

Geobags for capturing dredged sludge

The use of geotextile dewatering bags is recognised globally as an efficient and economical method for desludging to improve the functionality and safety of wastewater treatment works.

Fibertex geotextile bags (geobags) for use in on-site desludging wastewater projects have advantages over conventional methods, which are often unaffordable to authorities and contractors with limited budgets.

The benefits of using geobags for sludge removal include ease of operation, efficient retention of solids, compliance with environmental regulations and cost optimisation. A further advantage is this dewatering system is passive and does not require constant monitoring and maintenance of equipment.

The filtration properties of geotextiles, which are effective in retaining the fine-grained materials found in sewage sludge, while allowing the water to filter through, make these materials suitable in desludging wastewater ponds. The effluent that passes through the woven fabric can then be transferred to a designated safe disposal site, given that it meets the regulations set by the Department of Water Affairs in its document: *Policy and Strategy for Groundwater Quality Management in South Africa*.

"When wastewater treatment ponds reach their capacity, the options available are either to build new facilities or to empty the existing ones to make additional space available for waste. Traditional methods of waste containment, which usually require large amounts of space, stringent environmental permits and

frequent dredging, are normally unaffordable to municipalities," explains Johnny Oriokot, geotechnical engineer, Fibertex SA. "A feasible solution needed to be found to dispose of extracted material through the desludging process, which is not restricted by budget constraints and the limited space available at existing wastewater facilities.

"The use of geotextile dewatering bags is recognised globally as most efficient and economical method to achieve the required desludging process, which can improve the functionality and safety of wastewater treatment works."

Fibertex geobags, manufactured from UV-stabilised woven Polypropylene (PP) geotextile materials, are incorporated into the desludging process in wastewater treatment – the process used to convert wastewater into an effluent that can be returned to the water cycle with minimal environmental impact.

Solid particles (sludge) are then separated from the effluent and transported to a designated safe disposal site, or stored in a tailings storage facility at the wastewater treatment plant.

Fibertex geotextile dewatering bags, with high strength seams for a strong and durable dewatering system, are used to capture dredged sludge, whilst minimising water loss. The thread used to stitch the bags has a higher breaking strength than the geotextile itself,



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providing sufficient tensile strength to the geobags to withstand the stresses associated with pumping the material at high pressures.

Dewatering bags allow water to flow out through the porous geotextile fabric of the bags, while filtering any solids. The concern of the woven fabric opening size appearing to be slightly larger than the particle size of the dredged sludge material is countered by the formation of a filter cake on the inside of the fabric, which results in effective retention of the solids. This creates an equivalent two-stage filter, with filtration efficiencies above 98% for fine-grained material filtered through the high-strength woven geotextile bags – and certain geotextile designs are able to retain all particles larger than 10 µm.

In recent local projects, where wastewater treatment plants had reached their maximum storage capacities, the Fibertex solution was to remove sludge from the existing tailings facilities by using geotextile dewatering bags on-site. Fibertex also provided the geosynthetic products required for repairing existing



Fibertex geobags are constantly tested to ensure optimum performance and dependability.

lining systems that were damaged, and for installation of new lining systems in facilities that previously had none.

In order to accommodate pipe connections, two inlets per bag of standard size

200 mm were selected for pipe sizes up to 200 mm diameter. The pipe was inserted approximately two thirds of the way into the injection port and secured with tension strapping. At the end of the filling process in all installations, once the pipe is removed, inlets can be tied off easily.

The through-flow property of the geotextile determines the rate at which the effluent flows out of the geobag and these pumping rates are constantly monitored. A moderate rate ensures the bags keep their structural integrity throughout the operation.

Selection of the final disposal site for the dewatering geotextile bags needs to be as close to the generation area as possible, in order to minimise transportation costs. In addition, Fibertex recommends the following selection procedure for the suitable area:

- Ensure that the disposal site is not located in a sensitive area where disposal is not permissible.
- Ensure that the sludge disposal site is located as far as possible from the area where the final effluent is discharged to

limit possible contamination of the final effluent and to limit possible contribution of contaminants to the water resource.

- It is important to allow for the maximum buffer zones, greater than 400 m from surface water.
- Consider the slope of the disposal site to minimise run-off, erosion and ponding.
- Ensure the disposal site is not within the 1:100 year flood line.

In these recent projects, prior to placement and filling of the geobags, Fibertex lined the dewatering area with a 1.0 mm thick geomembrane layer, according to SANS 1526 specifications for thermoplastic sheeting. This material prevents local erosion and collects all effluent released from the geobags, thus preventing any seepage of the wastewater into the ground. The effluent is then channelled back into the dam or taken for further treatment.

No flocculants are necessary in this process, as there is sufficient time available for the material to dewater by gravity, resulting in further cost reductions. In order to ease the removal of the waste, water is pumped into the dams to agitate the sludge. Transfer of the sludge from the tailings dam into the bags is through pumps fitted with a suitable inlet impeller that prevents bigger particles being pumped into the bag.

The Fibertex team can assist customers with detailed studies to determine the volume of waste that could be extracted from tailings dams per bag. The duration of the dewatering and consolidation period varies depending on the type of geotextile, the bag sizes, fill material and site conditions. On average it takes about a week for the bags to drain. The solids are retained in the geobags and can then be safely disposed of or used as fertilizer. The geobags are also disposed of, as they are not reusable.

The selection of the geobag size is dependent on the volume that needs to be removed from the tailings facility and the space available on site where the geobags will be placed.

The Fibertex dewatering bag system is a cost-effective solution that simplifies the sludge removal process and subsequently increases the space available in wastewater tailings facilities for the additional waste. The geobags are an environmentally friendly solution and are suitable for use in aquaculture, industrial lagoons, sedimentation ponds and wastewater plants.

The Fibertex geosynthetics range encompasses a complete portfolio of nonwoven and woven geotextiles, as well as gabions and mattresses, drainage pipes, fittings, and erosion control and cellular confinement solutions. Fibertex also supplies soil reinforcing products, including geogrids and geocells, as well as geosynthetic clay liners, as part of composite lining systems in modern landfills. □



The benefits of using Fibertex geobags for sludge removal include ease of operation, efficient retention of solids, compliance with environmental regulations and cost optimisation – this dewatering system is passive and does not require constant monitoring and maintenance.



A recent local project where the Fibertex solution was used to remove sludge from the existing mine tailings facilities.