

High-strength geosynthetic provides reinforced seal to sewage sludge lagoons in Moscow suburb



Laying the *Stabilenka*® pieces



Stabilenka® woven laid over the sewage sludge

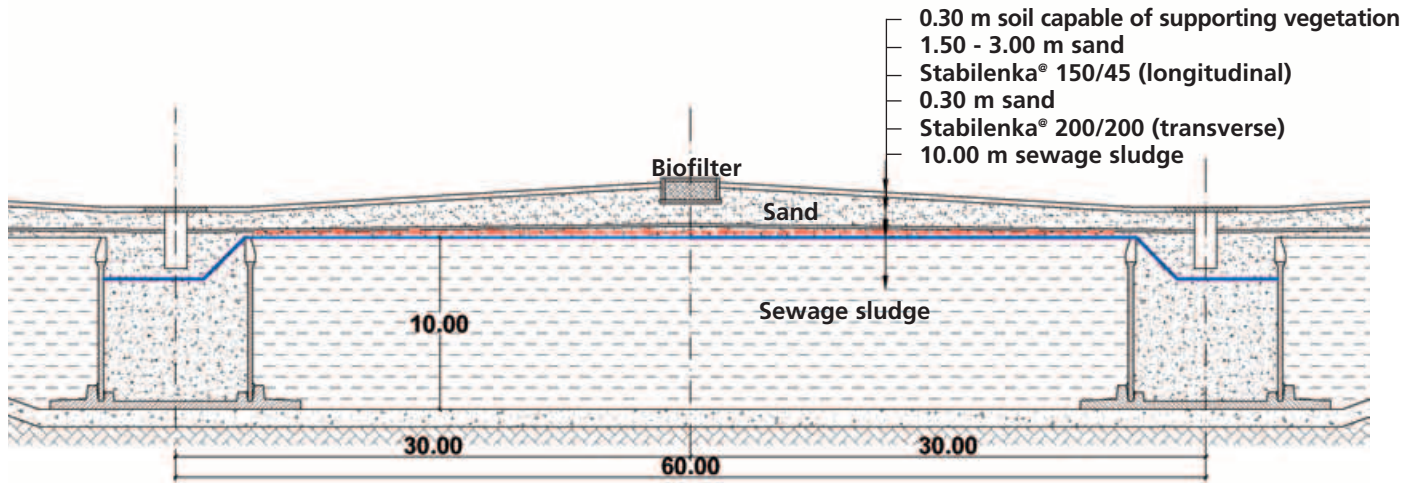
Background to the problem

Several sewage sludge disposal lagoons have been constructed in the Marjino district of Moscow, near the Marjinski Park residential area. These areas had been filled over the years with successive layers of waste deposit from local sewage treatment works. A total of 1.1 M. m³ of sludge had been placed in the 50 m wide reinforced concrete lagoons to a depth of 10m below ground level. Beneath a thin crust, supporting sparse vegetative growth, lay deposits of low-bearing capacity material containing zones of gas and water. After filling the lagoons, the intention was to cap and stabilise the areas in preparation for a change of use. The proposed sand capping with a thickness of 1.50 m to 3.0 m needs to be protected against sinking into the sludge. Furthermore the long term performance of the gas venting system, placed within the sealing layer, has to be guaranteed. Therefore a high-tensile geosynthetic reinforcement was introduced. Moscow City Council commissioned civil engineering consultant, MosvodokanalNIIprojekt, with the design of an appropriate capping solution.

Construction

Before installation of the geosynthetic reinforcement the existing vegetation was cleared from the surface and yet retaining the established root crust as a natural stabilisation layer. High-tensile *Stabilenka*® geotextile was used to stabilise the ground against failure, prevent the capping system from sinking, and separate the sewage sludge from the capping material. Due to the very low shear strength of the sludge and its inability to support construction plant, two orthogonal layers of geotextile reinforcement were laid over the lagoon. The geotextile layers were anchored in side trenches to mobilise an effective long-term tensile strength of 53.2 kN/m. The principal direction of load was selected as transverse to the main axis of the lagoon, which was reinforced with *Stabilenka*® 200/200, a biaxial-strength geotextile, delivered

High-strength geosynthetic provides reinforced seal to sewage sludge lagoons in Moscow suburb



Basin cross section with capping

to site in 65 m x 30 m panels. After placing a thin layer of sand on top of this reinforcement the second geosynthetic layer, a uniaxial-strength **Stabilenka® 150/45** (100 m x 5 m), was rolled out over the sand, parallel to the main axis of the lagoon. To exploit the high tensile strength of the geosynthetic reinforcement, particular attention was paid to anchoring the ends of the **Stabilenka® 200/200**, running transversely to the main axis of the lagoon, in sand-filled trenches on each side. Likewise the overlap of the **Stabilenka® 150/45** rolls, placed longitudinally along the main axis of the lagoon, was specified as large enough to ensure full transference of the required tensile force. At this stage thin layers of the capping

material, consisting mainly of sand fill, could be placed onto the reinforcement-covered sludge deposits using draglines and low load bearing, tracked construction plant, working towards the centre from the edges of the lagoon. The successful construction of the capping system was carried out by the contractor, Mosstroimechanisazia – 5.

Using this innovative construction method, the sludge-filled lagoons were stabilised and a valuable plot of land in Moscow's Marjino district was released for alternative use.

Project: Sewage sludge disposal basin
Marjino District of Moscow

Client: Moscow City Council

Consultant: MosvodokanalNIIprojekt

Contractor: Mosstroimechanisazia –5

Constructed: 2004

Products: **Stabilenka® 200/200**

Stabilenka® 150/45



Placing the sand to form the capping

HUESKER Synthetic GmbH

Fabrikstraße 13-15 • D-48712 Gescher/Germany
Phone: +49 (0)25 42 701-0 • Fax: +49 (0) 25 42 701-499
Internet: www.huesker.com • E-mail: info@huesker.de



DAP-PL-3226.00
Akkreditiert nach DIN EN ISO/IEC 17025