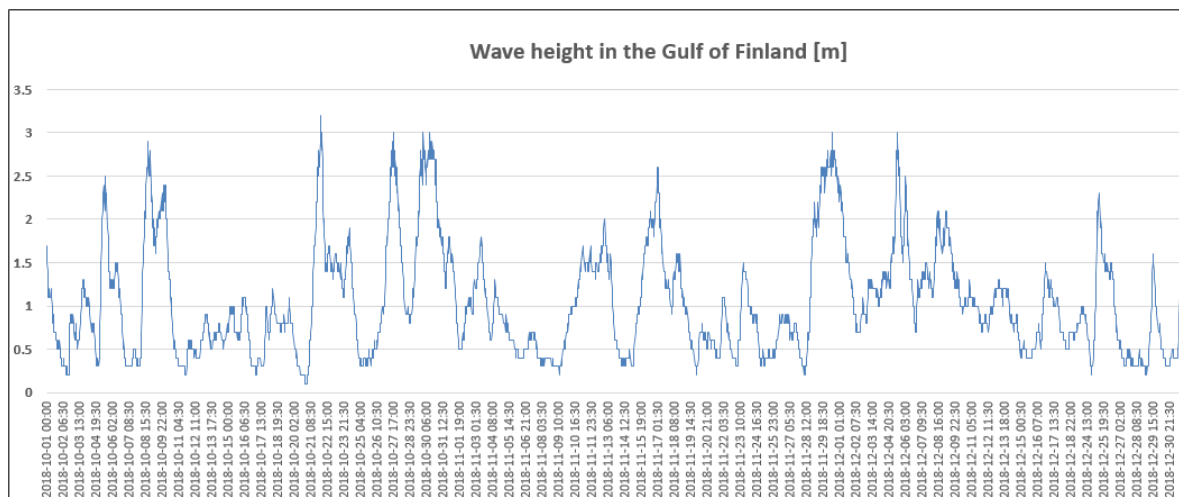


Figure 2. Wave height in the Gulf of Finland during period 1.10.–31.12.2018. The data consists of measurements conducted every half an hour.

3 Construction activities during the fourth quarter

3.1 Schedule

Construction activities during the fourth quarter included rock placement, mattress installation and continuing pipelay of Line A (Table 2). The mattress installation work in the Finnish EEZ was finished in mid-October. Rock placement was conducted during October and November and continued further in January 2019.

The pipelay (Line A) started on September 5, 2018 and continued throughout Q4. Line B is planned to be laid in 2019. Both lines are planned to be ready by the end of 2019, after which the pipelines are taken into operation.

Table 2. Construction activities during Q4 2018.

2018 Q4	October 2018				November 2018				December 2018				
Week	40	41	42	43	44	45	46	47	47	49	50	51	52
Mattress installation													
Pre-lay rock placement													
Post-lay rock placement									cont.				
Pipelay Line A													cont.

3.2 Activities during the monitoring period

Rock placement

Rock placement was conducted by vessel Bravenes until October 3, 2018, after which work was continued by Nordnes. The last pre-lay rock placement area constructed during 2018 was completed on October 21, after which the works continued solely with post-lay rock placement of Line A. Work continued until end November. Rock placement contractors were Boskalis Offshore Contracting B.V. and Van Oord Offshore B.V. (BoVO).

The last pre-lay rock placement activities took place at GKP 382 and GKP 458. The post-lay rock placement during Q4 took place between GKP 137 and GKP 237 focusing on the area south of Helsinki (Figure 3). During the Q4-period altogether 82 berms were finalized: one for Line B and 81 for Line A. The total number of finalized berms in the end of 2018 was 144. Two of the berms installed during Q4 were pre-lay and 80 post-lay. Post-lay berms were installed on the pipeline in order to support and cover the pipeline and increase its stability.

As part of construction redesign, one post-lay berm was added during Q4. In addition, 46 in-service buckling mitigation berms and four on-bottom stability berms were designed and installed in order to avoid excessive movement due to hydrodynamic loading and fatigue.

The volume of rock used in rock placement during Q4 was 173,700 m³. Of this, 9 % was pre-lay and 91 % post-lay rock placement. The total volume of rock used during 2018 was 478,700 m³.

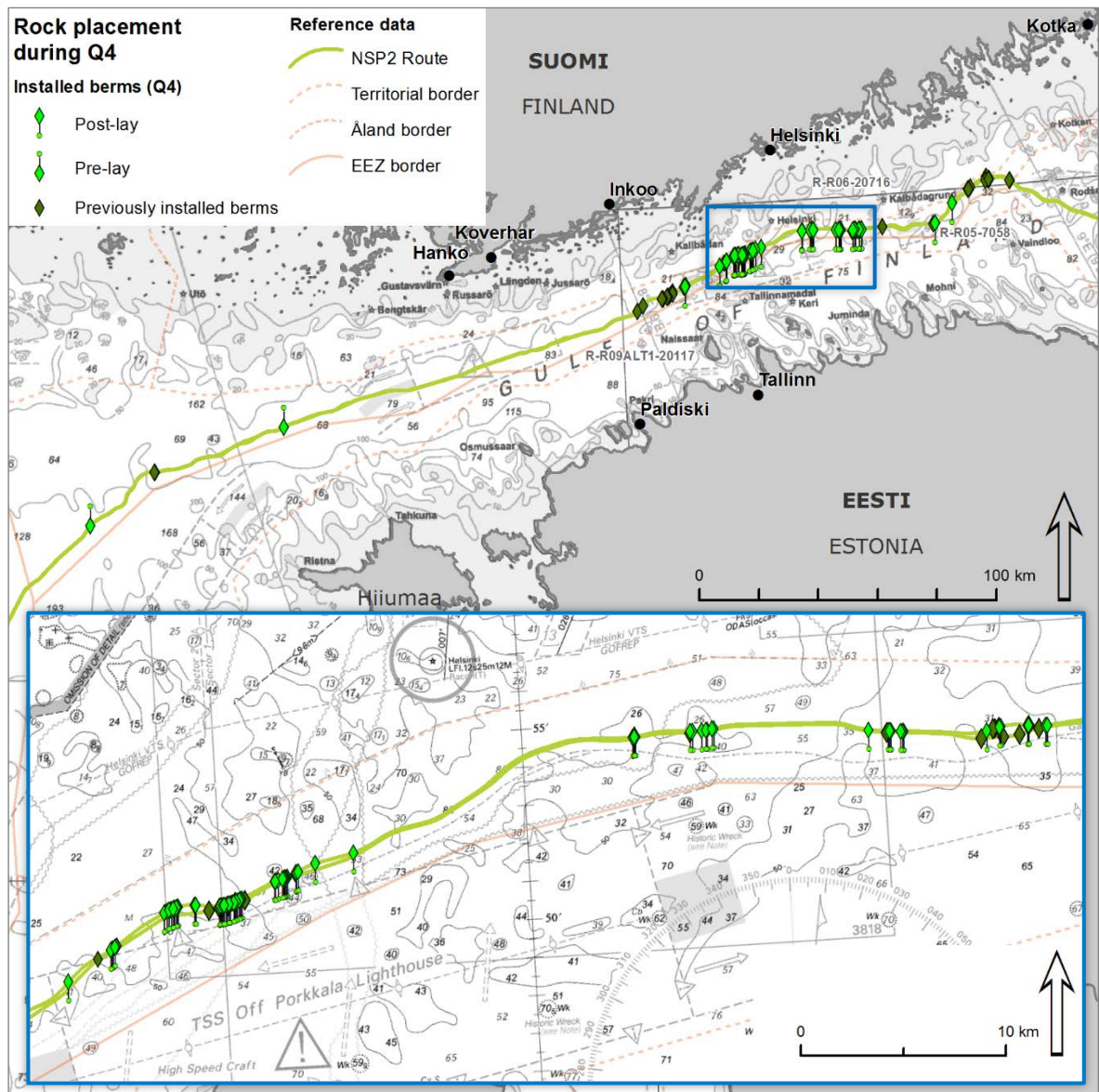


Figure 3. Rock placement activities during Q4. The lower map shows the area marked with blue frame in more detail.

Mattress installation

Mattress installation work started in Finland on July 1, 2018. During fourth quarter the installation of altogether 46 mattresses* (out of 492) was finalized for 14 cable crossings between GKP 127 and GKP 441 (Figure 4). The last mattress was installed on October 15, 2018.

*In the Q3 report it was stated that the amount of installed mattresses was 466. This figure contained a typo: the actual amount of mattresses installed during Q3 was 446.

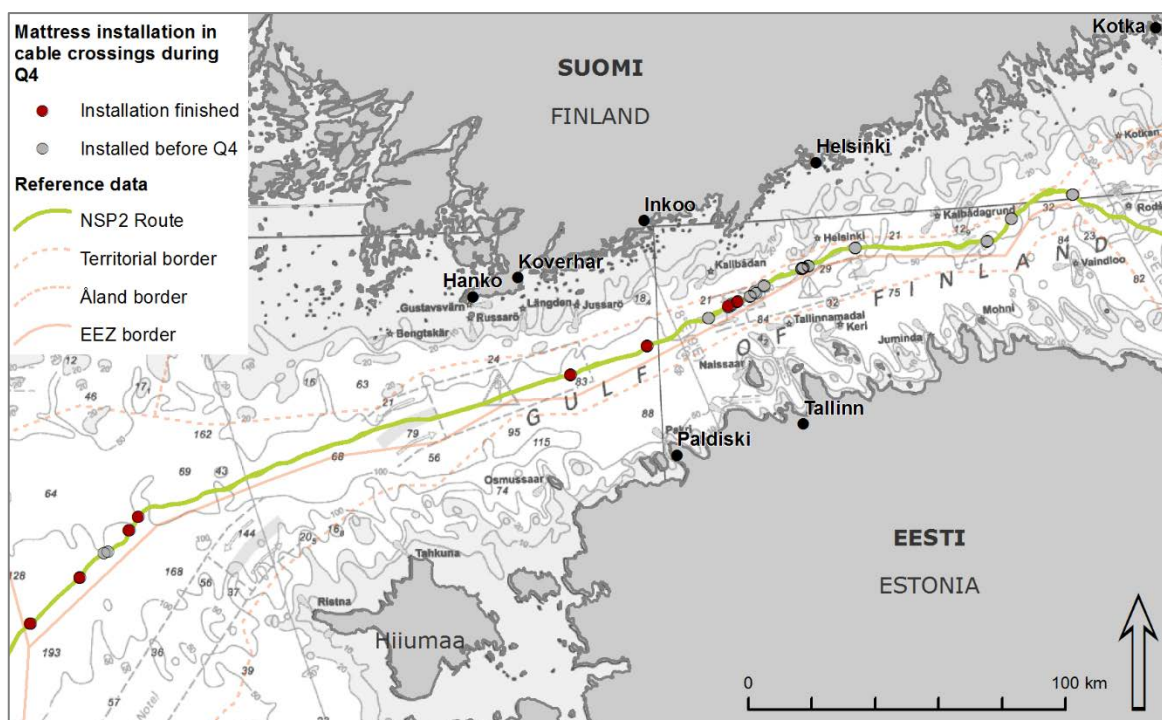


Figure 4. Mattress installation in cable crossings was completed in the Finnish EEZ during the fourth quarter of 2018.

Pipelay

In October the pipelay vessel Solitaire continued pipelay (Line A) eastwards from GKP 184 located southeast of Helsinki and reached the position GKP 117 near Russian territorial border on October 27, 2018 (Figure 5).

The vessel stayed at Muuga Port, Estonia for Azimuth thruster replacement (one of 10 thrusters) 29.10.–1.11.2018. After the mentioned date Solitaire transferred to position GKP 231 and commenced pipelay westwards on November 2, reaching position GKP 352 on 19 December.

Solitaire laid down the pipeline at GKP 352 and departed from Finland on 19 December (Figure 6). Pipelay vessel Pioneering Spirit replaced Solitaire and started pipelay on December 22, 2018 (Figure 7). She reached position GKP 376 on December 31, 2018.

During Q4 pipelay was interrupted five times due to weather conditions unsuitable for pipelay.

Efficiency of pipelay during Q4 is presented below:

- approximately 213 kilometers of pipelay
- 81 days of effective pipelay
- pipelay at 21 cable crossings
- highest daily lay speed in Q4 was approximately 4.2 km/day for Pioneering Spirit and 3.6 km/day for Solitaire
- overall average daily lay speed was approximately 2.63 km/day

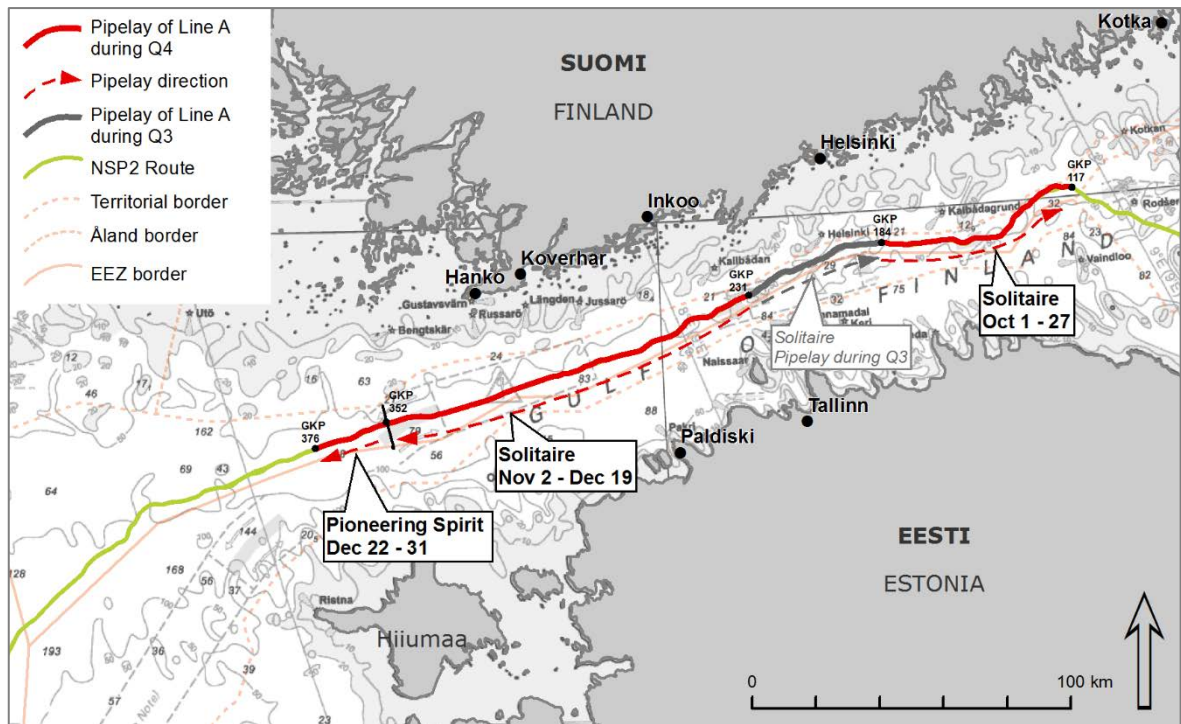


Figure 5. Pipelay of Line A during Q4.

In the beginning of the period MV Olympic Triton supported the Solitaire in Touch Down Monitoring (TDM) and pipelay operations. The OCV Oceanic took over the scope on 26 October.

As requested by Water Permit, a tug, the Esvagt Connector was stationed on the 13 m shallow southwest of Kalbådgrund lighthouse and to the north of the Kalbådgrund Traffic Separation Scheme during pipelay installation operation between GKP 161 and GKP 148 (7.-16.10.2018).

The vessel was mobilized to respond to ship emergencies, such as danger of grounding, under the request of the Finnish Transport Agency/Border Guard. The tug was on standby to assist the contractor and third party vessels by towing and pushing if necessary. No such situations were reported.



Figure 6. Pipelay vessel Solitaire in mobilisation in the Baltic Sea in August with construction vessel Fortitude on the right and pipe supply vessel on the left.



Figure 7. Pipelay vessel Pioneering Spirit started pipelay in Finnish EEZ on December 22, 2018.

4 Water quality and currents

4.1 Monitoring activities

Water quality and current velocity was monitored according to the approved Environmental Monitoring Programme Finland, at three sites by Luode Consulting (Table 3 and Figure 8).

During Q4, one monitoring site was still located in the Sandkallan protected area relatively close to the munition clearance and rock placement sites. In addition, two control stations continued to measure in the Western and Eastern Gulf of Finland. The same control locations were used during the Nord Stream project.

Water quality monitoring includes turbidity, dissolved oxygen, salinity and temperature measurements at three depth layers near bottom. The Sandkallan site was also equipped with profiling current meters measuring flow speeds and directions in separate depth layers covering the whole depth range from the bottom to the surface (W-PE-EMS-PFI-REP-812-WQCR02EN-03)

Table 3. Water quality and current velocity monitoring sites.

	Installed	Last service
Sandkallan	18.4.2018	12.12.2018
Control 1	17.4.2014	11.12.2018
Control 2	18.4.2014	12.12.2018

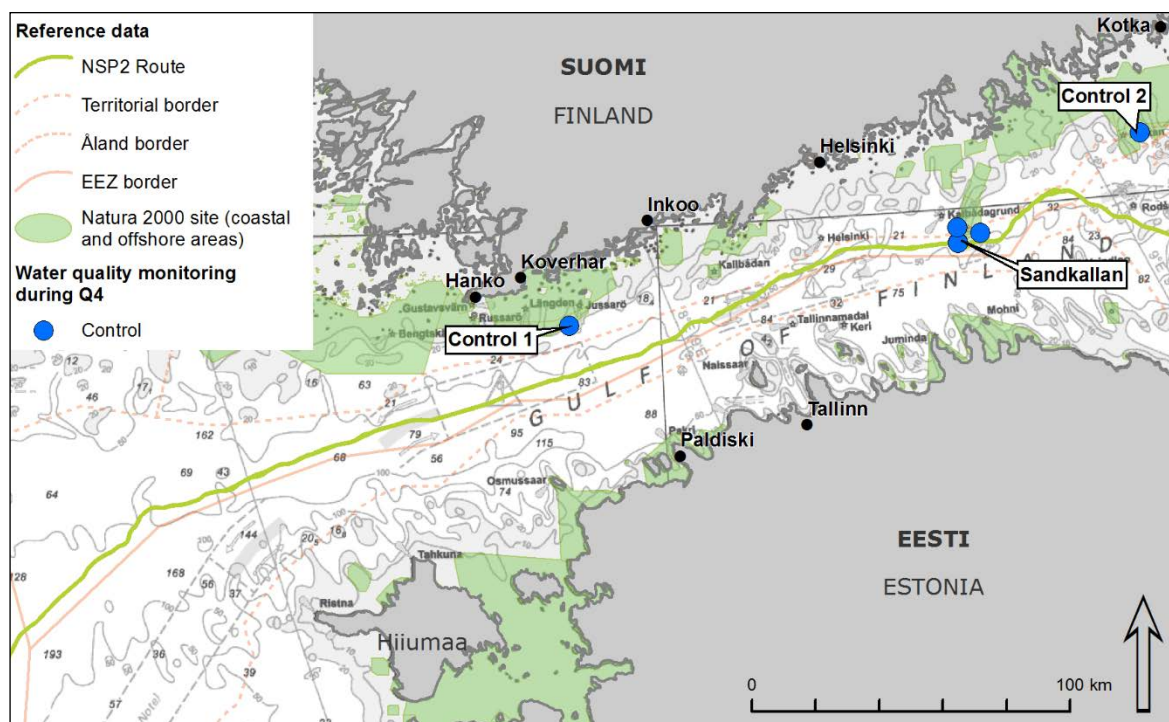


Figure 8. Water quality and current monitoring sites during Q4.

4.2 Results

No impacts from construction activities were detected in water quality at long-term monitoring stations Sandkallan, Control 1 and Control 2 during Q4.

5 Notifications to ELY-Centres during the fourth quarter 2018

NSP2 delivered the following notifications to Uusimaa, Southeast and Southwest ELY-Centres during the monitoring period:

- 23.10.2018: Notification on oil leak. An oil-leak occurred during Solitaire pipelay. The vessel's thruster leaked approximately 150 liters of gearbox lubrication oil. The leaked oil is of the type that is expected to be biodegradable, is not expected to bio-accumulate through food-chains in the environment and is not classified as dangerous to the environment. Remedial measures to stop leak were taken immediately by the vessel crew.
- 8.11.2018: Notification on small oil leak. A small amount of biodegradable oil (approx. 4 litres) leaked into the water from the ROV of Oceanic.

The content of the notifications will be presented in more detail in the 2018 annual report.

6 Conclusions

Construction activities in fourth quarter consisted of pre- and post-lay rock placement, mattress installation and pipelay of Line A. Due to unsuitable weather conditions, pipelay was interrupted five times during the fourth quarter. Two oil spills were notified to the ELY centres.

No impacts from construction on water quality at long-term monitoring stations Sandkallan, Control 1 and Control 2 during Q4 were detected.

Environmental and technical monitoring has been carried out according to the monitoring programme. The results in this report are preliminary. Final results for the year 2018 are presented in the annual report 2018.

7 List of sources

Literature

Luode Consulting Oy, 2019. Long-term water quality and current monitoring in the Gulf of Finland – October-December 2018. W-PE-EMS-PFI-REP-812-WQCR02EN-03

Ramboll, 2018. Nord Stream 2. Natural gas pipeline route through the Baltic Sea – Environmental monitoring programme, Finland. 1.2.2018. W-PE-EMS-PFI-REP-805-032300EN-11.

Maps and GIS data

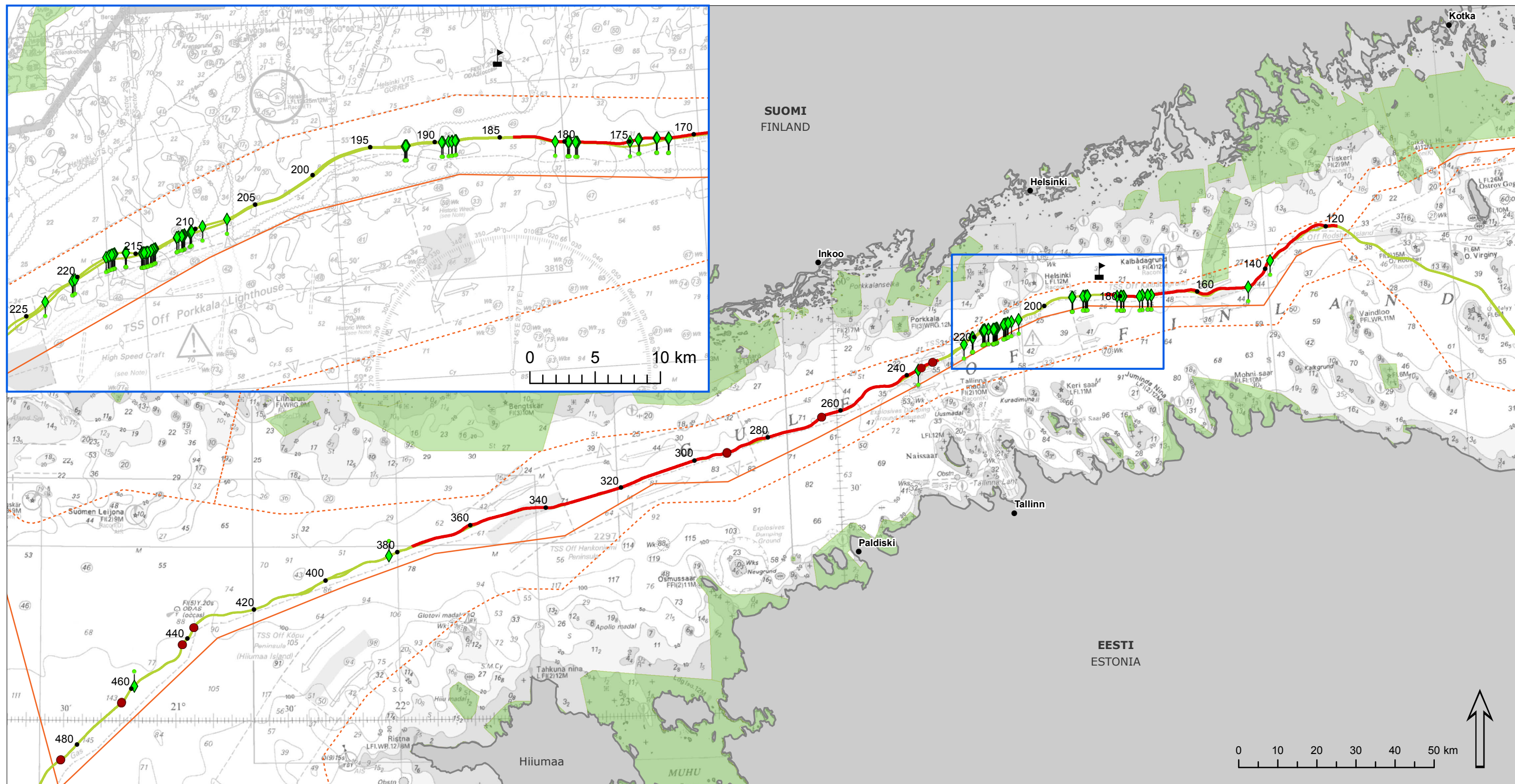
Background admiralty charts, 2018. Charts are not to be used for navigation.

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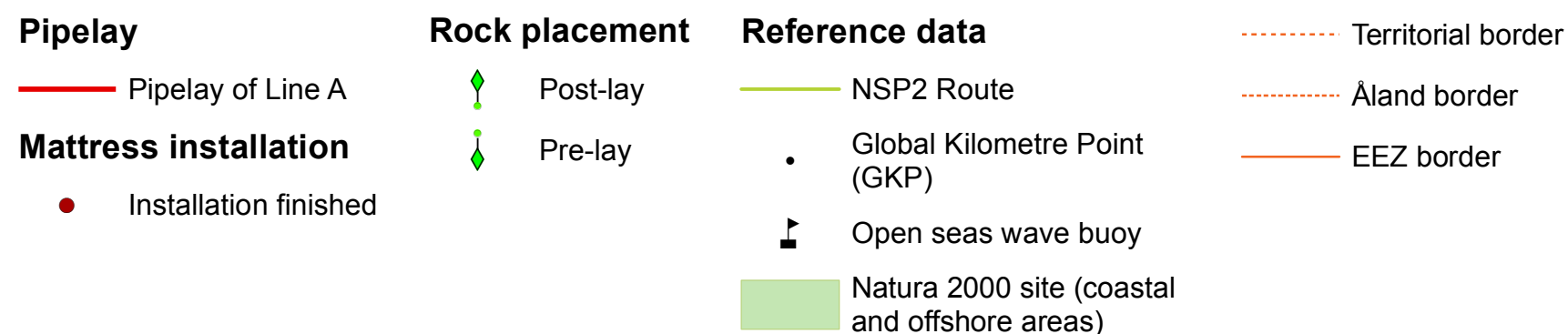
European Environmental Agency (EEA) 2018. Natura 2000 sites. © Directorate-General for the Environment (DG ENV).

Finnish Environmental Institute (SYKE) 2018. Natura 2000 sites.

International Boundaries Research Unit (IBRU) 2010. Borders of Exclusive Economic Zones and Territorial Waters.



Nord Stream 2 Construction activities during Q4/2018



References:
 - Limits of Exclusive Economic Zones and Territorial Waters: IBRU May 2010
 - Background sea charts are "Not to be used for navigation"
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 - Natura 2000 sites. EEA and SYKE 2018.

Annex 1

Version: Q4 report EN ver6
 Code: W-PE-EMO-PFI-RQU-892-RQU418EN-06
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Construction activities during Q4/2018

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