Environmental impact assessment and archaeological heritage

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Abstract: Today Environmental Impact Assessment is one of the most important tools for decision makers when it comes to assessment of the possible positive or negative impact that a proposed may have on the environment. The regulations for which type of projects needs an EIA vary from nation to nation, but usually the environment consists of natural, social and economic aspects. In many cases, the assessment of the impact on the cultural heritage seems to be questioned or even regarded unnecessary. During the planning process for the Nord Stream – natural gas pipeline through the Finnish EEZ, the underwater cultural heritage turned out to be one of the key issues when among other finds circa 50 previously unknown shipwrecks were found.

The Nord Stream AG was founded in 2005 to plan, construct and operate a twin pipeline system through the Baltic Sea from Vyborg, Russia to Lubmin near Greifswald, Germany. The two 1,224-kilometre offshore pipelines are the most direct connection between the vast gas reserves in Russia and energy markets in the European Union. The pipeline passes through the exclusive economic zone (EEZ) of five countries; Russia, Finland, Sweden, Denmark and Germany and the territorial waters of Denmark and Germany. The section running through the Finnish EEZ is 375km long from east to west.

The preparation of an Environmental Impact Assessment (EIA) report is an important part of public authority approval in Finland. The EIA is done to identify and assess the environmental impacts and consequences that can be expected in connection with construction projects. In the EIA report it is assessed how any negative impact on the environment can be avoided or limited as far as possible. If there is a major impact on the environment, alternatives are investigated and the impacts are compared. One part of the EIA concerns the cultural heritage, or in this case underwater cultural heritage, affected by the planned project.

Several possible threats to cultural heritage during the Nord Stream pipeline construction period were identified:

The pipeline itself would be a threat if it were laid on top of or very close to existing UCH, thus harming or restricting access to UCH during the lifetime of the pipeline. The normal installation corridor is +/- 7.5 m. With the use of ROV touchdown monitoring and/or acoustic beacons the accuracy of pipeline installation can be increased to +/- 1 m.
Anchoring of vessels taking part in the construction work is one of the greatest threats to cultural heritage. During construction, the pipe-lying barge will be positioned by 12 anchors, each weighing 25 tonnes. Depending on the water depth, the anchoring zone will be at maximum 2 km wide. The barge will be supported by anchor-positioning vessels that help move the anchors during the construction phase. In addition, other support vessels may use anchors as well. Anchors from even rather small vessels can severely damage cultural heritage. Special anchoring plans was required for sites were anchoring will take place.

According to Nord Stream AG, the only type of seabed rectification that was going to take place in the Finnish EEZ was rock-dumping. Rock-dumping was carried out to support the pipeline in areas were freespans otherwise would be too great. The material was placed on the seabed through a fall pipe, which controlled where the material was placed, thereby limiting the affected area.

Erosion will occur adjacent to the pipeline (<10 m) in areas where the pipeline is placed directly on the sea bottom. Over time, the pipeline will erode into the sediment, and changes in sedimentation patterns will decrease. Erosion will occur in limited areas and is not considered a problem in this case.

Clearance of ammunition was carried out prior to construction works. During World War I and World War II, the Gulf of Finland was heavily mined. After both wars, parts of the minefields were cleared through sinking. At present, standard practice for mine-clearing is to explode them on site, which can damage nearby cultural heritage. Also other types of ammunition ended up on the seafloor during the wars due to different circumstances. The effect of the ammunition clearance on the wrecks has been investigated by Nord Stream AG. Most of the wrecks are situated so far away that the ammunition clearing will only have minor or none effect on them.

Other possible threats to cultural heritage, such as corrosion, have been discussed with the different partners in the project. Corrosion is not considered a problem in relation to UCH.

In Finland, antiquities are protected under the Antiquities Act (295/63). The Antiquities Act protects Old shipwrecks by their age. Wrecks of ships and other vessels that can be considered to have sunk more than 100 years ago, or parts thereof, are all considered ancient sites. All finds in this category must be reported to the Finnish National Board of Antiquities (FNBA) without delay. If it is obvious that the owner has abandoned part or all of a wreck, the find is understood to belong to the state. The artefacts in or outside a wreck of this kind belong to the state as well.

According to the Antiquities Act, those who plan public waterworks must verify whether the execution of such works will also impact upon ancient monuments. Because the FNBA’s Register for Underwater Finds is not comprehensive, developers are usually required to survey the sea bottom beforehand. If a site may be harmed or destroyed during a construction project, the Antiquities Act obliges the developer to pay for the necessary investigations.

From 2005 to 2009 several large-scale geophysical investigations using different methods were made as part of the planning process for the natural gas pipeline. The 140m wide pipeline corridor and the 1.6km wide anchoring zone were investigated separately. In all, 74,000 ha of seafloor were surveyed. Following interpretation of the survey material, target reports were made and targets were selected for inspection by a remotely operated vehicle (ROV). During the different surveys close to 20,000 targets were inspected by a ROV. The bottom survey material and the inspected targets were evaluated from a culture heritage point of view and an impact assessment for each target considered to be cultural heritage was carried out.
An archaeologist spent three and a half months going through objects in the survey material. The work concentrated on checking the quality and coverage of the survey material, comparing the found wrecks and their positions to known wrecks in databases and going extensively through the survey-material and to pick out objects of interest and compare them to the target reports. Another three months was spent on evaluating the wrecks inspected by ROV and writing a report on the evaluation of the cultural heritage. As a result of the investigations circa 40 wrecks and some other targets were evaluated from a cultural heritage point of view.

Two different safety-zone protocols were set up in relation to cultural heritage. Archaeological sites closer than 250 m from the pipeline or the anchoring positions needed to be assessed. If the pipeline or an anchor was planned to be laid within 50 m of an archaeological site, sustainable protection is not possible. In such a case, a plan for safeguarding the archaeological information at the site must be established prior to the construction.

Due to the amount of ammunition and wrecks found during the surveys, a decision was made by Nord Stream AG to use a non-anchoring pipeline lying barge in for more than 200km in the Finnish EEZ. For the remaining part, special anchoring plans was established for cultural heritage sites and presented prior to the construction and the sites was also be inspected by ROV after the installation of the pipeline.

Nord Stream AG decided to attend to an avoidance strategy in relation to cultural heritage sites. To avoid impact on cultural heritage, the pipeline will be routed around shipwreck sites.