

Beneficial reuse of sediment by using innovative geotextile constructions to store sediment and promote nature development

Stook¹, P.J., G.A.R. Egbring² and F.M. Lauwerijssen³

¹⁻³Tauw Group, P.O. Box 6, NL-2900 AA Capelle a/d IJssel, The Netherlands

Phone: +31-(0)-611733317

E-mail: chiel.lauwerijssen@tauw.nl

Introduction:

The Wormer- en Jisperwater area is the largest uninterrupted peaty grassland in Western Europe and one of the most important areas for wetland birds in the Netherlands. It is under European Natura 2000 protection. As a result of industrial activities in the 17th and 18th century heavy metals (copper, lead and mercury) have accumulated in the sediment. Due to wave action and water currents shore lines erode and natural habitats are lost. Sediment particles keep in suspension and impede sunlight penetration to the bottom. Hereby growth of higher order aquatic plants and natural water quality improvement are inhibited. Commissioned by Dutch water board HHNK, innovative and sustainable measures were taken in order to both remediate the contaminated sediment and to improve water quality by creating new habitats.

Methods:

Together with TenCate Geosynthetics B.V., Tauw Group developed a light-weight geotextile structure, the Submerged Sediment Storer. Both design and implementation of this structure are innovative. A modified prefabricated TenCate Geotube[®] unit is linked to a geotextile screen and a floater. The geotextile container is filled with sand to keep the structure in place and the floater is used for tensioning the screen. The Sediment Storer is fixed with poles and used to store sediment by connecting it to shore and filling up the space with sediment (see figure 1).

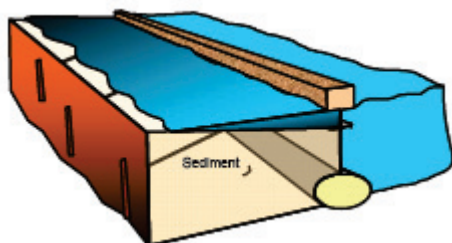


Fig. 1: Schematisation of Sediment Storer

Results: After two successful pilots in 2013, this winter over 2 kilometers of constructions are being installed in order to store circa 15.000 m³ of slightly contaminated sediment. The structures have been

functioning well under extreme weather conditions. The enclosed water surface behind the Sediment Storer was totally covered by a pioneer vegetation of reedmace (Typha) by the end of the first growing season, thereby forming a 'Natural Cap' to isolate the contaminated sediment underneath.



Fig. 2: Foto of vegetation development (August 2013)

Furthermore, both transportation and processing costs are minimized and also CO₂ emissions. Keeping sediment under anaerobic conditions inhibits decomposition as opposed to disposal on dry land. By an amount of 25.000 m³ sediment 900 household equivalents of CO₂ emissions can be saved!

Discussion:

Apart from storage the Sediment Storer is also used for nature development, shore protection and restoration. So, synergies were realized between remediation, nature restoration and shore line protection. Dredged material can easily be kept and stored within the river basin.