Parry Sound Uses Geotube® Technology to Dewater Sewage Lagoon Sludge

The Challenge...

The Municipality of McDougall operates a four lagoon cell system close to Parry Sound, Ontario for the management of sewage sludge. The four cells were in need of major rehabilitation which included the replacement of the cell liners and the repair of the cell walls. In order to perform the rehabilitation the sludge from the lagoon cells would need to be removed, dewatered and transported offsite. The township intended to landfill the material and in order to do so would require a dewatering technology which could not only produce a material that would pass the slump test but a technology which could be deployed quickly and economically.

The Solution...

Geo-Dredging and Dewatering Solutions Inc. was contacted by Fowler Construction who served as the General Contractor for the project, and were asked to undertake the dewatering portion of the projecting using the Geotube® dewatering technology. Before undertaking the project representatives of Geo-Dredging and Dewatering Solutions Inc. made a visit to the lagoon cell to collect representative samples of sludge contained in the lagoon. After bench testing several representative samples collected from the lagoon it was determined that the sludge contained in the lagoon was approximately 5-6% solids and was optimally flocculated using 4.7 kg of polymer per Bone Dry Ton of material.

Geotube® units were deployed atop a dewatering cell constructed of an impermeable geo-membrane material designed to collect the filtrate pouring from the bags.

The Construction...

A dewatering cell was constructed in close proximity to the Lagoon cells in order to transfer the filtrate produced through the dewatering process back to the lagoon as simply as possible. Fowler Construction undertook the construction of the dewatering cell which measured 120’ in width x 200’ in length and was designed to accommodate 4 Geotube® units measuring 60’ in circumference x 200’ long. Berms were constructed around the perimeter of the dewatering cell in order to limit the risk of filtrate being discharged to the environment. The area was sloped at approximately 1% so that filtrate could be discharged to a collection trench located at the end of the cell.

Once the base of the cell was constructed an impermeable geo-membrane liner was installed to control the flow of filtrate from the Geotube® units. On top of the liner a non-woven geo-synthetic was installed to protect the liner from incurring any damage over the course of the project. Finally a drainage media was installed in order to promote dewatering from the bottom of Geotube® unit. After the completion of the dewatering cell, the Geotube® units were deployed and connected to a manifold system capable of feeding all the units simultaneously or one at a time.
The Performance...

Sludge was pumped to the Geotube® units by a PTO driven manure pump. As the sludge was transferred to the bags it was conditioned inline by Geo-Dredging and Dewatering Solutions custom designed mobile polymer injection system. The automated nature of the system ensured optimal flocculation over the course of the project by reading the percent of solids of sludge every 15 seconds and automatically adjusting dosage rates. Quick subsurface deployment makes the Geotube technology the ideal solution for dewatering sump mine water.

During the course of the project it became apparent that the original volume of 15 000m³ originally to be contained in the lagoon had been underestimated. Geo-Dredging responded to the unanticipated increase in volume by expediting an additional two 60’ circumference x 100’ long and two 45’ x 100’ long Geotube® units to the site to ensure sufficient capacity to dewater the volume. Because the dewatering cell had been constructed by the four original Geotube® units, Geo-Dredging and Dewatering had to innovate and strategize their placement of the additional Geotube® units. The Geotube® units were stacked on top of the original bags, allowing the project to continue without additional lay down area being constructed, maintaining the original footprint.

Pumping continued until the lagoons had been emptied. The dewatering aspect of the project concluded on October 27, 2010.

The Municipality of McDougal commissioned the removal of solids from the Geotube® units in April of 2011. Geo-Dredging and Dewatering was onsite to collect samples of the dewatered material to be analyzed for total solids content. Although it was raining heavily during the solids removal, samples collected were analyzed at approximately 30% solids. Easily passing the slump test, allowing the township to haul the material offsite to the landfill.

The custom chemical conditioning system used by Geo-Dredging and Dewatering not only adjusts dosage rates to ensure proper flocculation it records detailed data pertaining to every project undertaken. At the completion of the project approximately 30 000m³ of material at an average of 5.5% solids had been pumped to and dewatered by the Geotube® units, leaving approximately 8000m³ of dewatered material to be transported offsite.

The use of the Geotube® technology for the dewatering aspect of this project allowed the municipality to pump the sludge during 2010 and dispose of the dewatered material efficiently and cost-effectively.

How the Geotube® works...

Dewatering with Geotube® technology is a three-step process.

In the confinement stage, the Geotube® container is filled with dredged waste materials. The Geotube® containers unique fabric confines the fine grains of the material.

In the dewatering phase, excess water simply drains from the Geotube® container. The decanted water is often of a quality that can be reused or returned for processing or native waterways without additional treatment.

In the final phase, consolidation, the solids continue to densify due to desiccation as residual water vapor escape through the fabric. Volume reduction can be as high as 90 percent.