



Fact Sheet: Rock Placement

Nord Stream 2 AG | Jun-18

1. Background

Due to the uneven nature of the seabed in the Baltic Sea, rock placement will be required along certain sections of the Nord Stream 2 Pipeline's route to ensure that pipeline integrity is maintained for the 50-year design lifetime of the pipeline system.

- > The entire route of the Nord Stream 2 Pipelines –1,230 kilometres – have been carefully surveyed to ensure their safe installation and operation, with minimum environmental impact.
- > The surveys, covering over 55,000 line kilometres, have mapped the seabed along the planned route in order to identify every detail of the seabed's topography. This includes, for instance, steep slopes, rock outcrops, sediment types, cables and other seabed infrastructure.
- > The surveys showed that the bathymetry and seabed conditions in the Baltic Sea require some intervention works on the seabed that need to be carried out both before and after pipelay. The majority of these intervention works involves the placement of rock material. The purpose of the rock installation is:
 - To provide pipeline support and protection at crossings with existing pipelines;
 - To mitigate against freespans, that is where spanning of an installed pipeline section is excessive, which could potentially lead to overstressing of the pipeline;
 - To mitigate against in-service lateral & upheaval buckling that could arise as a result of the pipeline's operating parameters, i.e. unacceptable excessive horizontal or vertical movement of the pipeline during operation that could compromise it's integrity;
 - To guarantee on-bottom stability of the pipeline such that it does not move under the action of environmental loading from waves and currents;
- > Rock placement is not carried out along the entire Nord Stream 2 route, but only at specific locations indicated in the five national permit applications for the pipeline.
- > All activities are implemented according to strict health, security and environmental (HSE) procedures based on applicable laws as well as international guidelines and standards. These take into account the safety of employees and the environment.

2. Rock Material

- > Facts and figures:
- > Use of Finnish granite
- > Estimated tonnage based on design theoretical design volume of rock to be installed is around 3.3 million Te.



- > In order to minimise the environmental impact, only clean, new crushed rock will be used. The granite chosen will have an average size of 60 mm, ranging from 20 to 100 millimetres. 90% of the rock is crushed to size up to 100 mm.
- > These small rocks will not contain any contaminants, such as heavy metals that can be dissolved into the water, nor will they contain any clay, silt, lime, vegetation or any other scattering constituents.
- > The majority of the rock material will be sourced from two Finnish quarries located in Rajavuori near Kotka, and Inkoo. Both are operated by Boskalis-Van Oord's subcontractor Rudus Oy.
- > A large majority of the rocks will be placed in Finnish and Russian waters.



To reduce excessive static stress on the pipeline, rock material will be used to reduce the length of freespans.

3. The Rock Placement Process

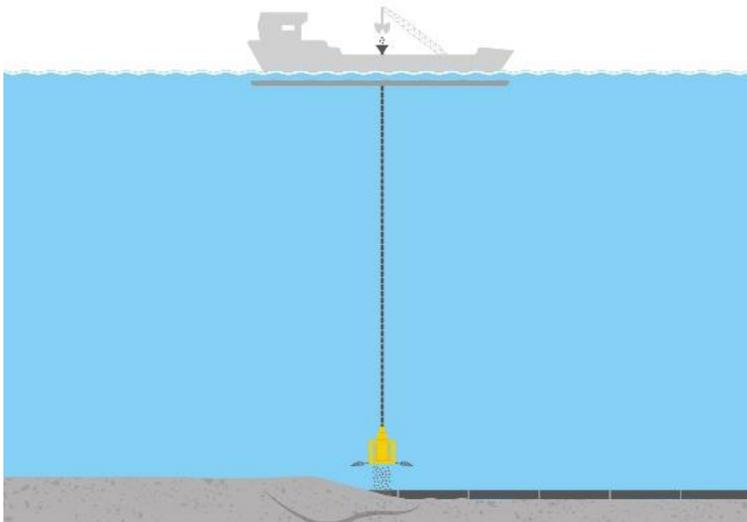
Boskalis-Van Oord, the joint venture in charge of all rock placement along the pipeline's route prior to and after the pipeline has been laid to the seabed, began with the works end of April 2018 in the Finnish Exclusive Economic Zone.

- > Boskalis-Van Oord uses dynamically positioned fallpipe vessels (FPV) such as "Rockpiper" and "Bravenes" to carry out the work.

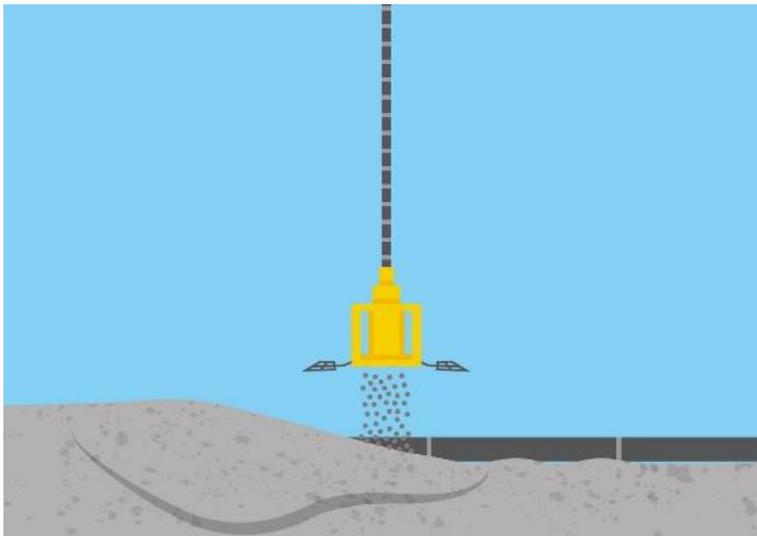


Rock placement vessel Rockpiiper, photo: Boskalis

- > Between two and three vessels will be working simultaneously along the pipeline routes.
- > Rock material is transported by FPV from the Kotka and Inkoo quarries to each of the identified positions where rock placement is required. The rocks are loaded into the vessel in port, and placed precisely via the fallpipe onto the seabed or pipeline at pre-determined locations. The entire rock placement process is supervised by a remotely operated vehicle (ROV) fixed to the lower end of the fallpipe.
- > The size and shape of each gravel berm is designed individually depending on seabed conditions. The size and amount of rock used for each berm is also calculated on the basis of the pipeline design, and the nature and topography of the local seabed.



Modern fallpipe vessels work along the route of Nord Stream 2 to place rock to the seabed wherever surveys and pipeline design have shown it is required.



Rock material is placed to its dedicated location on the seabed precisely with a fall pipe.

4. Gulf of Finland Requires Most Rock Placement

The Nord Stream 2 Pipeline will cross the territorial waters and/or the Exclusive Economic Zones (EEZ) of five countries along the Baltic Sea: Russia, Finland, Sweden, Denmark and Germany. Approximately 55 percent of the rock placement will, however, be carried out in the Gulf of Finland.

Russia

Approximately a 30 percent of the total amount of rock that is required will be installed in Russian territorial waters.

Finland

- > Finland requires the largest amount of rock placement, i.e. around 55 percent of the total amount of the estimated rock material. Nord Stream 2's route in the Gulf of Finland crosses a rough and, in many parts, uneven seabed, hence more intervention is required.
- > Finland is the main beneficiary of the rock placement activities in terms of job creation, as the rock material stems from two Finnish quarries. Additional jobs are created at the quarries, agencies, companies transporting the rock material from the Kotka quarry to the Mussalo Port, and at Inkoo for the coming two years. In the Finnish Exclusive Economic Zone, rock placement operations required before the pipelay started at the end of April 2018.

Sweden

- > Approximately 200 offshore locations along the Swedish route have been identified as needing rock placement. There are six active telecommunications cables and the already operational Nord Stream Pipelines that are being crossed within the Swedish



EEZ, necessitating the placement of a minimum of 380,000 m³ of rock. Rock placement is scheduled to start in summer 2018.

Denmark and Germany

- Negligible amount of rocks of the total designed amount of rock material need to be placed in German and Danish waters – only 1 percent and 2 percent respectively.



5. Contacts

Minna Sundelin

Stakeholder Relations Manager Finland and Estonia

press@nord-stream2.com

T: +41 41 418 3636

Nord Stream 2 AG

Baarerstrasse 52, 6300 Zug, Switzerland

info@nord-stream2.com

T: +41 41 414 54 54

F: +41 41 414 54 55

Moscow Branch

ul. Znamenka, 7/3, 119019 Moscow, Russia

info@nord-stream2.com

T: +7 495 229 65 85

F: +7 495 229 65 80

St. Petersburg Branch

ul. Reshetnikova 14a, 196105 St. Petersburg, Russia

info@nord-stream2.com

T: +7 812 331 16 71

F: +7 812 331 16 70