RECENT EXPERIENCE WITH MECHANICAL DEWATERING OPERATIONS

Introduction

Boskalis Environmental is a global leader in the field of large-scale processing of contaminated soils and dredged sediments. Boskalis Environmental has two home markets: the first based in the Netherlands operating in Europe under the name Boskalis Dolman b.v., the second based in North America, operating under the names Stuyvesant Projects Realization Inc. and Stuyvesant Environmental Contracting LLC.

Boskalis Environmental provides in-house design, installation and operation of soil and sediment processing equipment and facilities. This equipment includes units for gravel and debris screening, sand separation and mechanical dewatering. The company has over 30 years of directly relevant experience, mainly in the Netherlands, Germany, the United States of America and Canada. Over these years, the company has processed more than 15 million tons of sediments and soils while beneficially reusing more than 10 million tons.

Boskalis Environmental currently owns multiple transportable and fixed soil and sediment processing systems.

Operating in the dredging industry, Boskalis Environmental is well known with the interaction and integration of dredging and dewatering processes. The Fox River project, in operation since 2009, is the first large scale sediment remediation project where suction dredging and hydraulic transportation is combined successfully with mechanical dewatering using membrane filter presses.

The following project portfolio provides an overview of our relevant project experience.
Miami River, Florida (USA, 2005 – 2008)

The Miami River, which flows through an urban industrial area of Miami, Florida, had not been dredged since the area was built in 1934. In 1990 the US Army Corps of Engineers advised the city that the sediment had to be removed from the river as it was impeding shipping. There was one caveat however: the sediment, contaminated with heavy metals, pesticides and oil, could not be placed in the ocean.

In 2004 a consortium of Weston Solutions and Bean Environmental was awarded the job of restoring the river to its original depth. The two companies were jointly responsible for the dredging, transportation and processing of around 540,000 m$^3$ (720,000 cy) of contaminated sediment.

Boskalis Dolman was consulted on the project at an early stage and was subsequently commissioned as subcontractor to Bean Environmental to erect a transhipment and processing plant for the dredged sediments. A Mobile Soil Washing Plant (MSWP) was brought in and assembled on the banks of the Miami River. This MSWP combined coarse fraction separation and mechanical dewatering. Coarse fraction separation involves the precise separation of various materials using a rotating wash and sieve drum, shaker screens and hydrocyclones. Mechanical dewatering with Belt Filter Presses was used to process the remainder of the contaminated sludge, up to 30 tons of solids per hour at 24/7 operations.

As a result of the MSWP processing, a large proportion of the dredged sediments could be beneficially used in the community at little extra cost to the project.
As a result of industrialization, the riverbed of the Fox River (Wisconsin, USA) had become contaminated with PCBs (polychlorinated biphenyls). The remediation of this river is one of the largest sediment clean-up projects in the United States. When the government agencies ordered work to proceed, Appleton Papers Inc. and NCR Corporation formed the Lower Fox River Remediation LLC (“the LLC”) to contract to have the work done. The Fox River site is on the federal Superfund program’s National Priorities List.

Tetra Tech was commissioned by the LLC as the lead contractor for the remediation. Its responsibilities include water treatment and coordination of transportation and disposal of all residual materials. The dredging work is being carried out by local dredger J.F. Brennan, while Boskalis Environmental is processing the contaminated sediments.

Boskalis Environmental designed and built a plant to process the almost 3.5 million cubic meters of contaminated sediments from the Fox River within a period of approximately 12 months. The plant is capable of processing the hydraulically dredged and transported sediments into clean sand and mechanically dewatered filter cake. This is achieved without the use of a large intermediate storage facility, thus integrating the processes of dredging, processing and disposal in one single process.

The harsh winters in this region result in an effective operational period of about seven months per year. Nonetheless, the remediation work got off to a successful start in April 2009 and the project is on schedule. Key figures for the plant:

- 200 m³ per hour in situ capacity
- 8 membrane filter presses with a capacity of 18 m³ each (~7,500 tons solids per week)
- 9,000 m² for sand separation and mechanical dewatering
- 3,250 m² for rubble and sand storage
- 7,800 m² for sludge cake storage
- 1,000 m³ storage tank capacity (two units)
- Project recently achieved 1,600,000 hours without a lost time incident
The Lower Passaic River Study Area Phase I Removal Action Project, New Jersey (USA 2012)

After a year of engineering and construction, Stuyvesant Environmental Contracting, LLC (SECI) successfully processed the contaminated sediment under the Phase I Removal Action for the Lower Passaic Study Area. The Diamond Alkali Superfund Site is located at 80 and 120 Lister Avenue, Newark, NJ, at approximately River Mile 3.4.

Phase I targeted approximately 40,000 cubic yards with the main objective of this work to remove sediments impacted with 2,3,7,8-tetrachlorodibenzo-p-dioxin (2,3,7,8-TCDD), PCBs, mercury, PAH and other chemicals. This first phase of the clean-up demonstrated on a large scale the processing of very high levels of contamination and was executed within 3 months.

SECI processed the sediment based on the successful, purpose-built, in-house designed separation and dewatering process. The dredge area was separated from the river by a confined sheet pile wall enclosure to prevent downstream migration of re-suspended sediments to the maximum extent practicable. Within the enclosure, the sediments were dredged by a local dredging company and transported by barges to a specially designed floating pumping station and from there hydraulically transported to an Upland Processing Facility (UPF) about 2000 feet downstream of the removal area. The sediments were processed in a nearly enclosed system and by separation and dewatering transformed into a dry material that was then placed in lined and sealed containers to be transported by truck to a nearby rail yard. There they were loaded onto train to either a landfill or to an incinerator, according to the specific waste category.

After the Miami River and the Fox River this project is the third large river sediment remediation contract for SECI in the United States. Despite the very complex process and high level of contamination, the projected production was achieved from the first day of the project and all sediment processing was successfully completed in the summer 2012.
Jan van Riebeeck harbor, Amsterdam (The Netherlands, 1987 – 2005)

In the 1980s the presence of contaminated dredged sediments in Amsterdam's canals started causing serious problems. In addition to the chemical contamination, the dredged sediments contained large quantities of dirt and garbage, making unprocessed disposal of the material difficult. In addition, with no suitable place to dispose of these sediments, essential maintenance dredging work could only be performed to a limited extent.

In 1987 the City of Amsterdam authorities decided to develop a project site at the Jan van Riebeeck harbour, to take in dredged sediments from the whole Amsterdam region and to process the dredged sediments to create usable soil or soil suitable for disposal.

Boskalis Dolman was awarded the contract to design, build, operate and maintain the plant. During the more than 15 years that the plant was operational, dredged sediment from dozens of projects and sites were brought to the processing site by hopper barge and by truck. The loads varied in volume from 200 m³ to 100,000 m³.
Regional Soil Management Facilities, Various locations in The Netherlands, 1996 - ongoing

Boskalis Dolman operates 4 Regional Soil Management Facilities in The Netherlands. Annually, these combined facilities process a total of more than 600,000 tons of contaminated soils and aggregates. The primary aim of these facilities is to minimize contaminated volume by extracting aggregates for beneficial re-use and by separating and dewatering the contaminated fine fraction.

Third parties deliver the contaminated soils to the facilities. As owner and operator of the facility, Boskalis Dolman becomes the ‘owner’ of the contaminated soils and thereby accepts all associated risks and liabilities. Processing technology includes different types of screening, hydrocyclones, upstream classifying, and mechanical dewatering (using membrane filter presses or belt filter presses) of the contaminated fraction (approximately 50,000 tons solids per year).

Although the main treatment in these facilities is based on enhanced soil washing techniques, other remedial techniques such as biological treatment and stabilization or solidification can also be implemented, depending on the specific contaminants and associated clean-up levels.