

Nord Stream is committed, through national and international agreements, to carrying out all construction work on its pipelines in an environmentally responsible manner.



## Monitoring Provides Vital Ecological Data

### What is the basis of Nord Stream's Environmental Monitoring Programme?

**Samira Andersson:** As part of the preparation for constructing of the pipelines, Nord Stream developed national Environmental and Social Monitoring Programmes (ESMPs) for Russia, Finland, Sweden, Denmark, and Germany, to underscore its commitment to carrying out all work safely and with respect for the environment. The programmes were drafted in compliance with the permit conditions in each country and finalised in consultation with the relevant national authorities. The monitoring programmes are based on the findings from the national Environmental Impact Assessments (EIAs) and environmental studies where potential areas of concern were identified. National legislation generally requires an EIA to be completed as a prerequisite for a national permit. Extensive

**Samira Andersson,**  
Nord Stream Project Manager for Environmental Monitoring

### What types of impacts are expected when the pipelines are operational?

**SA:** After construction, we will be monitoring the recovery of the environment. For example, in the scope of our fish monitoring programme, we will review the quantitative changes in the fish populations adjacent to the Nord Stream pipelines, comparing the results with those for the fish community of the surrounding seabed. The intention of the monitoring is to determine whether the pipelines have an artificial reef effect and become a habitat for fish, and also flora that could grow on them.

### How long will the monitoring activities be in place, and how much is Nord Stream investing in the programmes?

**SA:** The national monitoring programmes began in 2010, and will run through 2016. In 2010 alone, Nord Stream invested 13 million euros in its monitoring programmes. The company plans to invest a total of approximately 40 million euros into its ESMPs to monitor any impact of the construction and operation of the pipelines through 2016.

### Have studies of this scale ever been conducted in the Baltic Sea?

**SA:** Nord Stream has made the most comprehensive survey of the Baltic Sea environment to date. More than 100 million euros were invested in environmental impact studies and planning to ensure that the design and routing of the pipelines would minimise environmental impacts.

Detailed surveys and research of potential environmental and socioeconomic impacts were first started in 1998. In 2007 a further round of studies was commissioned. These results were compiled in the EIAs and shared with national authorities. They were also made available to the public. The current monitoring programmes will verify the models established in the EIAs.

**What kind of impacts are expected from the construction of the pipelines?**

**SA:** The actual laying of the pipelines on the seabed is not expected to cause any critical or lasting impacts. However, during seabed intervention work, such as trenching, rock placement and dredging at the landfalls, the disturbance of the seabed results in dispersion of sediment. This temporarily increases turbidity, or cloudiness that could have an impact on marine flora and fauna. In addition to the environmental parameters that are being monitored, numerous engineering inspections and surveys applying to construction work along the entire route are being carried out.



### Nord Stream AG

Nord Stream AG is an international consortium of five major companies established for the planning, construction and subsequent operation of two natural gas pipelines through the Baltic Sea. The majority shareholder OAO Gazprom holds a 51 percent stake in the pipeline project. Leading German energy companies Wintershall Holding GmbH and E.ON Ruhrgas AG hold 15.5 percent each, and the Dutch natural gas infrastructure company N.V. Nederlandse Gasunie, along with the leading French energy provider GDF SUEZ each hold a 9 percent stake. The combined experience of these companies ensures the best technology, safety and corporate governance for this project, which aims to provide a secure energy supply for the European Union (EU).

The Nord Stream Pipeline system through the Baltic Sea is the most direct connection between the vast gas reserves in Russia and energy markets in the EU. When fully operational in 2012, the twin pipelines, each 1,224 kilometres long, will transport a combined total of 55 billion cubic metres of gas a year – that is enough to satisfy the energy demand of more than 26 million European households. The European Parliament and Council designated the project as being of "European interest." This status is given to projects that strengthen markets and reinforce security of supply.

### Contacts

For more background information, visit our website at:

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## Five Countries, Five Programmes

> Nord Stream's Environmental Monitoring Programme fulfills the requirements and commitments outlined in the national permits received from five countries to build and operate the pipelines. The subjects monitored differ from country to country based mainly on the different natural environments in each region.

### Germany



At the end of 2010, work at the landing point of the pipelines in the German Bay of Greifswald was completed. Both near shore and offshore construction activities took place. Near shore, a cofferdam was built, and offshore a 27-kilometre trench was dredged. During dredging, water turbidity levels were regularly tested to ensure compliance with permit requirements. In order to assess the impacts on marine mammals, such as harbour porpoises and seals, monitoring underwater noise levels was particularly important in this area during pile-driving at the landfall, and dredging and backfilling of the pipe trench. After backfilling, the seabed topography was monitored to confirm that the seabed was restored to its original state. Monitoring of the recovery of shallow water habitats will also take place through 2014.

### Denmark



The monitoring of sediment spreading and water quality is a key issue in Denmark during trenching activities in February 2011. Water quality is measured to assess turbidity levels, and sediment monitoring is focused on documenting any changes due to the disturbance of contaminants originating from constructing the pipelines. When the pipelines are completed, hydrographic measurements will be made to determine if the structures have an influence on the inflowing saline deepwater through the Bornholm Basin. Monitoring of hydrography will also help to determine whether the pipelines have altered current patterns. Two culturally significant wrecks identified in the pipeline corridor are monitored during and after construction to document that they have not been damaged.

### Sweden



In Sweden, the pipelines come within a few kilometres of two Natura 2000 sites – Hoburgen Bank and Norra Midsjöbänken. Therefore, the monitoring of water quality to assess turbidity during trenching is essential. Monitoring ensures that values are compliant with the permit requirements, which only allows turbidity to reach a set value above natural levels at the border of the Natura 2000 sites. Monitoring of fish and fishery is carried out to assess how construction work and the presence of the pipelines have impacted fish stocks and fishing, particularly bottom trawling. Fish monitoring at the Natura 2000 sites will take place twice a year through 2014 to evaluate and document changes in the fish community in the area adjacent to the Nord Stream pipelines. It is also likely that the pipelines might come to serve as an artificial reef creating new habitats for fish.

### Finland



Before construction could start in Finnish waters, 49 conventional munitions were cleared for the safe installation and long-term integrity of the pipelines. The monitoring programmes for this endeavour and for construction related activities were approved by national authorities through the permitting process. An important component of the programmes was monitoring of water quality. The spreading of sediment and potential sediment bound contaminants was measured during munitions clearance, rock placement and pipelay. During these activities, water quality was also monitored at sites nearest to the Estonian Exclusive Economic Zone in order to assess potential transboundary impacts. Sediment quality will be monitored throughout construction to evaluate the concentrations of metals, dioxins and organic tin compounds.

### Russia



Both onshore and offshore construction work takes place in Portovaya Bay, near Vyborg – the starting point of the pipelines. Water quality is monitored in Portovaya Bay and in the Gulf of Finland along the pipeline route. Onshore, there is a stream adjacent to the pipelines flowing into Portovaya Bay and its tributary, therefore water samples are also monitored from these sources. The quality of the hydro-test water that will be discharged from the pipelines into a settling pond at the landfall will also be monitored. Water quality samples are taken on a monthly basis during construction. The condition of fish populations and the migration of salmon is monitored to determine potential impacts from the construction. Also, the population dynamics of birds are monitored both from land and by vessel along the pipelines and near small islands.

For detailed information about monitoring activities in each of the above countries, please download Nord Stream's "Overall Environmental and Social Monitoring Report" from [www.nord-stream.com](http://www.nord-stream.com)

## Working with Respect for the Baltic Sea

> Nord Stream is dedicated to ensuring that the construction and operation of its twin pipelines will not have unforeseen impacts on the Baltic Sea ecosystem. Environmental impact assessments and monitoring activities conducted before, during and after construction will mitigate potential impacts.

**N**ord Stream is committed, through national and international agreements to carrying out all work on the pipelines safely and in an environmentally responsible manner. In order to obtain the permits necessary to begin construction of the twin pipeline system, an Environmental Impact Assessment (EIA) was carried out for each country through whose waters the pipelines will cross: Russia, Finland, Sweden, Denmark and Germany. The samples are analysed in internationally recognised laboratories, and Nord Stream reports the results to the national environmental authorities in each country in periodic reports, which are also available on the Nord Stream website.

Sixteen subjects are monitored, including water quality, seabed recovery, and fish, bird and mammal populations. Samples are collected from about 1,000 survey locations along the route in Russia, Finland, Sweden, Denmark and Germany.

### A Solid Base

In order to be able to classify the data that is currently being gathered, reference data of the Baltic Sea's flora and fauna in its "original" state prior to the construction of the pipelines was collected during numerous surveys, the first of which was carried out as early as 1995. In April 2007, Nord Stream commissioned additional studies to investigate areas where the pipeline route could be further optimised to minimise environmental impacts. Prior to the start of construction, the baseline data gathered in these studies was verified by yet another survey. Thus far, all the values collected from the locations have remained within the predicted limits defined in the EIAs. However, if any unforeseen impacts were to be reported during the construction of the first pipeline, corrective action would be taken immediately.

Additionally, procedures for the second pipeline would be adapted accordingly.

## 16 Subjects Surveyed

> Samples are collected from about 1,000 survey locations along the pipeline route. Sixteen subjects are monitored, including water quality, bird, fish and mammal populations, and seabed recovery.

### Investigations Are Run by 20 Independent Contractors

Nord Stream's environmental and social monitoring is focused on environmentally sensitive areas along the route, as well as on scientific subjects that have been assessed as likely to experience a potential impact. In total, 16 subjects were defined (see chart below). Some subjects might be monitored in some countries and not in others, according to environmental variations and the nature of the construction work in particular areas. The main potential impacts on nature are expected during the construction phase of the twin pipelines, though not by the actual pipelay. The pipelines touching down onto the seabed will only cause minor turbidity, or cloudiness, which will settle. Construction activities such as ploughing, trenching or rock placement underwater have more of an impact, although also of temporary nature. Ensuring water quality is a top priority throughout the project. Within water quality alone, there are roughly 20 different parameters that are monitored at nearly 50 different stations. Environmental monitoring will continue during the first few years of the operational phase of the pipelines. However, once the pipelines are in place, they are not expected to have much influence on nature – except for one positive impact. The pipelines might come to serve as an artificial reef, creating a new habitat for flora, fish, and other fauna.

SUBJECT	PHYSICAL AND CHEMICAL ENVIRONMENT				
	RUSSIA	FINLAND	SWEDEN	DENMARK	GERMANY
Water quality	+	+	+	+	+
Seabed sediment	+	+	+	+	+
Hydrography and seabed topography	+	+	+	+	+
Soil	+	-	-	-	-
Landscape and topography	+	-	-	-	+
Air quality	+	-	-	-	-
Noise	+	+	-	-	+
BIOLOGICAL ENVIRONMENT					
Fish	+	-	+	+	+
Birds	+	-	-	-	+
Marine mammals	+	-	-	-	+
Benthic flora and fauna	+	+	+	+	+
Terrestrial flora and fauna	+	-	-	-	+
SOCIO-ECONOMIC ENVIRONMENT					
Fisheries	-	+	+	-	-
Cultural heritage	+	+	+	+	+
MONITORING AND CLEARANCE OF MUNITIONS					
Conventional munitions	+	+	+	-	+
Chemical munitions	-	-	-	+	-

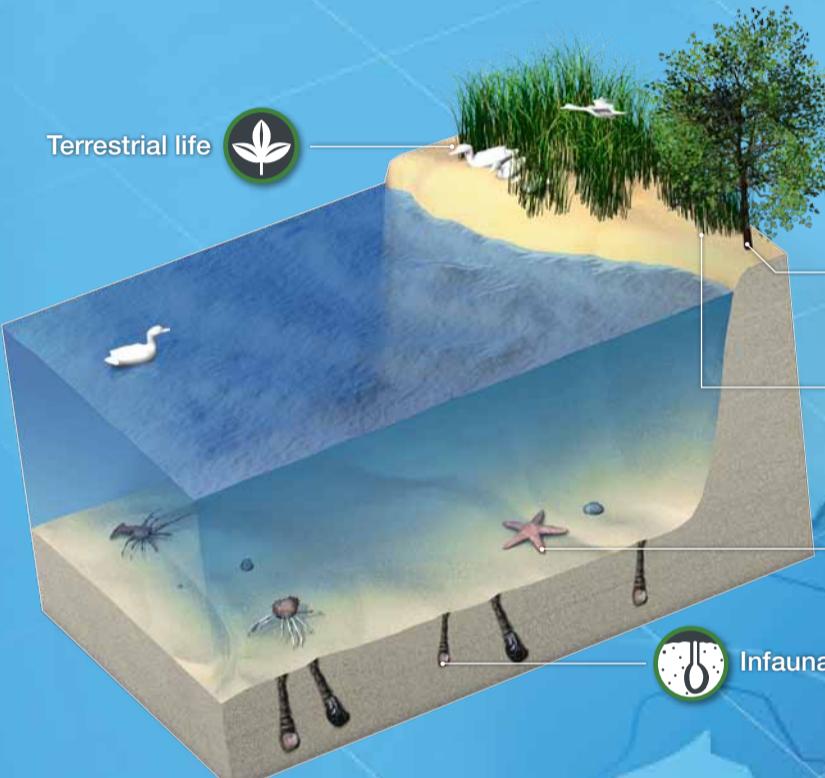
+: Monitored at selected/relevant locations -: Not monitored

# Nord Stream Environmental Monitoring

> In 2010, Nord Stream invested 13 million euros in its Environmental and Social Monitoring Programmes (ESMPs). More than 20 companies are conducting the surveys defined in the national ESMPs to determine just how, and if the Baltic Sea's flora and fauna have been impacted by the construction of the Nord Stream twin pipeline system.

**S**ixteen subjects, including water quality, bird, fish, and mammal populations, as well as seabed recovery are investigated from roughly 1,000 survey locations along the Nord Stream Pipeline route. As required in the national permits granted by Russia, Finland, Sweden, Denmark, and Germany, Nord Stream developed five national environmental monitoring programmes. Each has the aim of documenting the environmental impacts from the construction and operations of the pipelines in the respective jurisdictions. The national monitoring programmes are tailored to meet the requirements set by each country. The

data collected from the 1,000 survey locations is analysed in internationally recognised laboratories. The results of the monitoring will help to verify that the national permit conditions are met, and will be used as a basis for corrective action if necessary. The findings will be compiled in Nord Stream's annual monitoring report and distributed to the national authorities in each of the five countries, and also made publicly available on Nord Stream's website. Nord Stream plans to invest approximately 40 million euros into its ESMPs to monitor any impact of pipeline construction through the end of 2012, and also the operation of the pipelines through 2016.

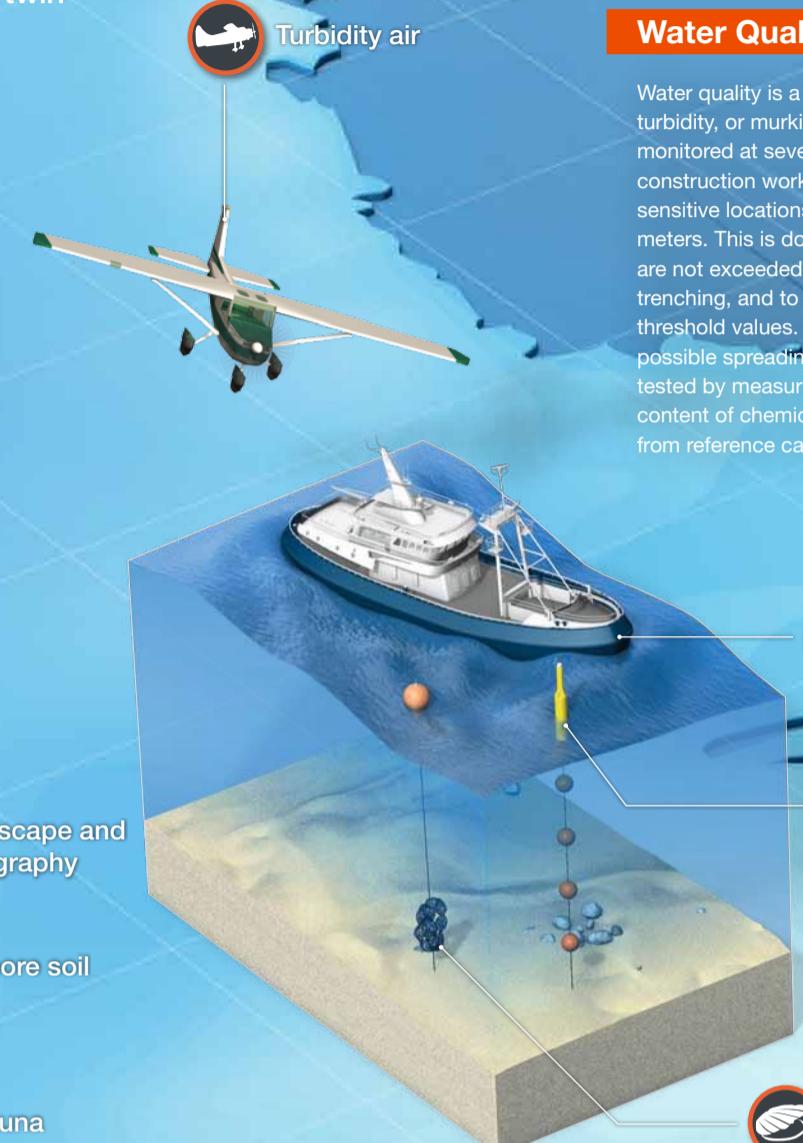
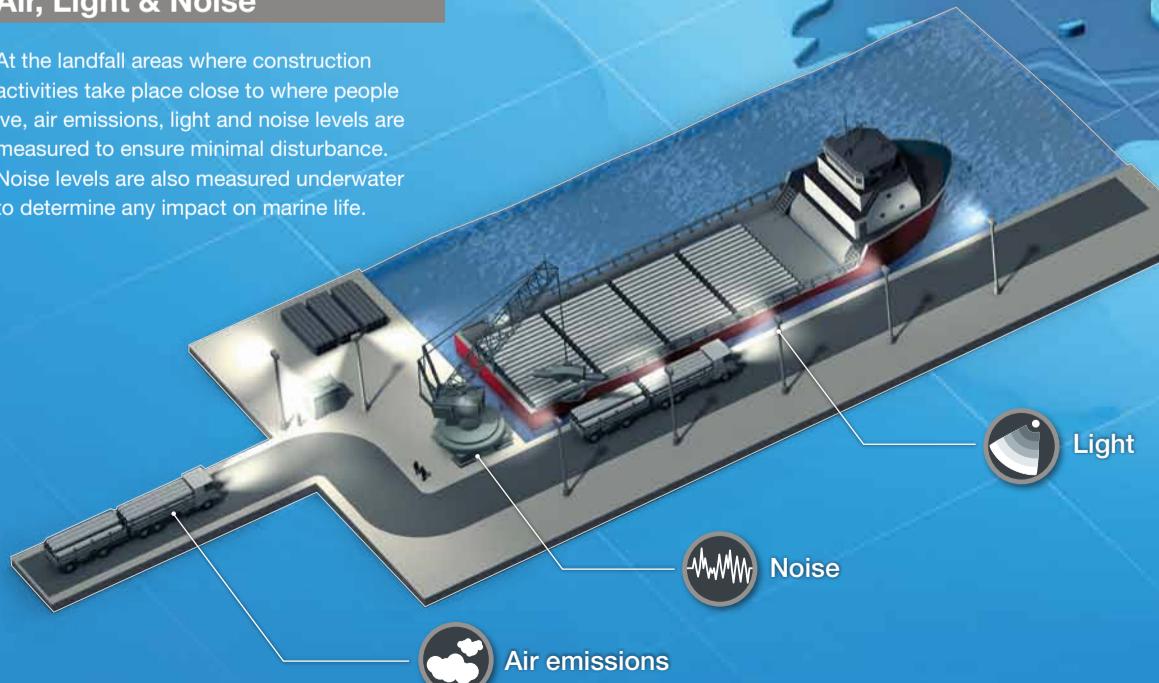


## Benthic Flora & Fauna

Benthic, or aquatic fauna, is monitored along the entirety of both pipelines. Infauna is monitored where dredging or trenching has disturbed the seabed in order to follow the rate of its regrowth. Epifauna growth on the pipelines themselves is also expected, and will be recorded. Recovery studies will take place for several years following project completion.

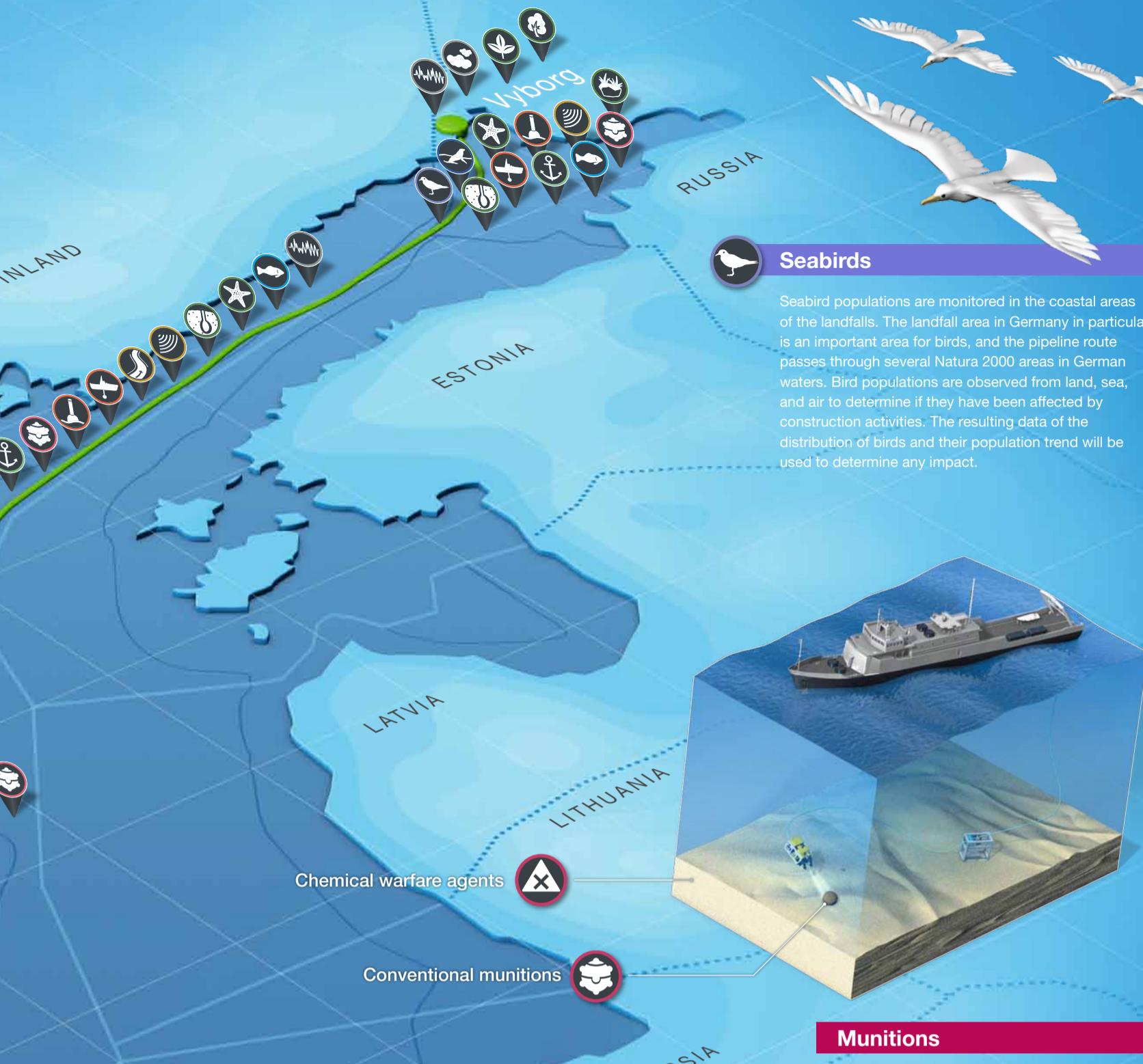
## Air, Light & Noise

At the landfall areas where construction activities take place close to where people live, air emissions, light and noise levels are measured to ensure minimal disturbance. Noise levels are also measured underwater to determine any impact on marine life.



## Water Quality

Water quality is a top priority throughout the project. Therefore, turbidity, or murkiness caused by suspended seabed sediment, is monitored at several locations as a measure of water quality during construction work. Buoys equipped with sensors are installed at sensitive locations to measure turbidity and other water quality parameters. This is done to ensure that the threshold values for turbidity are not exceeded during construction work, such as dredging and trenching, and to take appropriate action in case turbidity approaches threshold values. Turbidity plumes are tracked by air and sea. The possible spreading of contaminants associated with turbidity is also tested by measuring the impact on common mussels in cages. The content of chemicals in these mussels is compared with mussels from reference cages.



## Seabirds

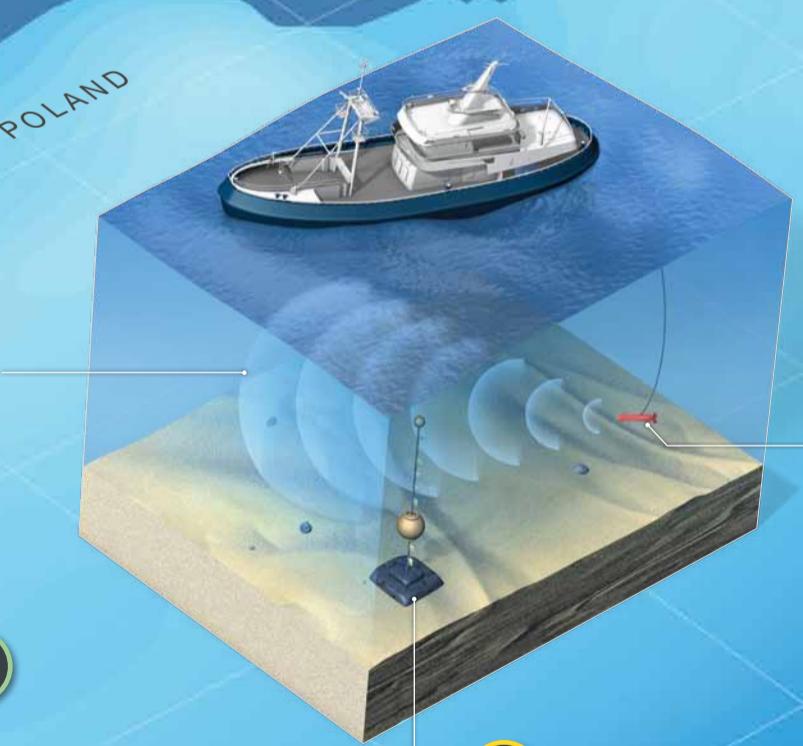
Seabird populations are monitored in the coastal areas of the landfalls. The landfall area in Germany in particular is an important area for birds, and the pipeline route passes through several Natura 2000 areas in German waters. Bird populations are observed from land, sea, and air to determine if they have been affected by construction activities. The resulting data of the distribution of birds and their population trend will be used to determine any impact.

## Munitions

Conventional munitions found along the route were cleared in late 2009 and in early 2010 in accordance with strict guidelines prior to the start of construction of the pipelines. Traces of chemical warfare agents present in the sediment in Danish waters are monitored to ensure they are not spread during construction.

## Water Flow

Water movements around the pipelines are monitored to verify that natural currents are not disturbed or changed by the structures. Deep water inflows to the Baltic Sea are measured, along with bottom currents in the Gulf of Finland. In areas where extensive work on the seabed has taken place, the seabed will be restored to its previous condition.



## Cultural Heritage

Objects of cultural value along the route are safeguarded throughout construction. Underwater cameras are used to document the state of objects before and after pipe lay.



## Marine Mammals

Marine mammals are monitored at the landfall areas to determine if increased turbidity and vessel activity during construction have any impact on their populations. The monitoring activities include a combination of vessel-based counts of seals and the use of hydrophones to detect harbor porpoises.

## Fish & Fisheries

The pipelines could become a new habitat for fish, and therefore their numbers are monitored to determine if they do, in fact, use them as an artificial reef. In areas near the route and at the landfalls, fish are counted to determine if turbidity increases might have impacted their populations.