Local sediment management – always the best economical solution?

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Introduction: When there is a project involving management of contaminated sediments a common problem is if they should be disposed locally or at an external site. In Norway local management of contaminated sediments is encouraged by the environmental authorities. The question is if local management is always the best solution?

Methods:
In Norway contaminated sediments are typically found in fjords where industries are located, close to coastal cities and close to shipyards. Projects involving dredging works in such areas will mostly result in the need to dispose the contaminated sediments in a safe way. Due to often very long distances to an approved disposal site, a local disposal solution is often sought. A typical solution is to establish a local confined disposal facility (CDF) for the sediments.
What has to be taken into consideration for a local disposal solution is:

- Is there any land available for establishing a CDF?
- The cost for establishing the CDF
- The cost for monitoring the CDF after the sediments have been placed there
- The problem owner will normally be the responsible for the contaminated sediments also after they have been placed in the CDF

What has to be taken into consideration for an external approved disposal site is:

- The cost for the transport to the site
- The cost for the disposal, to be paid to the owner of the disposal
- The problem owner will have no further responsibility for the contaminated sediments after they have been delivered to the disposal site

Example:
In Trondheim harbour in Norway 77 000 m^3 contaminated sediments were dredged and a solution with a local disposal (CDF) was compared with an external disposal site [1].
The cost for establishing the local CDF was 1 mill. €, complementary work including the completion and securing after it had been filled was another 0.5 mill. €. To reduce the leaching of contaminants from the sediments in the CDF about 25 % of the volume was stabilized with cement and fly ash at a cost of 1 mill. €. Monitoring was estimated to be necessary during 10 years after the CDF had been completed, at a cost of 0.5 mill. € for the whole period. This gave a total cost for the local disposal solution of 3 mill. €.
The placement in an external disposal site including transport to the site would cost between 50 to 100 €/m^3 depending on the current market price. This means that the cost would roughly be in the range of 4 to 8 mill €.
Because the local disposal was cheaper, Trondheim harbour decided to choose this solution, even though it gave them the disadvantage of having the responsibility for the disposal and the monitoring. An important factor was also that after completion the CDF could be used as a container storage area and thereby generate an extra income for the harbour.

Discussion: Local management of contaminated sediments will in many cases be the economically most favourable solution. This is especially true when there are larger amounts of contaminated sediments to be handled and the investment to build a local disposal can be economically justified. When smaller amounts of sediments have to be handled, transport to an external approved disposal site will be cheaper. Exactly when transport to an external disposal site is cheaper depends from case to case. In Trondheim harbour it would have been for an amount in the region of 25 000 to 50 000 m^3 of contaminated sediments that the price for the two alternatives would have been equal.

References: [1] Brånås, M. and Laugesen J. (2005) Cost-benefit analysis of dredging and stabilization. The pilot project in Trondheim harbour. Report 2003-016 (in Norwegian).