Nord Stream
The new gas supply route for Europe

Route Survey and Intervention Works for the Nord Stream Pipeline

Dredging and the Environment – Seminar, Tallinn, 15 Oct. 2008

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Agenda

1. Nord Stream Project
2. Routing Optimisation and Route Survey
3. Types of Intervention Works
4. Example of Routing and Design Optimisation

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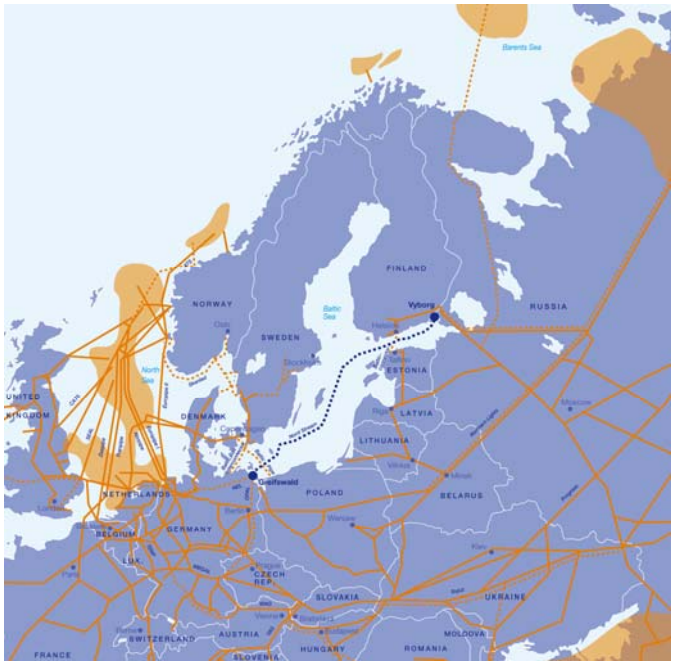
Nord Stream – Contribution to energy security

- **The new gas supply route for Europe consists of two parallel 1,220 km long** offshore natural gas pipelines across the Baltic Sea (each 48” in diameter)
- **Enhances** Europe’s security of supply by delivering 25% of additional gas imports
- **Directly connects** Russia with its **largest available gas reserves** in the world to European gas networks
- **Complements** existing routes from Russia to Western Europe
- **Transports** gas directly to the countries and customers where it is most needed: the UK, the Netherlands, Belgium, France, Italy, Czech Republic and other countries



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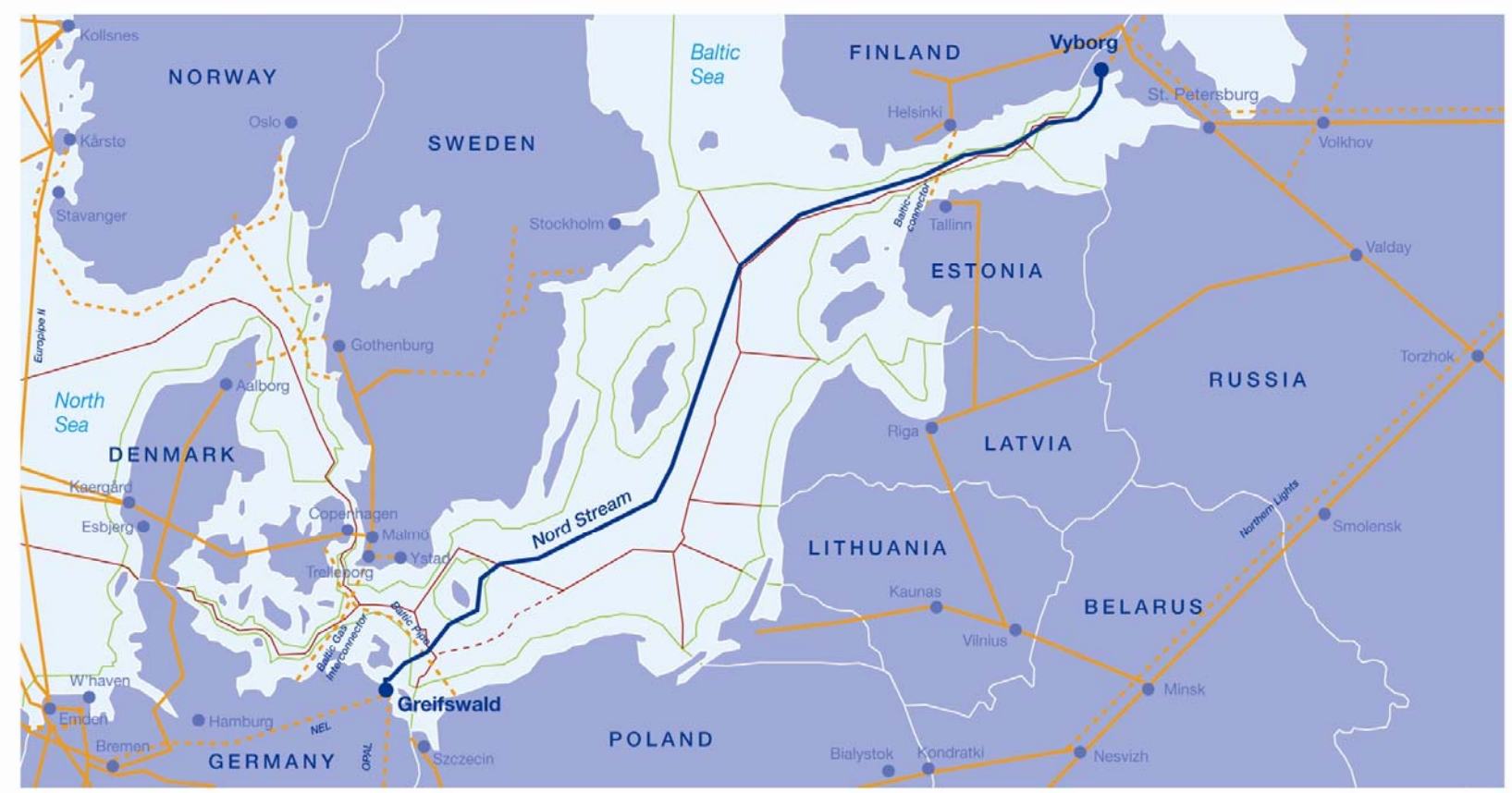
Nord Stream Pipeline Route



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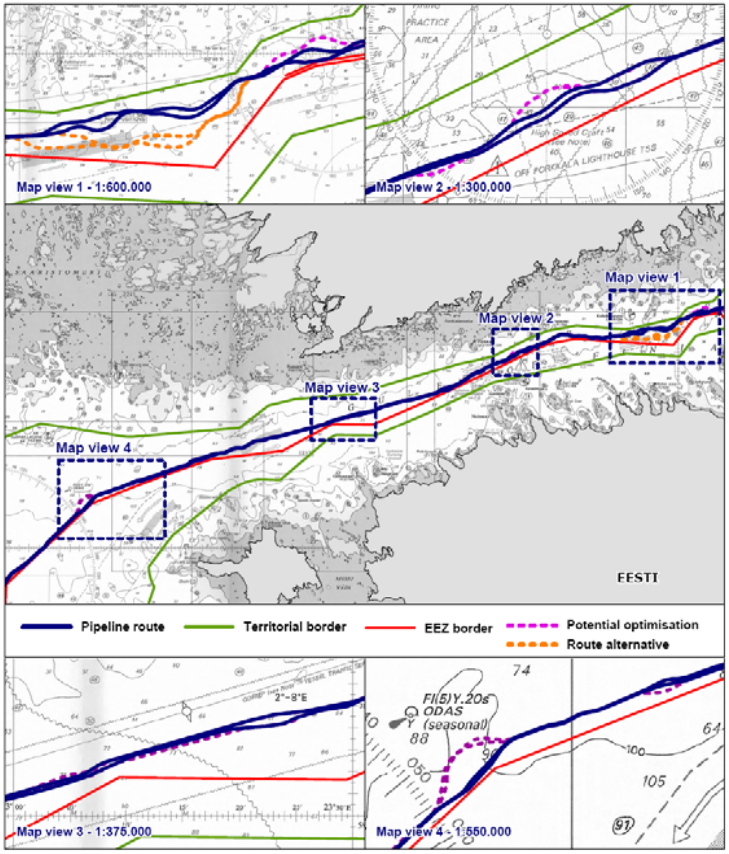
Route optimisation to minimise environmental impact of the pipeline

Routing – Important factors

- **Minimise** pipeline length
- Take account of **seabed conditions** and **bathymetry** and avoid areas with unsuitable seabed soil conditions and/or irregular seabed morphology
- Avoid **environmental protection areas**
- Avoid **munitions and shipping risks**
- **Respect alternative uses**, e.g. military activities
- Avoid planned and existing infrastructure
- **Respect cultural heritage**
- Avoid impeding fishery



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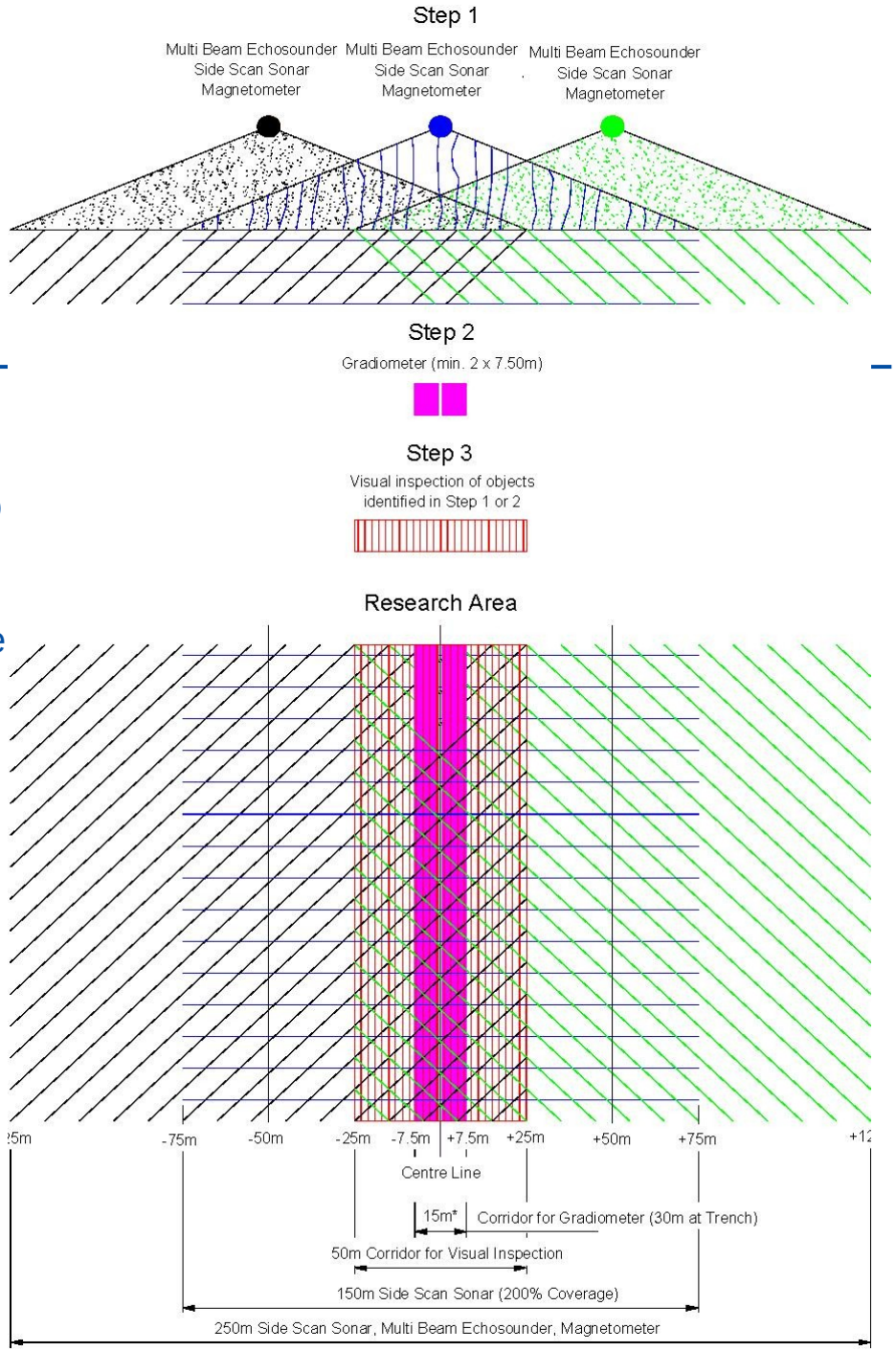
Survey methodology

Initial Route Planning:

- Route planned based on detailed desk studies
- Geophysical survey along the planned route to achieve a detailed bathymetry for a 2 km wide corridor
- Route planning, pipeline engineering and route optimisation

Detailed Route Survey for each Pipeline:

- Phase 1: Detailed geophysical survey and target location (cables, wrecks, ammunitions, obstacles, etc.) with side scan sonar and magnetometer (250m wide corridor)
- Phase 2: Installation corridor screening with ROV-mounted gradiometer array with 12 sensors (15m wide corridor)
- Phase 3: Target identification by visual inspection of targets within ± 25 m of each pipeline alignment
- Phase 4: Classification and evaluation
- Initial offshore evaluation and final verification by marine warfare experts



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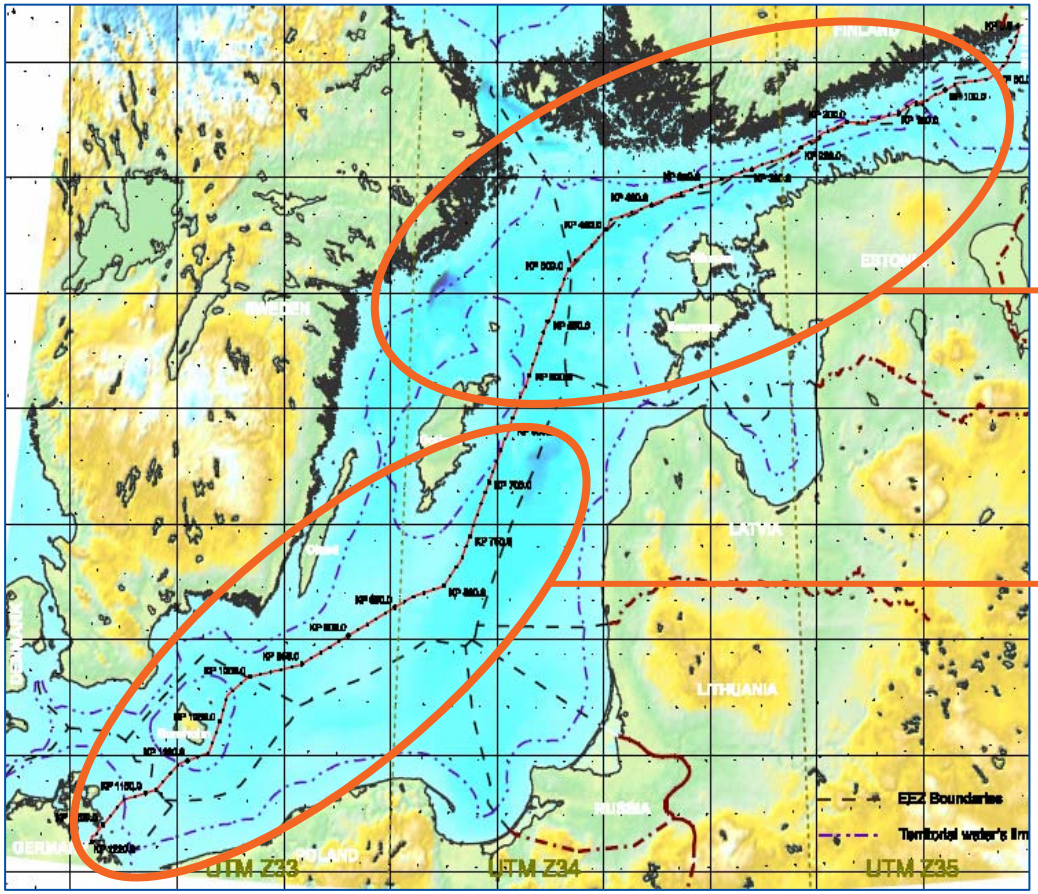
Main pipeline route features



- Very uneven seabed, with rocky outcrops alternated with very soft clay valleys
- Moderately corrugated seabed with sandy sediments

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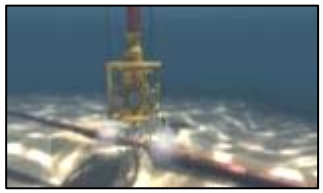
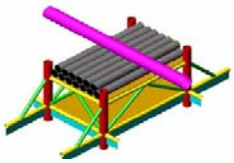
Four different types of offshore seabed IWs will be deployed during pipeline construction phase

1 **Dredging**
(pre-lay trenching)



2 **Installation of gravel supports**
(pre-lay/post-lay)

3 **Trenching**
(Ploughing - post-lay trenching)



4 **Installation of Support Structures**

Reasons for Intervention Works:

- Ensure on bottom stability
- Create safe foundations for the pipeline
- Protection against external interference

1) Sheet piling will only be used in the German landfall area. Cutting will only be applied where needed from an engineering point of view.

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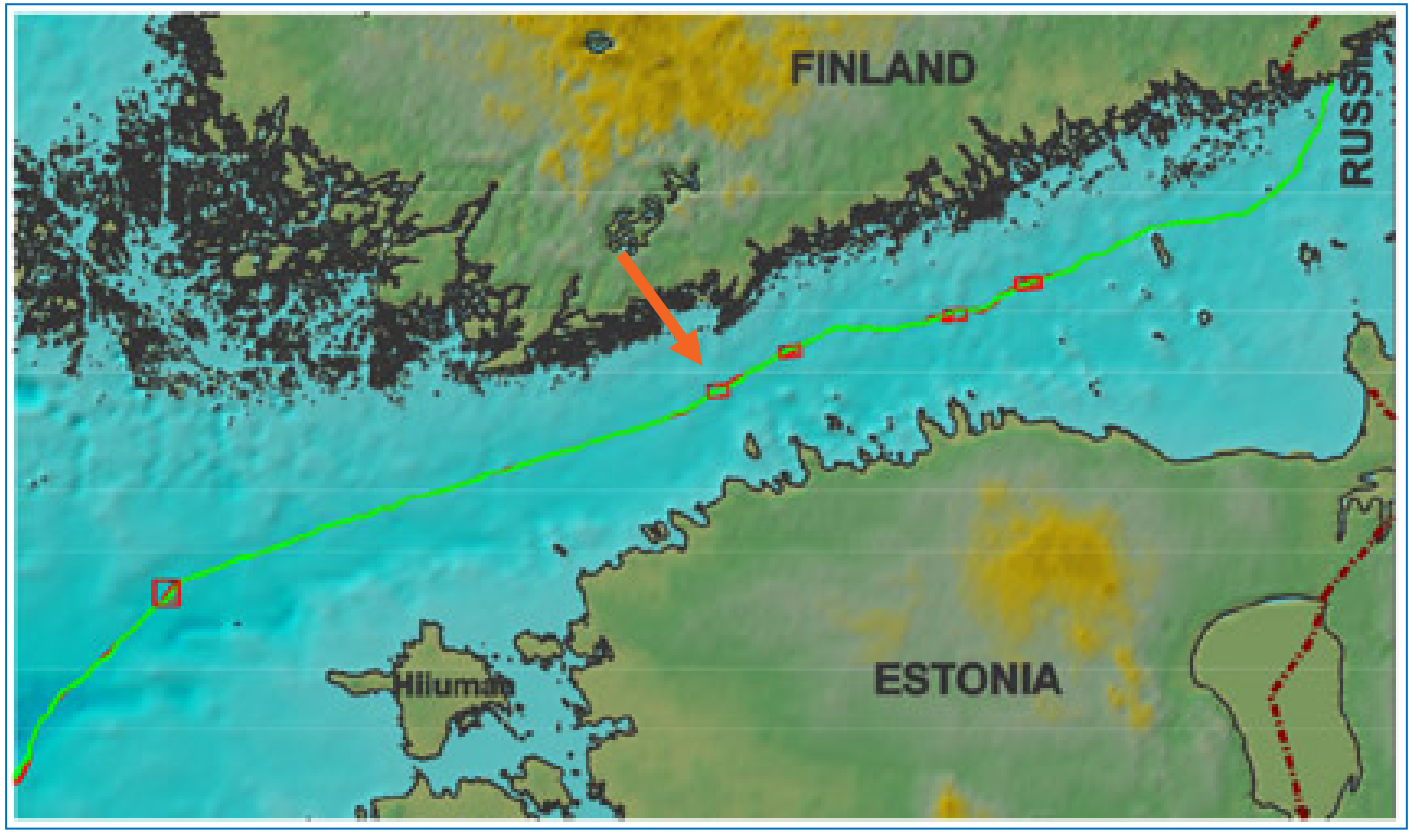
Example Rock Dumping

Importance of Route Optimisation Process (1/3)



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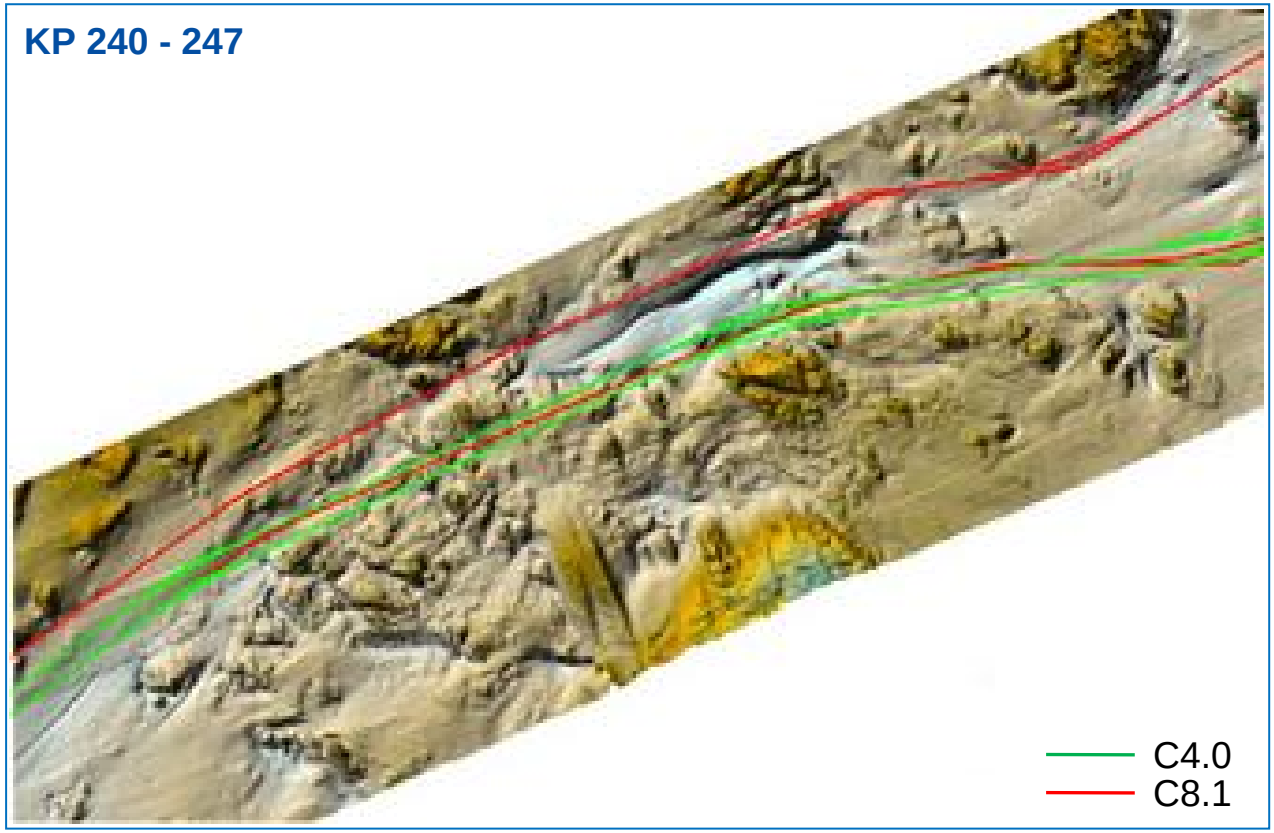
Example Rock Dumping

Importance of Route Optimisation Process (2/3)



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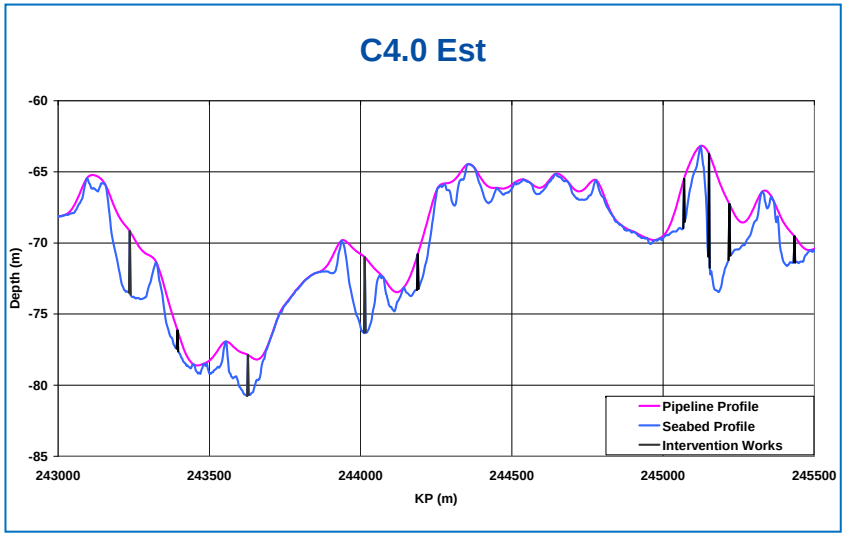
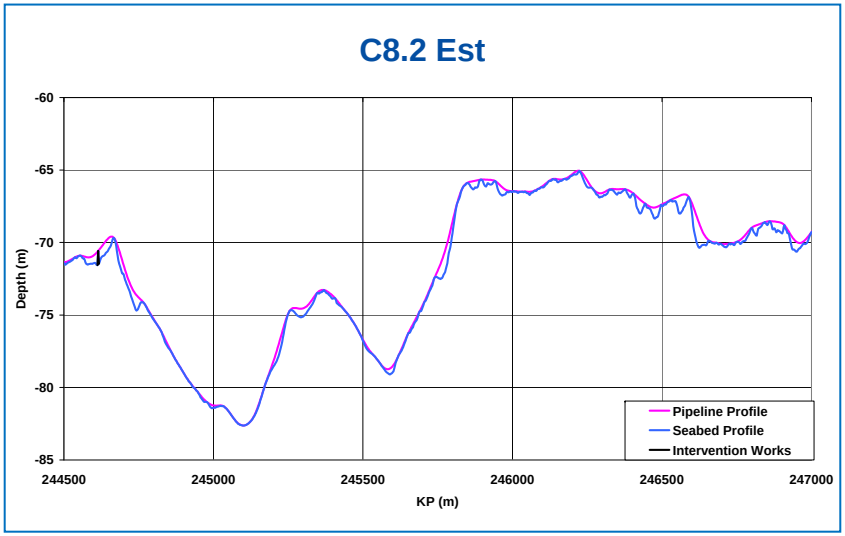
Example Rock Dumping

Importance of Route Optimisation Process (3/3)





	C4.0 Routes	C9.1 Routes	C10.3 Routes	C14.0 Routes*
Number (No) of IWs (Pre+Post Lay for static only)	183	119	95	36
Total Volume Gravel (m^3)	431,122	157,337	196,652	51,651

(East route as comparison case) FINNISH SECTOR

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Conclusion

- Nord Stream carried out detailed route survey with state of the art and high resolution equipment
- Nord Stream carried out very detailed engineering and route optimisation in order in order to provide
  - safe and reliable pipeline system and to
  - minimise the environmental impacts

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