

## Lagoon Dewatering Solutions Case Study: The Town of Cobalt, Ontario

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### Ontario Companies Partner to Provide Municipal Sewage Sludge Management Solutions

#### THE CHALLENGE

The Town of Cobalt (Cobalt) is a rural community located in Northeastern Ontario, with a population of about 1,200 people. Cobalt's sewage is treated using constructed wetland technology. Raw sewage is discharged to a maintenance forebay where the solids are allowed to settle. Supernatant from the forebay overflows to the constructed wetland where it is treated before being discharged to a nearby creek. In November of 2009 the forebay had become filled and required emptying. The town needed a solution for removing solids from the forebay which would also provide storage for the biosolids until they could be land applied. Being a small, rural community, a low cost solution to cleaning the forebay was imperative.

#### THE SOLUTION

Environmental consulting firm, Story Environmental Inc. of Haileybury, Ontario was retained by the town to determine the most effective method of cleaning the lagoon and to manage the project. Maria Story of Story Environmental had read an article in a Environmental Science and Engineering publication which highlighted the Geotube® technologies effectiveness in lagoon sludge management, and contacted Bishop Water Technologies to help determine the feasibility of utilizing the technology for the Cobalt project.

Geotube® dewatering containers are constructed of a special woven polypropylene material which is extremely efficient at retaining solids and producing a clear effluent. Geotube® units sit upon a constructed lay down area which is designed to direct the filtrate to wherever the application demands, in this instance back to the forebay. As sludge is pumped to the containers it is chemically conditioned with a polymer to allow the Geotube® to dewater at its maximum efficiency. Once pumping is completed the Geotube® units are



*Geotube® unit is being filled with sludge from the forebay in subzero temperatures, allowing a clear effluent to filter through the material of the bag and back into the forebay.*

left to dewater until such time that the odorless, retained solids are land applied.

Ashland Hercules Water Technologies performed bench testing of the forebay sludge to determine the optimal polymer and polymer dosage rate to chemically condition the sludge. Bench testing also determined that that 1 Geotube® unit measuring 30' in circumference x 90' in length would be required to complete the project, however Cobalt ended up using 2 Geotube units measuring 30' in circumference x 47' long. The low cost of the polymer and Geotube®, along with the quick time frame in which the project could be completed appealed to Cobalt, and they chose to proceed with the Geotube technology to reduce the volume of solids in the forebay.

Bishop Water Technologies, based on their extensive experience using the Geotube® containers in both permanent and temporary

applications, was able to supply Story Environmental with all the necessary information to initiate the project.

#### THE CONSTRUCTION

In less than a week the Cobalt Public Works Division, under the direct supervision of Vic Legault, had prepared a lay down area for the Geotube® which would allow filtrate to be directed back into the forebay. The lay down area was first leveled by creating a sand sub grade. A geo-synthetic liner was then laid over the sub grade to allow the filtrate to drain via gravity back to the forebay. Crushed stone was used to construct berms around the Geotube® unit and as filtration media to promote dewatering from the bottom of the container.

Mr. Legault, constructed a custom polymer mixing chamber which was used to inject a predetermined amount of polymer solution into the sludge prior to dewatering and contain-

ment by the Geotube® unit. With the site preparation complete, representatives of Bishop Water Technologies, Story Environmental and Cobalt met with the polymer supplier, Ashland Hercules Water Technologies, to begin the project.

### THE PERFORMANCE

Over the course of 2 days sludge was pumped for 9 hours from the forebay into the Geotube® unit at a rate of 39.4 liters per second. In this short time span approximately 1,277 cubic meters of sludge was pumped from the forebay to the Geotube® units. Immediately upon commencement of filling, clear effluent began filtering through the polypropylene fabric of the bag, and back into the forebay. The Geotube® was filled to its maximum pump height during the first day of pumping and Cobalt had to wait for it to drain to continue filling it the following day. During day two of pumping the Geotube® was filled for approximately 2 hours as a problem with a frozen water pump interrupted the filling process.

Samples of filtrate were collected and analyzed, the results were impressive. Analysis showed major reductions in Heavy Metals, Biological Oxygen Demand, Coliform, E-Coli, Total Phosphorous and Total Kjeldahl Nitrogen.

The Geotube® units will remain in place until Cobalt removes the solids. Once the container is opened the retained solids will be odorless and will resemble a black earth material. Several options are available to Cobalt for disposal of the dewatered material. Municipal solids retained by the Geotube® technology are most often land applied, however they can be disposed of at landfills, incinerated or used as a feedstock for anaerobic digesters to produce methane gas.

The diversity and flexibility of the Geotube® technology provided benefits to the Town of Cobalt, that mechanical methods of dewatering could not. By dewatering and containing the sludge in a single process the town has the luxury of spreading the total project cost over years, as opposed to incurring the cost of sludge removal and disposal at the same time. In addition they will not dispose of a material that is over 95% liquid, instead they will dispose of a material which could reach up to 30% in solids content, greatly reducing the volume to be hauled off site, and transportation costs.

The simplicity, affordability and versatility of the Geotube® technology has encouraged Cobalt to consider the technology as a long term solution for managing sewage sludge. Should Cobalt decide to implement the Geotube® technology as a long term solution Cobalt will reduce odors, improve the effectiveness of their wetland system and have a long term sustainable solution for its sewage sludge.

The successful partnership between Story Environmental, Bishop Water Technologies and the Town of Cobalt in implementing a low cost,

### Snapshot of Filtrate Analysis from Cobalt, Ontario

- 93.8% Reduction of B.O.D.
- 99.8% Reduction of Total Phosphorous
- 89.2% Reduction in TKN
- 99.6% Reduction of E-Coli
- 99.9% Reduction of Coliform

environmentally friendly solution to manage the sludge contained in the forebay, has helped to change the perception of how forebay and lagoon sludge can be managed.

As Cobalt moves forward in evaluating the Geotube® technology as a long term solution for sewage sludge management, Bishop Water Technologies and Story Environmental will continue their dedication to providing clients with effective and affordable sludge management and environmental consultation services.



Filtrate from the Geotube® dewatering technology in comparison to the raw sludge which was pumped from the forebay.

## How Geotube® Dewatering Technology 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 escapes through the fabric. Volume reduction can be as high as 90 percent.



Step 1: Filling



Step 2: Dewatering



Step 3: Consolidation

### Bishop Water Technologies Inc.

Contact: 110-B Bonnechere St. W  
Kevin Bossy Eganville, On  
Phone: 613-628-5266 K0J 1T0  
Cell: 613-433-0289  
Email: kevin@bishopaquatic.com

### Story Environmental Inc.

Contact: 770 Lakeshore Rd  
Maria Story Haileybury, On  
Phone: 705-672-3324 POJ 1K0  
Fax: 705-672-3325  
Email: maria.story@storyenvironmental.com

### The Corporation Of The Town Of Cobalt

Box 70  
Cobalt, On  
POJ 1C0  
Phone: (705)679-8877  
Fax: (705)679-5050