Newsletter 6
February 2014

PRISMA

Promoting Integrated Sediment Management

The Project

PRISMA aims to develop improved techniques in dredging and to stimulate sediment reuse instead of landfill, by additional research and field work. The PRISMA pilot sites will demonstrate;

- more sustainable removal methods
- improved decision making for treatment and reuse thanks to on-site quality analysis
- good practice guidance in reuse method selection
- policy recommendations to promote reuse opportunities

The described problems in sediment management are an issue in numerous locations in Europe. Within the Two Seas Programme the experts among the PRISMA partners share their knowledge on innovative methods and new techniques in sediment management and through cross-border cooperation this knowledge will be shared across Europe.

The Partners

The PRISMA project unites

Waterwegen en Zeekanaal NV, Flemish waterway operator, Belgium
The Broads Authority, which manages the watercourses of the Broads in the UK
The Dutch District Water Board Hoogheemraadschap van Schieland en de Krimpernerwaard
The French research association Armines acting through Center of Douai—DGCE.

Sediment of the Scheldt used for building a compartment dike

Waterwegen en Zeekanaal NV
weg van water

LESS TRANSPORT BY PROCESSING AND TREATMENT OF SEDIMENT ON SITE

The Flemish waterway operator Waterwegen en Zeekanaal NV (W&Z) transported and treated 100.000 m³ of dredged material from the river Scheldt to build a compartment dike at Vlassenbroek to create a natural tidal area.

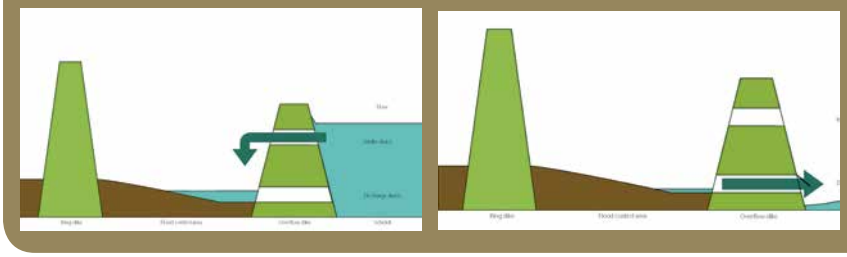
About a year ago W&Z started the construction of the floodplain at Vlassenbroek in Dendermonde. This floodplain is important in the realization of the Sigma Plan. With an area of approximately 240 acres it will have a major contribution to reducing the flood risks in the Scheldt estuary. The northern part of the area is arranged as a reduced intertidal area.

With a construction for water to flow in and out, the Scheldt tides are imitated thus creating natural tidal environment (tidal marshes). The southern part is designed as a floodplain that will be flooded in extreme circumstances (high tides). To separate these two compartments from each other, a compartment dyke of 800 meter length has been built with PRISMA support.

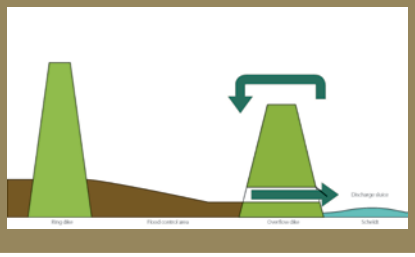
The challenge was to use as much sediment as possible. At least 100.000 m³ dredged material from the river Scheldt was transported by barge and pumped from the mooring site by a concrete pump through a 200 meter long pipeline to a mixing installation where additives were added to the sediment. By opting for this process the immediate area was spared from 12.000 truck movements.

Meanwhile, the technique used to build this compartment dike is under evaluation so that it can be applied for future implementation in other dyke projects.

Flood control area with reduced tides (CRT)



Flood control area (FCA)



Excavator and submersible pump on the pontoon at Hardley

Submersible pump

Valuable Research from Broads Authority Dewatering Trial

REDUCING THE COSTS OF DEWATERING AND BECOMING MORE SUSTAINABLE

Broads Authority
The Broads - a member of the National Park family

The Broads Authority has been carrying out a dewatering trial at Hardley looking to reduce the cost of dewatering techniques and lessen the carbon footprint. Organisations, especially local government, are under pressure to make such reductions but suitable methods are not easily available.

A submersible pump was fitted to the boom of an excavator with a 15m reach. This was placed on a pontoon fitted with two electronically operated legs that anchored the link flotes in place. The 8 inch pump was capable of dredging dense silts up to 300 m³/h and transporting it via a 700m pipeline.

The sediment was pumped into a geotunnel - a large sheet of woven fabric fixed to a square metal frame approximately the length of 2 swimming pools. Chemicals designed to clump sediment particles together were added at the dewatering site. This makes particles heavier so they drop out of suspension quicker. This process was monitored closely to ensure that the separated sediment was of the right consistency and did not clog the textile fabric.

The frame of the tunnel was temporarily fixed to steel mats that force the water through the woven fabric. The sediment remains and the water drains away into a lagoon. Once filled, the steel frame was removed and the fabric lifted so the dewatered sediment could be removed. The empty geotunnel and frame are reusable reducing time, cost and carbon footprint.

The sediment was applied to agricultural land by a muck-spreader. Being nutrient rich, it improves the quality of the soil and its ability to retain moisture.

This four week project focussed on the development of the geotunnel concept and allowed for significant learning and development. The geotunnel took approximately 6 hours to fill and 4 hours to dismantle and empty. Greater efficiency could be gained by using two geotunnels, one filling and one emptying. A production rate of 160 m³/day in-situ solids was achieved rather than the proposed 200 m³/day because of the use of a single geotunnel.
It was found that clayey silt dewatered more slowly than expected and had to consolidate for several days prior to spreading.

Throughout the trial, the Broads Authority overcame several challenges with components ranging from chemical dosing to water pumps. Based on the outcomes of this work the direction for additional development of the geotunnel (patented in Nov 2012) was made clear and the Broads Authority is keen to see how further research builds upon this initial innovative project.

Prisma Project Manager William Coulet beside a geotunnel

Dredging the Ringvaart as a win-win situation

HEIGHTENING OF DUTCH LOWLANDS AND AVOIDING TRANSPORT COSTS

The Waterboard of Schieland and the Krimpenerwaard (HHSK) removed 70.000 m³ dredged material out of the Ringvaart in the Zuidplaspolder. This amount of dredged material corresponds to the volume of 28 Olympic size swimming pools. HHSK decided to beneficially reuse this sediment dredging too heighten lowlands. In a pilot project in the lowest-lying polder in the Netherlands HHSK made this work!

Dredging for a better drainage

At the bottom of all water there is a layer of mud: a mixture of plant residues and settled sediment. Too much sediment on the bottom of a watercourse provides a poor flow. It is not easy to manage the output of excess water from the area fast enough and it is also bad for the water quality. The water becomes shallow, rich in nutrients and eventually becomes anoxic.
The Ringvaart is a major waterway in the water system of the waterboard of Schieland and the Krimpenerwaard. Through the Ringvaart the water authority carries excess water form the residential area to the North Sea (it flows from the Hollandsche IJssel and the Maas).

Lowlands heightened with sediment

Lowlands are heightened and transport costs are saved

During the pilot, a total of 70.000 m³ of dredged material is removed from the Ringvaart. 60.000 m³ was used to heighten lowlands in the Zuidplaspolder and the remaining 10.000 m³ was used in the slope of the new entrance and exit of the A20 in the city of Moordrecht.
The sediment was dewatered in geotextile tubes, until it was dry enough to heighten the lowlands. The water balance of this land significantly improved by this.

As well as helping landowners with a better use of their lowlands, a lot of savings were made in transport costs. Using the dredged material on the spot in the Zuidplaspolder made it possible to save at least 37.000 miles on transport. This distance is equal to a trip around the world one and a half times.

What is a geotextile tube?

A geotextile tube is a kind of large bag of woven geotextile, made of polypropylene or polyethylene. Through a discharge pipe the dredged material is brought into the geotextile tube. The excess water leaves the tube through the "pores" in the fabric. This goes gradually, so that the water flows from the geotextile tubes right back into the surface water.

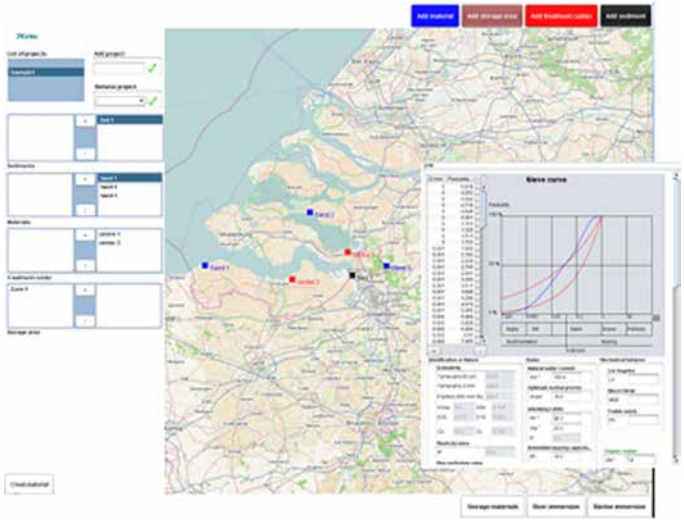
Through the large tube in the middle the sediment is brought in geotextile tubes. The water leaves the tube through the "pores" in the geotextile

Use of mobile characterization lab unit

Decision tool helps to optimize the (re-)use of sediments

ARMINES MINES DOUAI (AMD) GIVES SEDIMENT MANAGEMENT A SCIENTIFIC LOOK

For several years now there has been a strong increase in world consumption of materials used in the field of civil engineering and in particular materials for public works. Valorization of sediments from marine and river dredging may constitute a significant alternative.
But the issue of treating dredged sediments is often problematic in all valorization operations because of ever stricter regulatory and economic constraints. The problem consists in finding the optimum set of treatments and solutions while respecting these constraints.



PRISMA decision model

The scientific research of Armines Mines Douai is based on four major steps:

1. An investigation of the properties (physical, chemical, mechanical, geotechnical and environmental) of dredged sediment from each PRISMA partner was performed. This phase allowed us to assess the potential of these sediments and the development of suitable formulations for use in road construction.

2. The concept of a mobile characterization lab unit was realized and allows scientists and industrialists to have in situ fast and reliable results. The comparison between the experimental in-situ results of the mobile unit and those obtained in laboratory are very satisfactory.

3. An study was carried out into the influence and optimisation of adding flocculants (for sediment dewatering) on physical, geotechnical, mechanical and environmental properties. The results revealed the relevance of this drying method which can be applied by using Geotubes. This polymer treatment does not affect the global behavior of sediments.

4. As the scientific and mathematical knowledge of AMD is of major importance, AMD took the lead in building a decision model, which is one of the activities all partners work on together. This tool, based on mathematical programming, has been developed for the sustainable management of dredged sediment recovery. It has been validated on several kinds of sediment. The decision tool model now offers a real opportunity to optimize the management and reuse of sediments for scientists, industrials, and policy makers.

NEWS & EVENTS

Final conference PRISMA on June 18th 2014 in Antwerp.

At the final conference of PRISMA the project managers of the four PRISMA partners will present their findings on new and innovative dredging techniques, treatment and reuse of sediment. This conference will be held at the Elzenveld Hotel & Seminarie in the Centre of Antwerp, Belgium.
Please reserve this date in your calendar.

PRISMA has been invited to present PRISMA projects in Germany and the USA.

PIANC is a global organisation that specialises in waterborne transport and dredging. At its 33rd conference in San Francisco, USA on June 1-5, 2014, the Salhouse Broad project will be one of the projects presented. The overall theme of the conference is "Navigating the New Millennium" with focus on 'working with nature' as done in the Salhouse project.

In the Salhouse project 7,000m² of reed bed has been reconstructed, which had been eroded by wind and waves from boats over the last 60 years. Four giant geotextile bags have been fixed to alder poles cut from trees on the river banks. The bags are being filled with 3000m³ of sediment dredged to provide a 170m retaining bank. The filled bags will sink below the waterline and the space behind the bags has been filled in with 9000m³ of dredged sediment to restore the reed bed to the condition it was in 1946.

DredgDikes is an European funded project in the Baltic region and is similar to PRISMA, working on the reuse of sediment. At its Final conference in Rostock on April 10-11, 2014 PRISMA will be presented in general and some specific projects in particular, such as the use of geotextile bags in sediment applications, the decision model and the construction of a compartment dike.

For both conferences presentation papers will be prepared. These will be made available on the websites of the conference hosts:

http://2014congress.pianc.us/
http://www.dredgdikes.eu/en/category/events

Waterwegen en Zeekanaal NV
weg van water

Broads Authority
The Broads - a member of the National Park family

"Investing in your future"
Crossborder cooperation programme
2007-2013 Part-financed by the European Union
(European Regional Development Fund)

ARMINES

MINES Douai

Hoogheemraadschap van Schieland en de Krimpenerwaard