

We are committed to building the pipeline in the most environmentally friendly and sustainable way. The route and construction period have been defined in consultation with national authorities to minimise potential impacts on the sensitive Baltic Sea environment. Our team also benefits from the experience of the existing Nord Stream Pipeline.

Independent contractors monitor the actual impacts on the environment and marine life before, during and after construction along the pipeline route across 12 categories. This is to verify that construction impacts remain within the limits laid out in approved permitting documents, in addition to providing details for reporting on the

mitigation measures implemented. National monitoring programmes prepared in the countries whose waters the pipeline passes through verify compliance with the project's permit provisions. The results are provided to the national authorities and in summary reports disclosed on our website.



WATER QUALITY

As a top priority throughout the project, water quality is measured according to turbidity, or cloudiness caused by suspended seabed sediment, to ensure that relevant threshold values are not exceeded. Turbidity plumes are tracked with optical sensors and water sampling to measure levels of suspended sediment in the areas where seabed intervention works are performed. Chemical analysis of water samples shows whether changes in water quality have occurred.



UNDERWATER NOISE

Activities that cause underwater noise, such as munitions clearance and rock placement, were monitored with hydrophones. Noise from munitions clearance, which has the highest potential to negatively impact wildlife, was reduced where necessary with the use of bubble curtains to attenuate sound.



BIRDS

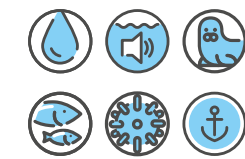
Seabirds are monitored from land, sea and air in the coastal and marine areas near the Russian and German landfalls. These areas are particularly important for migration, nesting, and foraging. The resulting data on their distribution and population trends are used to determine any impacts from the construction.



BENTHIC FLORA & FAUNA

Benthic flora and fauna are monitored to document changes during construction, and their subsequent recovery after pipeline operation begins. Epifauna is expected to colonise the pipelines in areas with favourable conditions, and growth will be recorded as part of post-construction recovery studies. Infauna is monitored where dredging or trenching will disturb the seabed to follow its recovery as well.

Finnish section



Russian section



Narva Bay

FINLAND

ESTONIA

RUSSIA

SWEDEN

LATVIA

LITHUANIA

RUSSIA

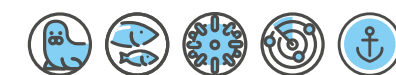
POLAND

GERMANY

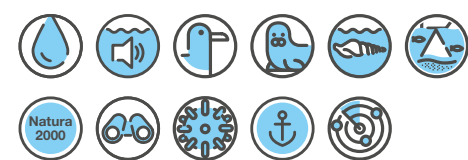
DENMARK

Bornholm

Danish section



German section



Lubmin near Greifswald

Swedish section



NATURA 2000

The German section crosses several Natura 2000 areas. To limit the impacts of intervention in these waters as much as possible, the main construction activities were completed by the end of 2018, for example. All works and their effects are being carefully monitored.



MUNITIONS

The Baltic Sea was subject to extensive mine placement during certain conflicts and used for dumping of munitions after the World Wars. The pipeline route was adjusted to avoid such objects wherever possible, though a number of conventional munitions had to be cleared. The impact of clearance was reduced with the use of various mitigation measures. Additionally, monitoring of chemical warfare agents in seabed sediments is performed to demonstrate that contaminants are not spread during construction.



MARINE MAMMALS

A variety of monitoring methods determine whether increased turbidity and vessel activity during construction have impact on marine mammal populations. Hydrophones are used to assess if underwater noise could have any effect on the resident populations, while visual observations and tracking are conducted to evaluate potential behavioural changes.



SEABED SEDIMENTS

The seabed around the pipelines is monitored to verify that they do not hinder natural sediment movements or impact the topographical environment along the route. Physical and chemical properties of seabed sediments are analysed to demonstrate that there are no changes.



MARITIME TRAFFIC

Ship traffic is monitored during construction using tracking networks like the automatic identification system (AIS). This demonstrates that commercial ships safely and freely navigate around construction vessels.



CULTURAL HERITAGE

Objects of cultural value along the route are monitored with video surveys before and after construction. Consultations with the national cultural heritage authorities are to ensure that these artefacts are assessed and safeguarded.



FISH & FISHERIES

Potential changes to fishery patterns, fish catches or fishing behaviour are evaluated during and after the pipeline installation. Bottom trawling patterns may need to be adapted in certain areas due to the presence of the pipelines, but these could potentially become a new habitat for fish.



ONSHORE MONITORING

Extensive assessment of biological and physico-chemical parameters takes place at the landfalls in Russia and Germany. Emissions and noise levels are measured near residential areas to ensure minimal disturbance and compliance with regulatory thresholds. Baseline monitoring of flora and fauna also documents the state and variety of local populations. In the sensitive areas at the Russian landfall, monitoring of plants and animal life is performed throughout construction and into the early phase of the pipeline's operation.

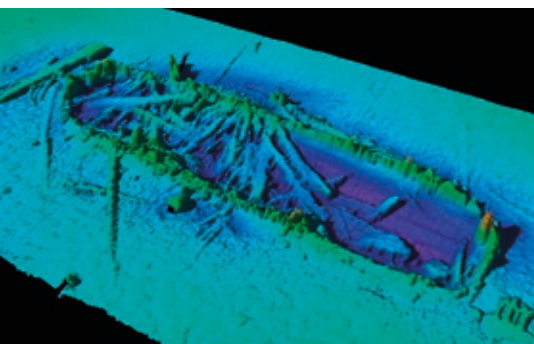


Diving in at the Deep End

Efforts to preserve the Baltic Sea also involve expanding our knowledge about this unique environment.

A piece of history

During initial seabed surveys in Swedish waters, we found a 24-metre long wooden shipwreck that seems to be relatively intact: a potential cultural monument. The degree of decomposition suggests that it sailed prior to 1850, but still images didn't allow a precise dating. Further investigations are needed to determine the ship's exact place in history.



The secret life of seals

The Baltic ringed seal is a protected species, but data on its population in the Gulf of Finland is scarce. Alongside our monitoring programme in Russia, we are sponsoring research into the mammals' sea use that continuously tracks their movement over several months with GPS telemetry tags.

Initial findings have confirmed the importance of the Moschnyi islands and Kurgalsky reef as summer foraging and resting grounds, and revealed seasonal movements to the northern shores of the Gulf, where seals find breeding ice in the winter. This knowledge about their behaviour offshore is key to developing an effective conservation strategy for the species.

Many Heads Are Better Than One

Independent consultants ensure the quality of our monitoring and reporting – two experts describe how.

"Luode Consulting is responsible for monitoring noise, water quality and sediment toxicity during offshore operations in Finland, as well as conducting noise monitoring in nearby Estonian waters. It's an important project for us, mobilising a large number of instruments. We have been happy to see that Nord Stream 2 is always prepared to do a little bit more than what is strictly required – even if it means spending more money and working hours.

"Sitowise is the environmental consultant for the project in Finland. The monitoring contractors provide their findings on munitions clearance, underwater noise, water quality, currents and cultural heritage to Nord Stream 2, which in turn submits them to us. We then perform quality control for all information submitted and provide independent environmental expertise to produce reports for the Finnish environmental administration supervising the monitoring.

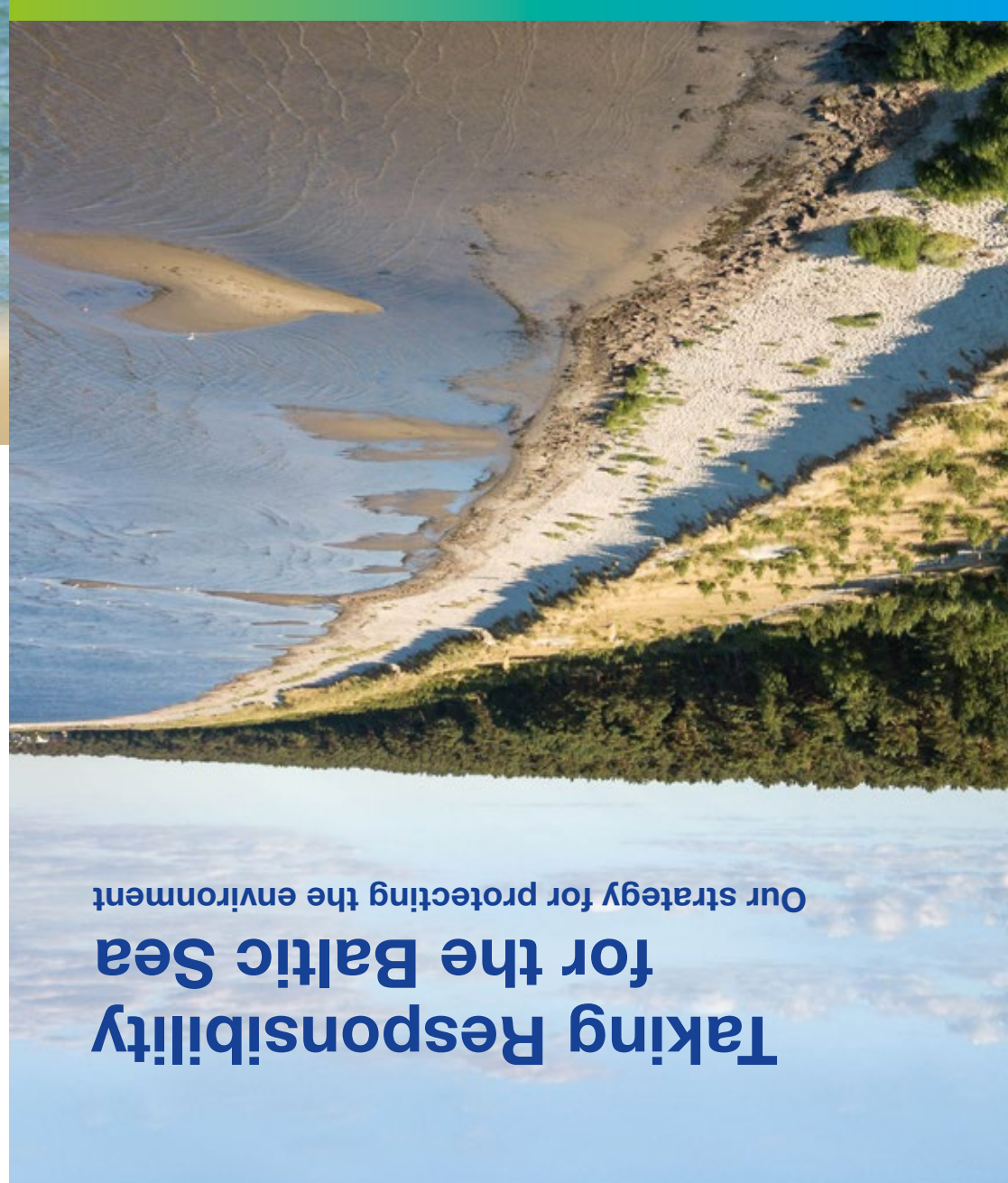
Underwater noise is actually a new monitoring requirement, as it is now known to cause hearing losses in marine mammals. This topic was particularly important during munitions clearance, when explosives were used to clear over 70 mines from the World Wars in Finnish waters. We needed to verify that the forecast values from the EIAs were consistent with what we were finding in the field. In the end, we analysed over 250 sound recordings: only one of these was some decibels higher than expected, while all the others were lower than predicted."



Antti Lindfors,
Luode Consulting



Sakari Grönlund,
Sitowise

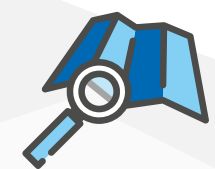


Taking Responsibility for the Baltic Sea

Our strategy for protecting the environment



Facts and Figures



By the end of 2020, Nord Stream 2 will have invested over **100 million euros** in environmental surveys, assessments, analyses, monitoring and conservation activities.



Approximately **30 wrecks** are being monitored



9 ringed seals

were tracked in telemetry studies to collect much-needed data on seal behaviour and use of the marine environment.

Bubble curtains were used to reduce underwater noise for clearance of **58 munitions**



Up to **40 independent contractors** have contributed to our environmental monitoring.



Water quality monitoring takes place **at 30 locations** via fixed or mobile stations.

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Solutions for an Ecologically Safe Pipeline



Construction of the Nord Stream 2 Pipeline takes place in a sensitive ecosystem: the Baltic Sea. Ekaterina Kurakevich, Environmental Expert Denmark, explains how the company assumes its responsibility to protect it.

What are the main environmental challenges associated with the new pipeline?

Our goal is to safely build the twin pipelines in the most ecological, sustainable way possible. Pipeline routing was one of the most important and thus challenging factors in minimising potential environmental impacts. We had to define the most efficient route while following national legislation in five countries, complying with environmental restrictions like protected areas, and ensuring technical feasibility in places where the seabed is uneven or where munitions are present.

Why is environmental monitoring important to the project?

Its purpose is to demonstrate that our activities don't affect the marine environment in any significant way, and to verify that the project's impact is in line with the EIA reports included in our permit applications. The results of our monitoring also let us know if unexpected environmental impacts occur, and allow us to implement corrective measures.

The data is published in annual reports which can be found on our website.

Have you taken any mitigation measures for the impacts that are expected?

Our mission is to provide optimal technical solutions that ensure the environmentally safe construction and operation of the pipeline. Along most of the route in deep-water sections we used dynamically positioned construction vessels that use thrusters for positioning, in order to avoid direct seabed contact and to minimise the need for munitions clearance. In Germany, we pulled the pipeline through a 700-metre long underground microtunnel running from the Bay of Greifswald to the onshore pipeline operation facilities. The microtunnel, located about 10 metres below the waterline, allowed us to keep the nearshore forest intact and preserve the recreational beach area. In situations where impacts couldn't be entirely avoided, we have taken action to minimise their duration and intensity.



Can you give examples?

During the preparatory phase, when clearing munitions in the Gulf of Finland, we used so-called "bubble curtains" to decrease the underwater noise propagation associated with detonations and minimise potential impacts on marine mammals and fish. In Russia, we installed the pipeline in trench boxes along a 3.7-kilometre long section through the Kurgalsky nature reserve, from Narva Bay to our onshore facilities. Their use, paired with a ground water management system, reduced the size of the construction zone and preserved the hydrological characteristics of the area.

What is the scale and timespan of your environmental monitoring?

Monitoring activities started before construction began and will continue for several years after the pipeline goes into operation. The details of single activities have been agreed with the relevant national authorities, but in general, our approach depends on the parameters that need to be evaluated in the onshore, nearshore

and offshore environments. In addition to environmental monitoring, regular internal and external inspection surveys of the pipeline system will be carried out throughout its lifetime to ensure safe and reliable operation.

What have the monitoring results shown so far?

The results show that there have been no significant impacts on the Baltic Sea from construction. Observations were generally in line with or below the predicted impacts outlined in the national EIAs, remaining both temporary and local in nature. For example, turbidity measurements during construction demonstrated that there were no lasting impacts on water quality. Underwater noise monitoring showed that the pipelay vessel source level and noise spectrum were comparable to ship traffic in the area. Thanks to extensive mitigation measures, no harm to marine mammals was observed. Comprehensive monitoring in the Kurgalsky nature reserve, meanwhile, verified that works there had no significant effects on the flora and fauna.

Different Countries, Different Requirements

Five national monitoring programmes were prepared in consultation with competent authorities before construction, to fulfil the permit requirements in each country. Our priorities reflect the local environmental conditions.

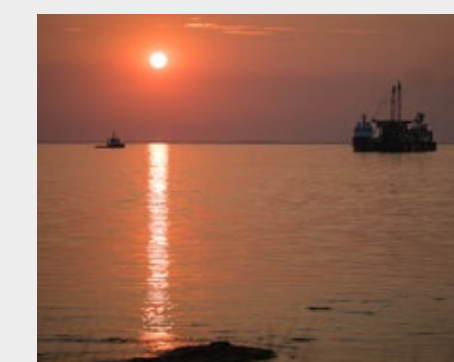
Germany



The monitoring targets, processes and reporting requirements in Germany were agreed with several national authorities and cover both offshore and onshore construction activities at the German landfall. During construction, the potential impacts and parameters monitored include noise, water turbidity and wildlife. Once the pipeline has been installed, recovery monitoring will take place over the course of four years to document

the full restoration of the status quo. This will cover marine mammals, seabirds and seabed composition, with a special focus on the Natura 2000 protected areas along the pipeline route. The specific conservation objectives of these areas are to protect benthic habitats, marine mammals such as seals and harbour porpoises, and wintering seabirds – this will also be the main priority of Nord Stream 2's environmental monitoring in Germany.

Denmark



The Danish monitoring programme was discussed in detail with the national authorities and focuses on the sensitive biological, physico-chemical and socio-economic parameters. For example, monitoring of chemical warfare agents in seabed sediments is performed before and after construction. This will demonstrate that contaminants are not spread during construction.

Sweden



As stipulated by the Swedish government's permit, the monitoring programme was developed in consultation with multiple environmental and maritime administrations. The focus of environmental monitoring in Sweden is the newly extended Natura 2000 area "Hoburgs bank och Midsjöbankarna" that the pipelines pass south of the island of Gotland. This is mainly due to the important habitats present in the shallow waters along the southern part of the route through the

Swedish EEZ. In winter, the shallow bank areas provide vital resting and feeding grounds for migrating birds. In summertime, harbour porpoises congregate there for mating, breeding and suckling. We monitor noise from construction work in the area to verify the findings, both of the environmental study and of additional expert assessments, that the noise levels in various frequencies will not lead to any significant impacts for these animals.

Finland



The Finnish programme was approved by the national water permit authority and defines the parameters to be monitored as well as the agencies to be informed. Underwater noise, water turbidity and currents, commercial fisheries and cultural heritage are all key priorities in this area. In addition, our environmental reporting also covers the monitoring of seals in the protected Kallbada area, which is carried out by the country's forestry authority.

Russia



Environmental monitoring based on the EIA results approved by the Main State Expertise of Russia was key to securing local authorisation for the project. To protect biodiversity in the Kurgalsky reserve, we created artificial bird nests and moved Red Book plant and moss species away from construction. They are assessed regularly in the first season after relocation, and at the start, middle and end of the vegetation period for the next two years.

