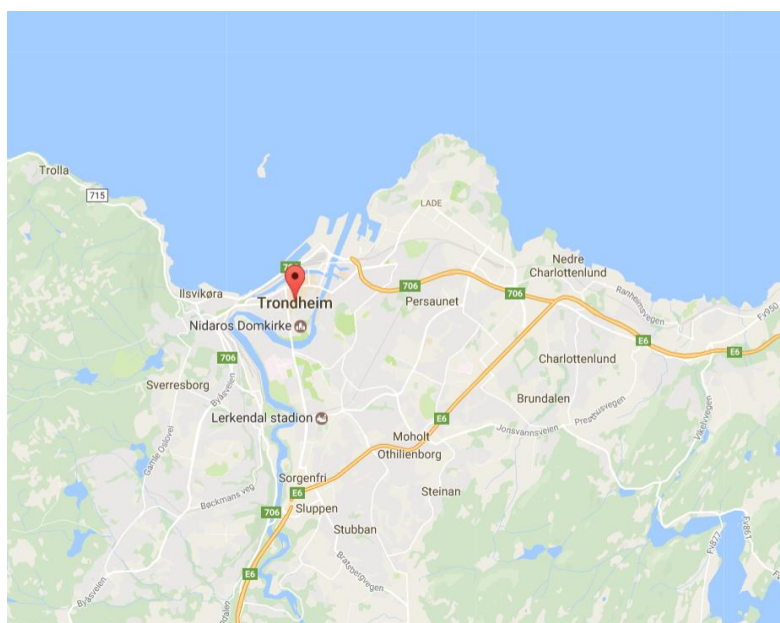


CASE TRONDHEIM HARBOUR

TRONDHEIM HARBOUR
Norway
Quay extension

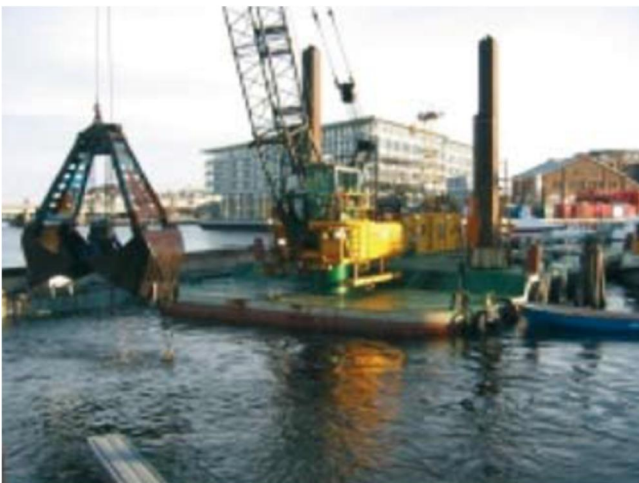
Key words:
contaminated sediments,
port construction

General information	The initial problem in Trondheim harbour was the disposal of the dredged sediments with low stability and containing PCB, PAH, TBT and heavy metals. The problem was solved by construction of a confined disposal facility (CDF) dredging and placing of contaminated sediments in the CDF and binding of harmful substances by mass stabilisation.
Advantages of stabilization	Achieve a geotechnical and chemical stability that makes it possible to utilize the area of the CDF for commercial purposes after stabilization.
Project timetable	2002-2003
Volumes and dimensions	11 000 m ³ of sediments (1. phase)
Geology and stabilized material	The sediments from the dredging area consisted mainly of silt and sand with water content between 40 to 60 % and TOC (total organic carbon) between 1 and 3 %.
Target strength of the stabilized material	Necessary axial compression strength was estimated to be 100 kPa (shear strength 50 kPa).
Binder(s)	Cement 80 kg/m ³ + fly ash 40 kg/m ³
Laboratory and field tests	Stabilisation testing in laboratory focused on reuse of industrial by-products in addition to cement. Stabilisation tests using binders containing cement, cement+silica or cement+fly ash were performed. The pilot stabilization was carried out with cement+fly ash mixture. In addition, the leaching tests were done to evaluate the leaching of contaminants from the stabilised material. Stabilisation tests were carried out in the Ramboll Finland's R&D laboratory.
Other	The local disposal and mass stabilisation of the contaminated sediments was significantly cheaper than the placement in an external disposal site.
Long-term follow-up and lessons learned	An extensive monitoring programme was performed during and after the project. According to the results no elevated concentrations of metals or organic contaminants were found outside the CDF. Samples taken of the stabilised sediment had approximately the same strength as reached at the laboratory and results showed that the mixing of the binder in the field had been successful.
Sources	Laugersen J. et al. 2005 Stabilisation of contaminated sediments in Trondheim harbour - Special challenges. Proceedings of the International Conference on Deep Mixing - Best practice and recent advances, Deep Mixing'05. Stockholm, Sweden, May 23-25, 2005.
Stabilization contractor	Selmer Skanska



CASE TRONDHEIM HARBOUR

The project area in Trondheim harbour



Ongoing dredging and stabilization in Trondheim harbour