



# **Nord Stream 2 Natural Gas Pipeline construction and operation in the Finnish EEZ Environmental and Technical Monitoring Quarterly Report Q1 2019**

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*The original report is written in Finnish and has been, together with appendices, translated into Swedish and English.  
If there are conflicting information in the different language versions, the Finnish version prevails.*

## Summary

The report presents results and preliminary findings of the environmental and technical monitoring for construction activities of The Nord Stream 2 Gas Pipeline in the Finnish EEZ for the first quarter of 2019. Monitoring is based on the report Natural Gas Pipeline Route through the Baltic Sea – Environmental Monitoring Programme, Finland, by Nord Stream 2 /1/. The programme was 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 its' monitoring and technical contractors. All findings are preliminary and final conclusions will be reported in the annual report 2019 to be published in May 2020.

The construction activities during the first quarter were rock placement and pipelay of Line A.

During Q1 2019, environmental monitoring of water quality and currents continued at three long-term monitoring sites. Results of the water quality monitoring will be available in the Q2 report, as the service of the monitoring stations cannot be carried out offshore in winter conditions.

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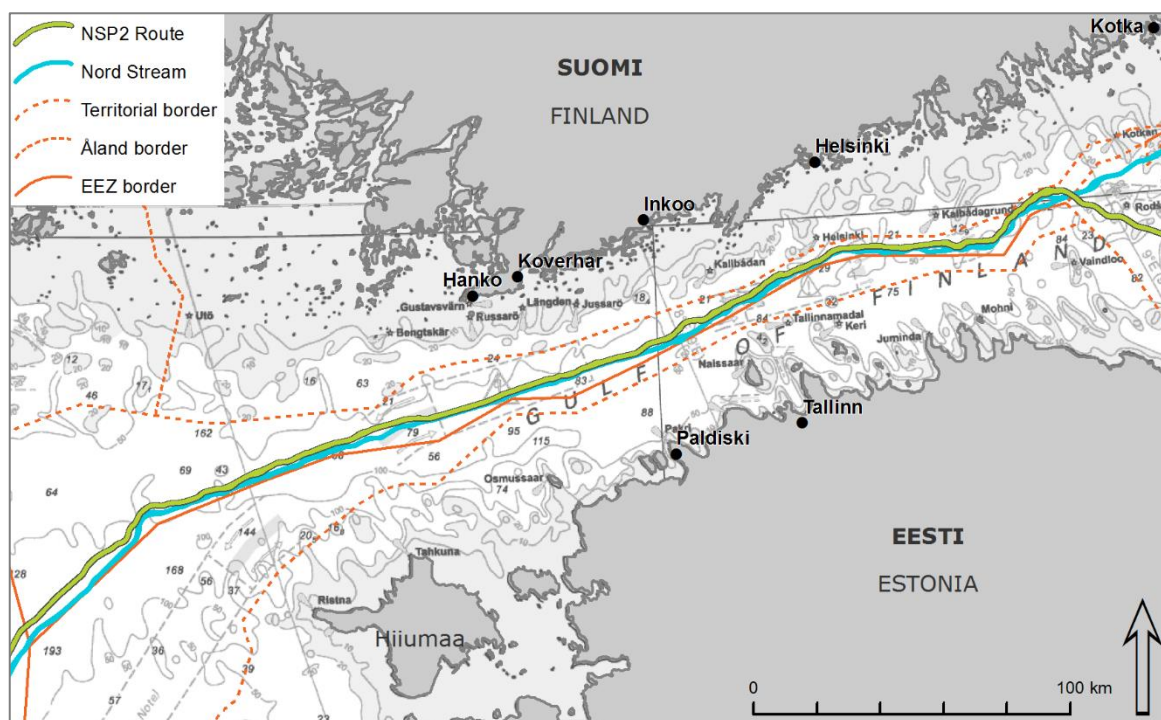
Annex 1 Nord Stream 2 construction activities during Q1/2019

# 1 Introduction

The report presents results and preliminary findings of the environmental and technical monitoring for the construction activities of Nord Stream 2 Gas Pipeline in the Finnish EEZ for the first quarter (Q1) of 2019.

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 pipeline route. The length of the route in the Finnish sector is approximately 374 km.

Pipelay of Line A started on September 5, 2018 and continued until February 4, 2019 in the Finnish EEZ /2/. Pipelay of the last approximately 3 km section in the Finnish EEZ close to Russian territorial waters was performed in Q2 2019 /3/. All construction works are scheduled to be completed during 2019, after which the pipelines are planned to be taken into operation.



*Figure 1. Nord Stream 2 route passes through the Finnish EEZ. It is situated north of the existing Nord Stream pipelines with an exception of a short section in the east, close to Russian territorial waters.*

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 Finnish Environmental Monitoring Programme /1/. The programme has been approved within the water permit decision on April 12, 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 during 2018–2023 in the Finnish EEZ (based on /1/, 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 supervisory authorities for monitoring of underwater noise, currents and water quality are the Southeast Finland, Uusimaa and Southwest Finland ELY Centres (The Centre for Economic Development, Transport and the Environment). For fishery monitoring, the supervisory authority is the Southwest Finland ELY Centre. For cultural heritage, the supervisory authority is the Finnish Heritage Agency (former 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 of the following year during construction and during operation.

Quarterly reporting aims at presenting the main results from technical and environmental monitoring to the 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.

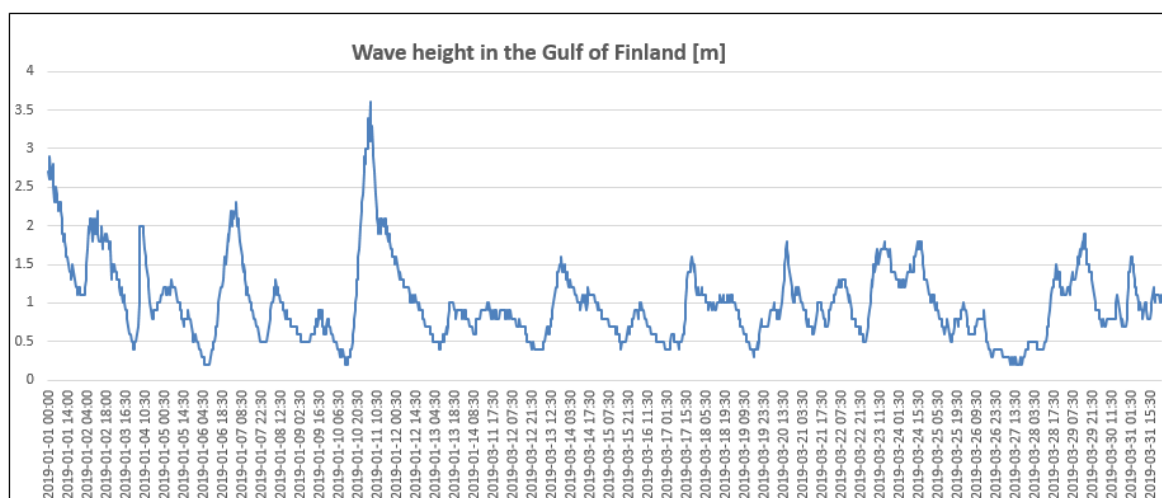
## 2 Environmental conditions during the first quarter

The mean temperature in the coastal areas was slightly (approximately 1°C) colder than the long-term average values in January, except in Åland islands, where it was slightly warmer. According to the statistics from the Finnish Meteorological Institute, the mean temperature in February was 4-6 °C above the long-term average in southern parts of Finland. The mean temperature in March was 1-2°C above long-term average values except in Lapland.

The precipitation levels in January mainly exceeded the long-term average values in southern parts of the country. In February and in March the precipitation levels were above average throughout Finland.

The most notable weather event in January was the storm “Aapeli” on the night of January 2, 2019. A new national record, 32,5 m/s for the maximum sustained wind speed at maritime stations was recorded on the Bogskär islets situated on the southwest coast of Finland.

According to the Finnish Meteorological Institute’s open data /4/, from January 1 to March 31, 2019, wave height varied between 0.2 and 3.6 m (Figure 2). The observation data was collected from an open sea wave buoy located in the Gulf of Finland (see Annex 1) approximately six kilometres north of GKP 185.



*Figure 2. Wave height in the Gulf of Finland during period 1.1.–31.3.2019 /4/. The data was collected from an open sea wave buoy located in the Gulf of Finland (see Annex 1) and consists of measurements conducted every half an hour.*

According to the Finnish Meteorological Institute /5/, the winter of 2018/2019 was mild until mid-January, when the weather turned very cold for two weeks. The extent of the ice cover was at its maximum on January 27, 2019, covering 88,000 km<sup>2</sup> of the northern Baltic Sea (Figure 3). Thereafter, the weather was milder than usually, with alternating short mild and cold periods. The conditions were, however, challenging for seafaring due to floating and pack ice. The easternmost part of the Gulf of Finland was not completely free of ice until the week before the end of April.

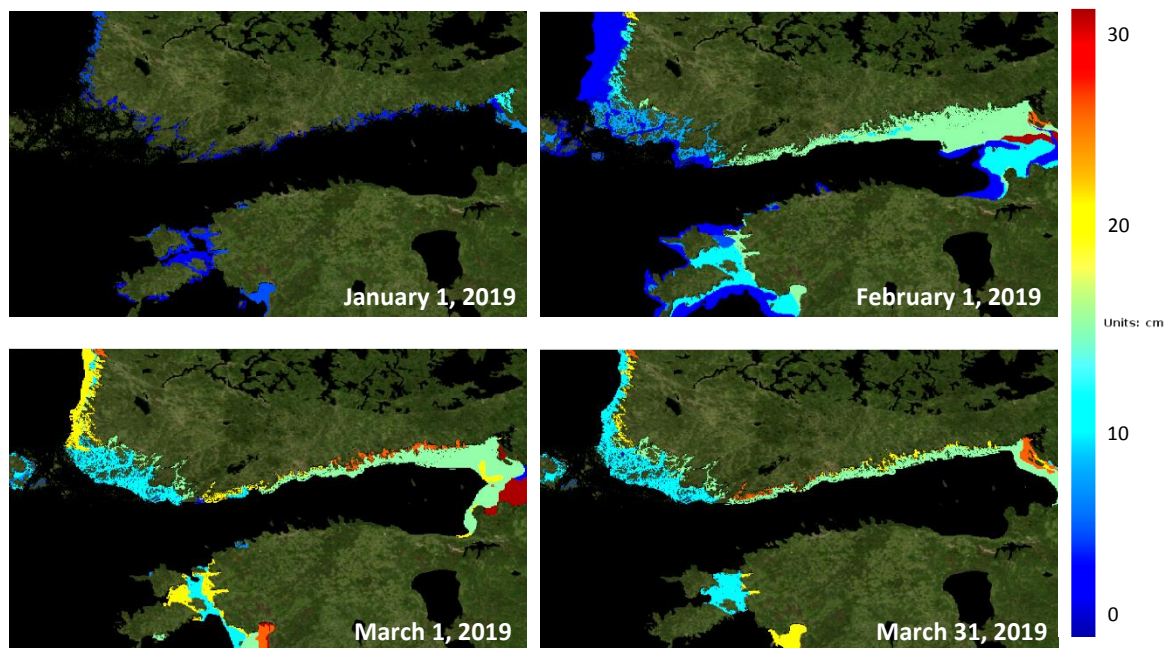


Figure 3. Thickness of sea ice (cm) during Q1, 2019. Adapted from /6/.

## 3 Construction activities during the first quarter

### 3.1 Schedule

The construction activities during the first quarter included rock placement and pipelay of Line A (Table 2), as the mattress installation work in the Finnish EEZ was finished in October 2018 /7/ and pipelay of Line B will only begin in Q2 2019.

Table 2. Construction activities during Q1 2019.

2019 Q1	January 2019					February 2019					March 2019		
Week	1	2	3	4	5	6	7	8	9	10	11	12	13
Rock placement											Cont.		
Pipelay Line A	Continues												



### 3.2 Activities during the period

#### Rock placement

Rock placement was conducted by vessel Nordnes from January 4, 2019 until January 12, 2019. The work was continued by Rockpiper from January 11 to February 9, 2019 and subsequently by Bravenes from March 13, 2019 continuing to the second quarter of 2019. There was a pause in rock placement work from February 10 until March 12, 2019 and a shorter one from March 14 to March 19, 2019, during which operations were transferred to the Swedish EEZ. Rock placement contractors were Boskalis Offshore Contracting B.V. and Van Oord Offshore B.V. (BoVO). Contractors report the proceedings of the rock placement works in an as-built register /8/, which is summarized in quarterly reports.

The rock placement during Q1 took place between GKP 120 and GKP 429 focusing on the area south of Inkoo and the area between Helsinki and Kotka (Figure 4). During the Q1-period altogether 70 berms were finalized: one pre-lay berm for Line B and 69 post-lay berms for Line A (Table 3). The need for an additional pre-lay berm for Line B was determined in early 2019. Post-lay berms were installed on the pipeline in order to support and cover the pipeline and increase its stability.

In total 35 of the 70 berms were stress/freespan correction berms, and one of them was the additional pre-lay berm for line B (Table 3). In addition, 32 in-service buckling mitigation berms were designed and installed for additional protection along the route to avoid excessive movement due to hydrodynamic loading and/or fatigue caused by current action of freespans in sections of uneven seabed. Furthermore, three UXO-berms were designed and installed post-lay to prevent the pipe from moving towards UXO's in the vicinity that had not been cleared as a precaution measure (Table 3). The total number of finalized berms was 207 at the end of Q1 2019.

The volume of rock used in rock placement during Q1 was 199,500 m<sup>3</sup>. Of this, 9 % was pre-lay and 91 % post-lay rock placement. Of the rock material used during Q1, 18,300 m<sup>3</sup> (9 %) were of Norwegian origin /8/ and the rest was Finnish rock. By the end of Q1, the total volume of rock used was 678,200 m<sup>3</sup>.

Table 3. Rock placement during Q1, 2019. Data summarized from /8/.

Berm type	Installed volume Q1/2019*	Number of berms
Stress/freespan correction	149,400 m <sup>3</sup>	35
Pre-lay	16,700 m <sup>3</sup>	1
Post-lay	132,700 m <sup>3</sup>	34
In-service buckling mitigation, lateral stability (post-lay)	40,300 m <sup>3</sup>	32
UXO (post-lay)	9,800 m <sup>3</sup>	3
Total	199,500 m <sup>3</sup>	70
* Installed volume was notified to Nord Stream 2 by contractors as tonnes (t), which was converted to cubic meters using factor 1/1.5625.		

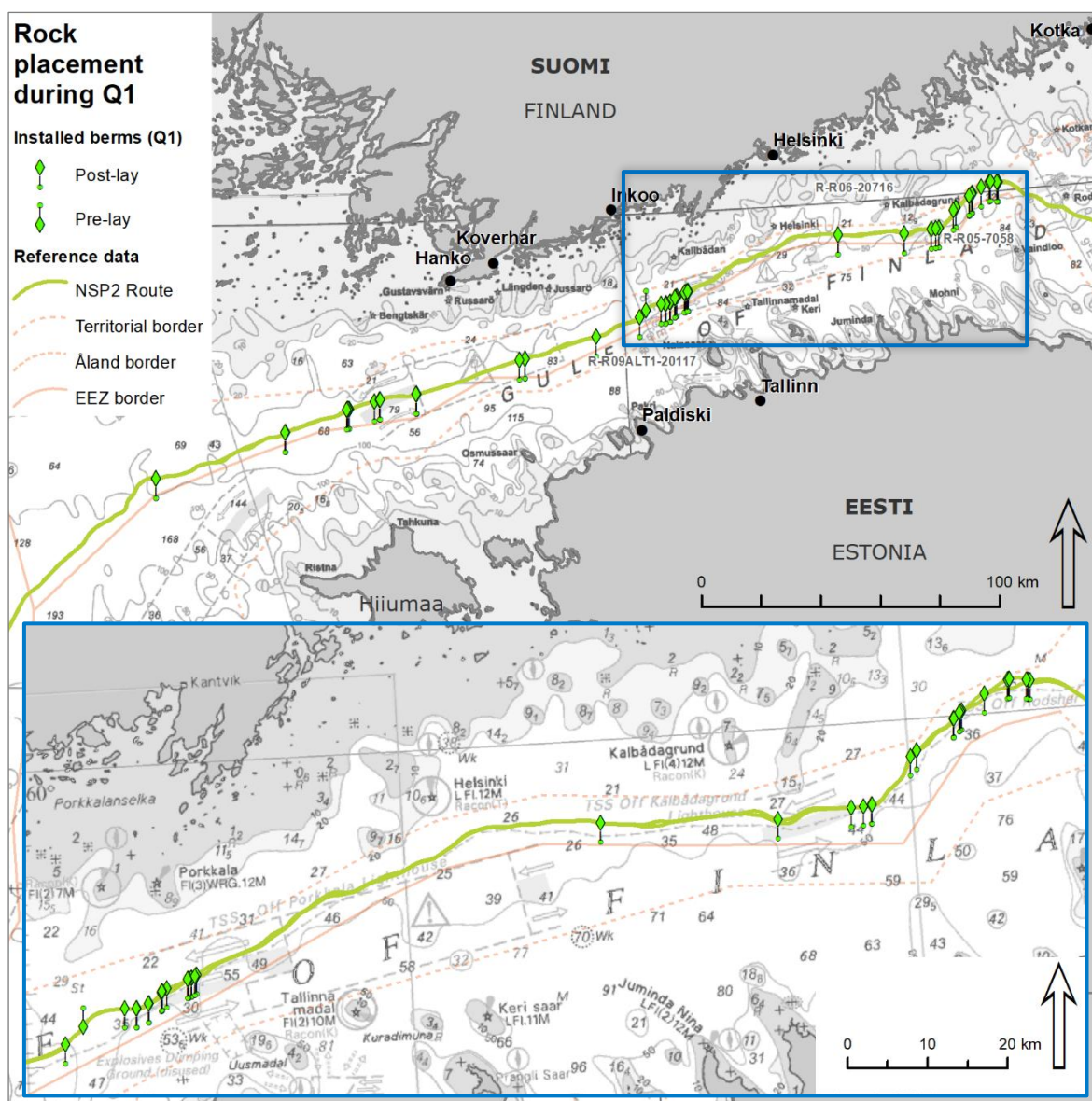


Figure 4. Rock placement activities during Q1. The lower map shows the area marked with blue frame in more detail.

## Pipelay

During the first quarter 2019 pipelay was conducted in the Finnish EEZ by the pipelay vessel *Pioneering Spirit*. The OCV Fortitude and OVC Oceanic provided survey support to *Pioneering Spirit* including Touch Down Monitoring (TDM) and A&R operations of the pipeline and support at cable crossing locations. In addition, OCV Oceanic also performed pre- and post- lay surveys /9, 10, 11, 12, 13/.

Pipelay was interrupted in the first two days of the year due to weather conditions unsuitable for pipelay (the storm "Aapeli"). After the storm, *Pioneering Spirit* continued pipelay (Line A) in southwest direction, starting from GKP 377 on January 3, 2019 /14, 15, 16, 17/. Due to bad weather, the pipeline was temporarily laid down on January 11, 2019. After a short weather downtime period, the pipeline was picked up again and pipelay was continued on the same day at GKP 402.978 /18/.

*Pioneering Spirit* crossed the Finnish-Swedish EEZ border at GKP 488 and continued pipelay in the Swedish EEZ on February 4, 2019 /2/.

Efficiency of pipelay during Q1 is presented below:

- approximately **115 kilometers** of pipelay
- 32 days of effective pipelay
- pipelay at 5 cable crossings
- highest daily lay speed in Q4 was approximately 4.4 km/day for *Pioneering Spirit*
- overall average daily lay speed was approximately 3.6 km/day (effective days)

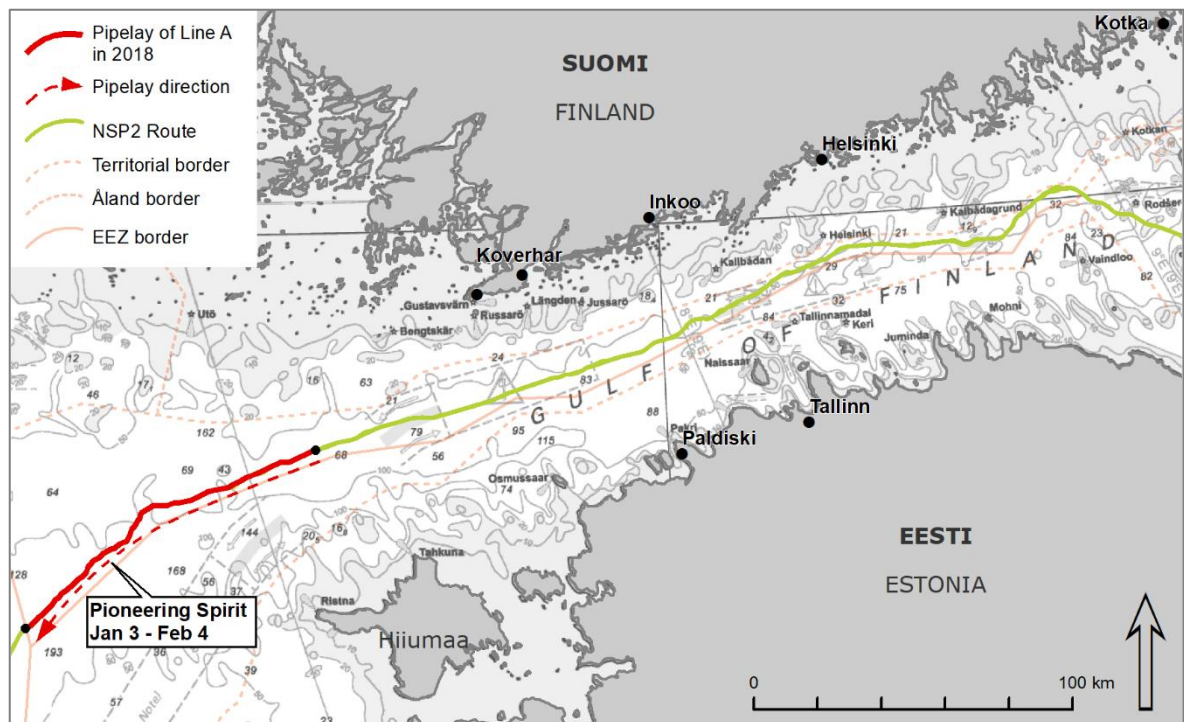


Figure 5. Pipelay during Q1 2019.



## 4 Water quality and currents

### 4.1 Monitoring activities

Water quality and current velocity is monitored at three sites by Luode Consulting, according to the approved Environmental Monitoring Programme Finland /1/ (Table 4 and Figure 6).

During Q1, water quality measurements continued at control stations located in the Western and Eastern Gulf of Finland and at Sandkallan monitoring site. The same control locations were used during the Nord Stream project.

Water quality monitoring includes turbidity, dissolved oxygen, salinity and temperature measurements in three depth layers near the seabed. 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 /19/.

The next water quality field report will be attached to the Q2 report. Due to winter ice conditions, no servicing of the monitoring stations was possible before Q2 2019. This is why the next report will cover the entire winter period from December 2018 - May 2019.

Table 4. Water quality and current velocity monitoring sites.

	Installed	Last service	Next service
Sandkallan	18.4.2018	12.12.2018	Q2
Control 1	17.4.2018	11.12.2018	Q2
Control 2	18.4.2018	12.12.2018	Q2

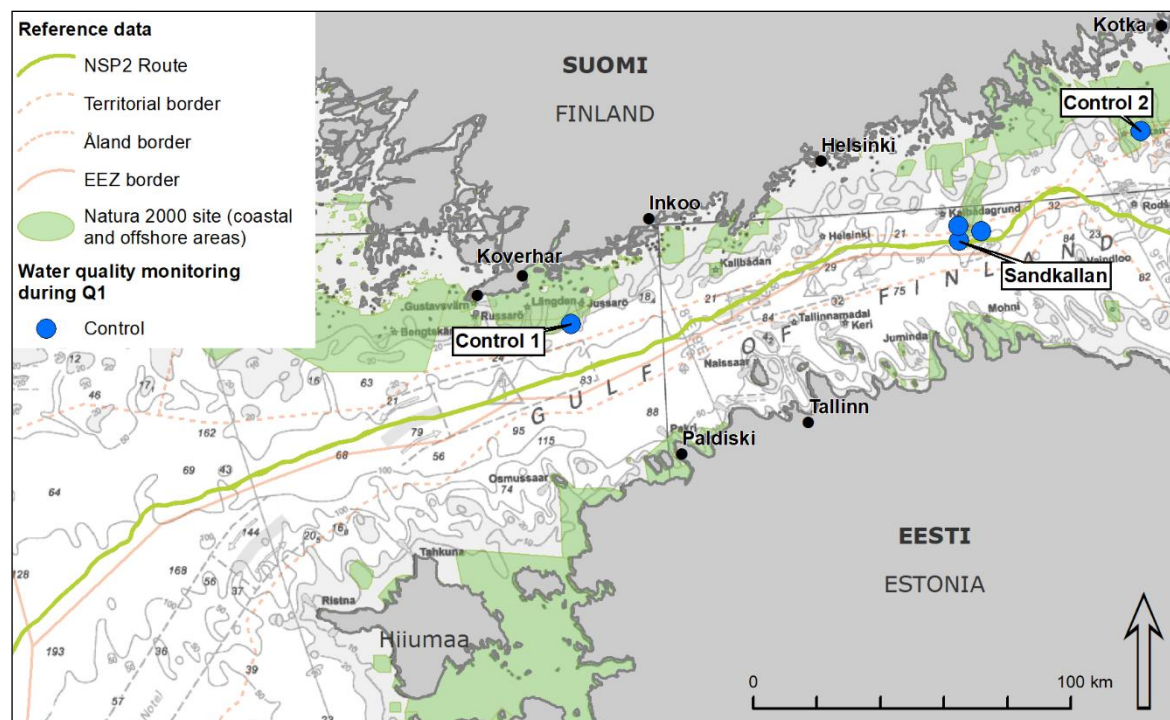


Figure 6. Water quality and current monitoring sites during Q1 2019.

## 4.2 Results

Water quality and current data analysis for Q1 and Q2 2019 will be presented in the Q2 2019 monitoring report.

## 5 Notifications to ELY-Centres during the first quarter

To clarify contradicting dates in the monitoring programme and the water permit decision Nord Stream 2 AG proposed on February 15, 2019 /20/ a clarification of the submission date of the annual monitoring reports. Nord Stream 2 suggested that the submission date of the annual reports is to be the end of May. The Uusimaa ELY Centre approved the schedule in line with the suggestion.

There were no anomalies to be notified to the ELY Centres in the reporting period.

## 6 Conclusions

Construction activities in the first quarter of 2019 consisted of pre- and post-lay rock placement as well as pipelay of Line A. During the period pipelay was interrupted twice due to unsuitable weather conditions.

Water quality monitoring continued during Q1. The next water quality monitoring report will cover the period between December 2018 – May 2019 (Q1 and Q2 2019) and will be included in the Q2 report.

Environmental and technical monitoring has been carried out according to the monitoring programme. The results in this report are preliminary. The final results for the year 2019 will be presented in the annual report 2019.

## 7 List of references

### Literature

1. W-PE-EMS-PFI-REP-805-032300EN-11. Nord Stream 2. Natural gas pipeline route through the Baltic Sea – Environmental monitoring programme, Finland. Ramboll. February 1, 2018.
2. Finland Authority Notification 190204\_PLV Pioneering Spirit. E-mail February 4, 2019.
3. Finland Authority Notification 010519\_PLV Solitaire. E-mail May 1, 2019.
4. Finnish Meteorological Institute 2019. Open weather data. [www.https://ilmatieteenlaitos.fi](http://www.ilmatieteenlaitos.fi)
5. Finnish Meteorological Institute, 2019. Viimeisetkin jäät ovat sulaneet Perämereltä. (The last ice has melted from the Bothnian Bay.) FMI bulletin May 14, 2019. [https://ilmatieteenlaitos.fi/tiedotearkisto/-/journal\\_content/56/30106/980718279](https://ilmatieteenlaitos.fi/tiedotearkisto/-/journal_content/56/30106/980718279). Accessed June 5, 2019.
6. EU Copernicus Marine Service Information and Finnish Meteorological Institute 2019. Baltic Sea – Sea ice concentration and thickness charts. [http://marine.copernicus.eu/services-portfolio/access-to-products/?option=com\\_csw&view=details&product\\_id=SEAICE\\_BAL\\_SEAICE\\_L4\\_NRT\\_OBSERVATIONS\\_011\\_004](http://marine.copernicus.eu/services-portfolio/access-to-products/?option=com_csw&view=details&product_id=SEAICE_BAL_SEAICE_L4_NRT_OBSERVATIONS_011_004). Exported from site June 6, 2019.
7. W-PE-EMO-PFI-RQU-892-RQU418EN-06 Nord Stream 2 Natural Gas Pipeline construction and operation in the Finnish EEZ. Environmental and Technical Monitoring. Quarterly Report Q4 2018. Sitowise. March 22, 2019.
8. W-OF-RDU-POF-CRB-830-ASBREGEN-07. As-Built Register. Nord Stream 2 – Rock Placement Works. Boskalis Offshore Contracting B.V. & Van Oord Offshore B.V. (BOVO). Rev 07. May 2, 2019.
9. Weekly authority notification Finland\_190104 PLV Pioneering Spirit. E-mail January 4, 2019.
10. Weekly authority notification Finland\_190111 PLV Pioneering Spirit. E-mail January 11, 2019.
11. Weekly authority notification Finland\_190118 PLV Pioneering Spirit. E-mail January 18, 2019.
12. Weekly authority notification Finland\_190125 PLV Pioneering Spirit. E-mail January 25, 2019.
13. Weekly authority notification Finland\_190201 PLV Pioneering Spirit. E-mail February 1, 2019.
14. Finland Authority Notification 190101\_PLV Pioneering Spirit. E-mail January 1, 2019.
15. Finland Authority Notification 190102\_PLV Pioneering Spirit. E-mail January 2, 2019.
16. Finland Authority Notification 190103\_PLV Pioneering Spirit. E-mail January 3, 2019.
17. Finland Authority Notification 190104\_PLV Pioneering Spirit. E-mail January 4, 2019.
18. Finland Authority Notification 190112\_PLV Pioneering Spirit. E-mail January 12, 2019.
19. W-PE-EMS-PFI-REP-812-WQCR02EN-03. Long-term water quality and current monitoring in the Gulf of Finland. October-December 2018. Luode Consulting. March 11, 2019
20. 800–961-PE-EIA-PFI-NTE-190215FI. Esitys tarkkailun tulosten vuosiraportoinnin ajankohdasta Uudenmaan ELY-keskukselle, hyväksytty Dnro UUDELY/9564/2017. Unofficial translation: A clarification on the schedule of submission of the annual monitoring reports to Uusimaa ELY Centre. February 15, 2019

## Maps and GIS data

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

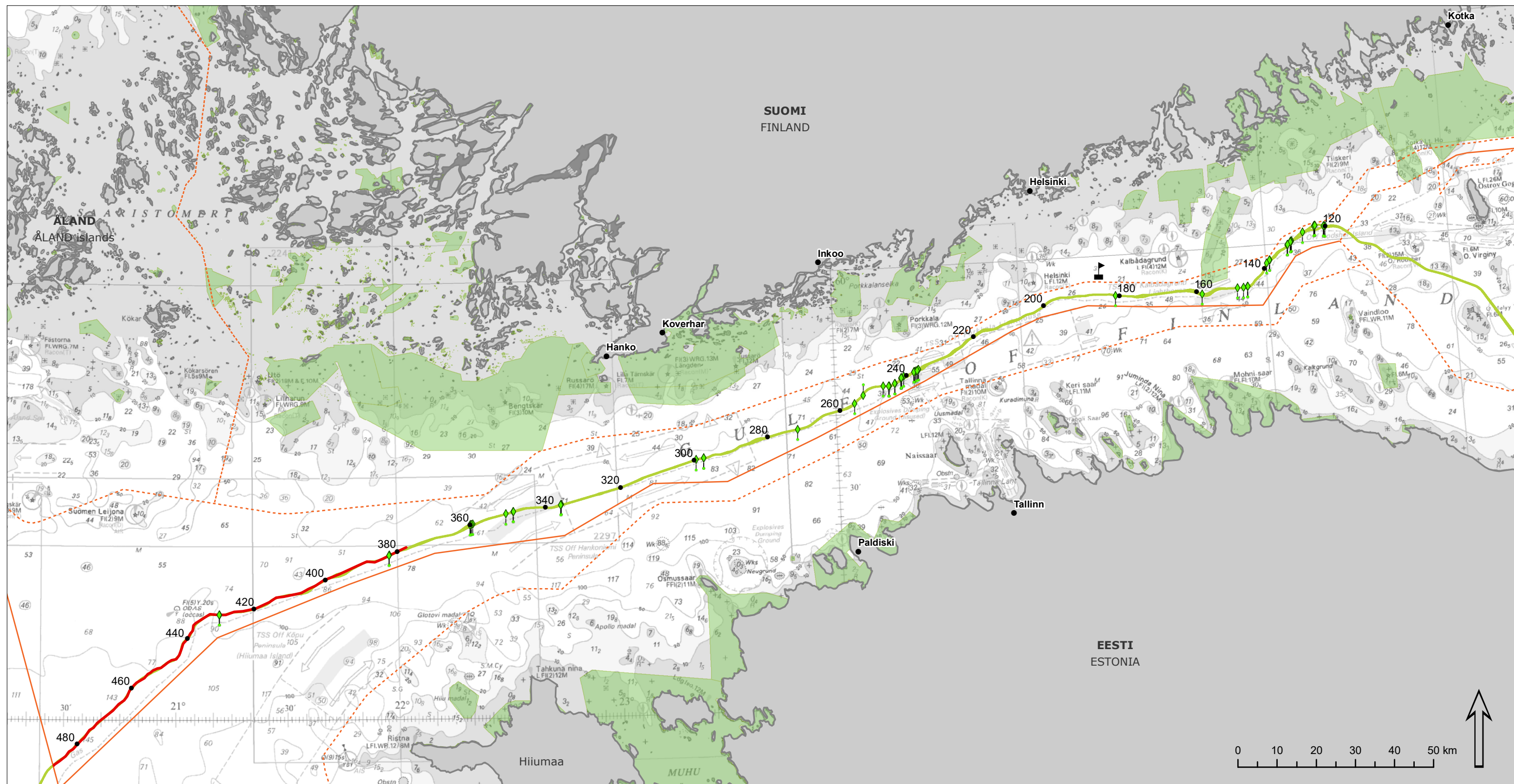
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European Environmental Agency (EEA) 2018. Natura 2000 sites. © Directorate-General for the Environment (DG ENV).

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

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





## Nord Stream 2 Construction activities during Q1/2019

### Pipelay

— Pipelay of Line A

### Rock placement

◆ Post-lay

◆ Pre-lay

### Reference data

— NSP2 Route

• Global Kilometre Point (GKP)

🚧 Open seas wave buoy

■ Natura 2000 site (coastal and offshore areas)

--- Territorial border

--- Åland border

--- EEZ border

### References:

- Limits of Exclusive Economic Zones and Territorial Waters: IBRU May 2010  
- Background sea charts are "Not to be used for navigation"  
- Background sea chart; © Crown Copyright and/or database rights. Unauthorized copying prohibited. See further copyright description in the report.  
- Natura 2000 sites. EEA and SYKE 2018.

### Annex 1

Version: Q1 report EN ver5  
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### Construction activities during Q1/2019

**SITOWISE**