

MICROTUNNELLING IN PEAT

LÜBECK USES AN ASSESSMENT MATRIX





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“Entsorgungsbetriebe Lübeck“, the waste-management company publicly owned by the Hanseatic city of Lübeck, operates a wastewater network with a total length of about 1,000 km, mainly as a separate system comprising 391 km of pipes for foul wastewater and 382 km of pipes for rain and surface water. The wastewater is led via a combined wastewater system over a distance of 135 km, and by a pressurized system for a further 78 km. A 630-meter-long section of damaged wastewater pipes beneath the “Geniner Ufer”, a stretch of the bank of the Trave Canal, has now recently been regenerated using the microtunnelling method.

A challenging combination

The geological constraints and the subsoil conditions in the Lübeck region pose a number of problems: man-made banks of soil, dense inhomogenous layers of peat, fine sand, silt, and clay piled on top of each other, meaning that the groundwater horizons can shift repeatedly. The choice of the appropriate construction method thus depends on an exact knowledge of the subsoil on the site together with an accurate assessment of the various methods available and of the prevailing traffic conditions.

Careful review

Drillings made along the Geniner Ufer yielded the following picture: Beneath a three-meter-thick layer of man-made river bank bearing one aquifer, a seven-meter-thick inhomogenous stratum of peat (slightly too strongly decomposed forest-swamp peat) with deposits of fine sand. Under this layer, sands containing a second dynamic aquifer, so-called Artesian water.

After thorough and highly specific planning, careful appraisal of the geological constraints, and assessing the various construction and jacking techniques available, Entsorgungsbetriebe Lübeck decided to construct the 630-meter-long wastewater pipeline with vitrified clay pipes by the microtunnelling method.

A “clean” installation

After being awarded the contract for the project, in November 2013 the ARGE Geniner Ufer consortium, comprising the construction companies Bergemann-Gräper mbH & Co. KG in Lübeck, Echterhoff GmbH & Co KG in Hamburg, and interra Microtunnelbau GmbH in Crimmitschau started the preliminary excavation work.

A starting shaft 3,200 mm in diameter was excavated to a depth of approximately 6.50 m – i.e. bang in the centre of the peat layer. From the bottom of this shaft, DN 400 vitrified clay jacking pipes were then jacked through the subsoil using an AVM 400 jacking device made by Herrenknecht AG. Before this work could be started, first a deep well had to be dug directly next to the starting shaft to relieve the pressure of the second aquifer, the Artesian water directly beneath the peat stratum.

The pipeline distances that were achieved in this way were between 50 m and 85 m in length. Both the DN 3,200 starting shaft and the DN 2,600 target shaft were converted into inspection manholes after the jacking operations had been completed.

A “normal” way of financing

Even if they’re embedded in a highly aggressive peat milieu, the vitrified clay pipes will do their job: reliably, safely, sustainably. Entsorgungsbetriebe Lübeck have set a depreciation period of 70 years and can comfortably finance the costs for the regeneration of the sewage system from their “completely normal” wastewater levies. ■