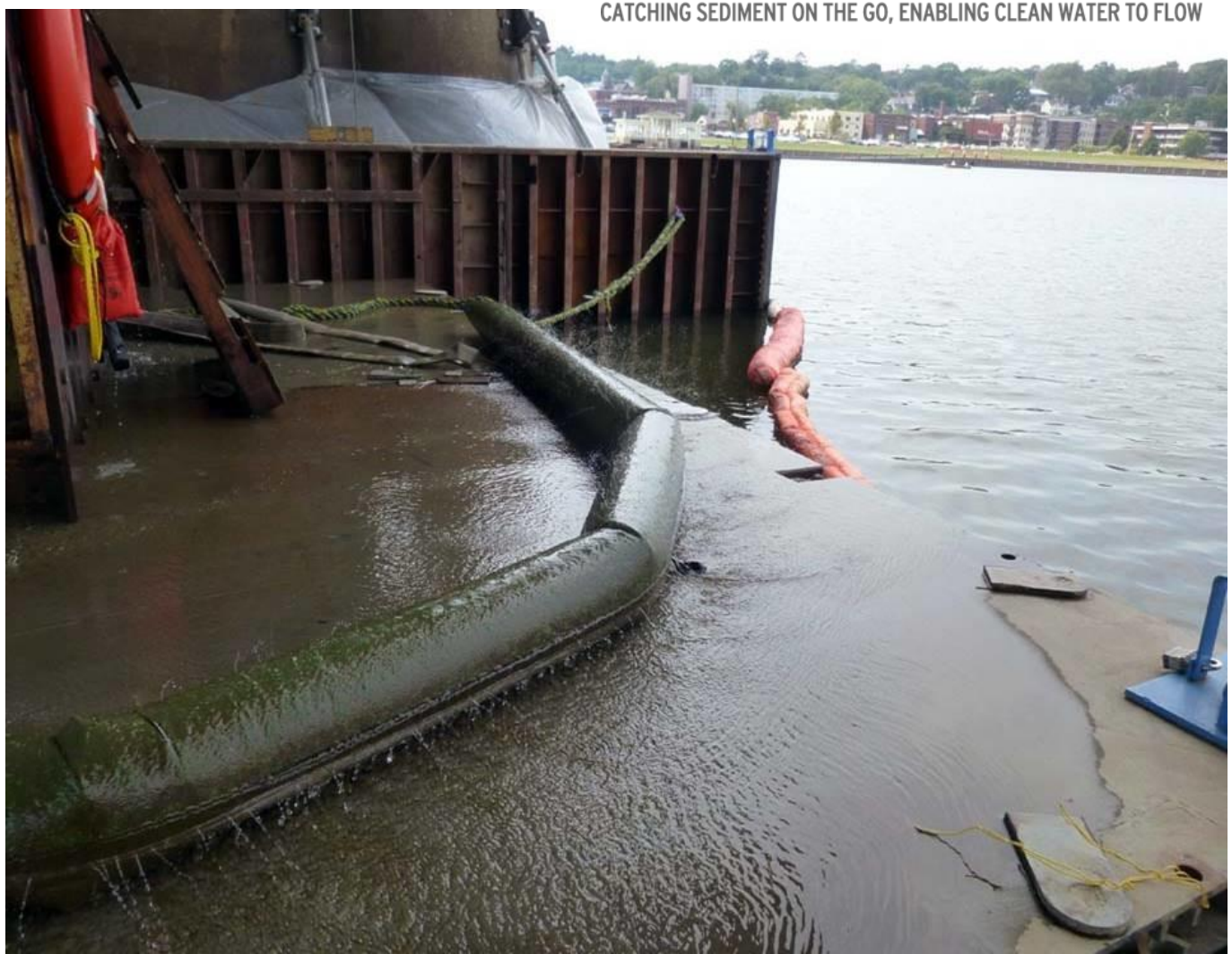
Various agencies have discussed the possibility of using turbidity as an effluent standard for construction sites, but turbidity monitoring can be difficult for dynamic construction sites. A project at St. Croix Crossing in Minnesota—south of Stillwater and connecting Oak Park Heights, Minn., and St. Joseph, Wis.—investigated turbidity relationships and developed protocols for the design and installation of cost-effective monitoring systems. At this site, sediment-laden water was releasing into the St. Croix River from barges.

FLO-WATER

CATCHING SEDIMENT ON THE GO, ENABLING CLEAN WATER TO FLOW



Dewatering Bags

Regulations and specifications have been set to ensure contaminated water is filtered when pumping of water. Flow rates of established dewatering bags often are limited and often blow out as sediment is captured. However, certain advancements enable projects to produce cleaner storm water and eliminate dewatering challenges.

Regulations and construction specifications may require sediment control, erosion prevention, brown water, and pollutant prevention management techniques. Despite good plans and intentions, coping with turbid water or sediment or erosion control during active construction can lead to illicit discharges. While gravity discharge failure can occur due to forces beyond our control, dewatering can occur within defined parameters and in control of the contractor. There are many passive and active ways to manage turbid water, but treatment is a function of the soil type, the volume of water to be treated and the total suspended solids.

FLO-WATER

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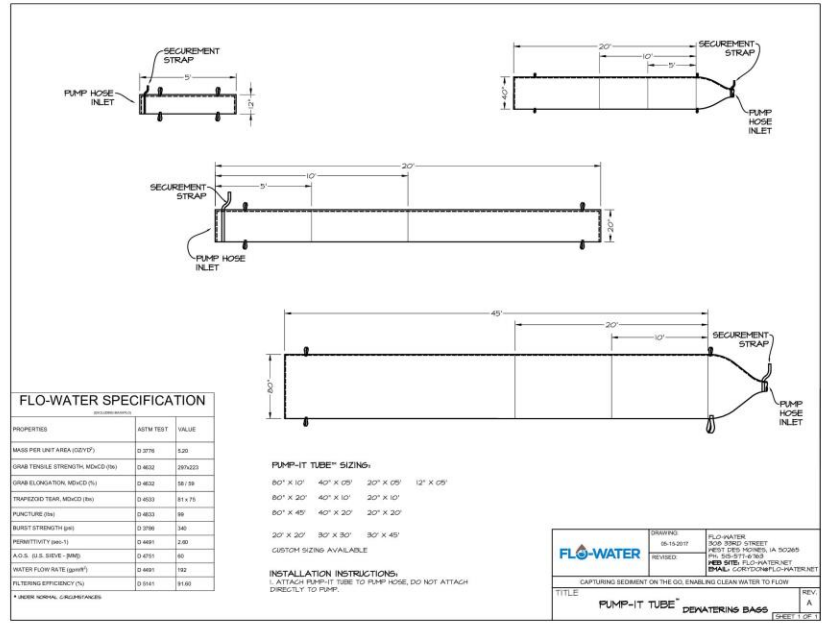

Research

The turbidity characteristics of 14 different soils in Minnesota were investigated. Trends in turbidity with sediment concentrations were well represented by power functions. The exponent of these power functions was relatively constant between soils, and the log-intercept, or scaling parameter, varied substantially among the different soils. A regression analysis for the scaling parameter was a function of percent silt, integral erodibility, and maximum abstraction. The field studies also were used to develop turbidity monitoring systems that would be adaptable to construction sites and to collect turbidity data on construction site runoff. For example, the construction site turbidities often exceeded 1,000 NTUs and sometimes surpassed 3,000 NTUs.

Pump-It Tube Dewatering Bags were used in the research to define means and methods for reducing turbidity during construction activities. This was part of a project to actively select a subset of discharge flow and monitor with the intent to ultimately add flocculent chemistries to reduce the sediment load by using automated machines. The tubes were used for real-time automated dewatering of a drill shaft hopper barge dewatering system for final polishing of the discharge prior to release back into a designated wild and scenic river.

The goal was to reach 25 ntu above background—not to exceed 70 ntu for special and impaired waters—and 50 ntu not to exceed 125 ntu for all other waters. The pH was adjusted to be 7.0, +/- 1.0.

FLO-WATER

CATCHING SEDIMENT ON THE GO, ENABLING CLEAN WATER TO FLOW

The dewatering tubes have provided benefits for the scour control. The small apertures of the heat-bonded non-woven fabric use pressure to force water out of the tube. The tubes also were used along gutter lines for urban utility dewatering work, as part of a treatment train with lined dumpsters and potential chemicals in the pre-treatment flow path. In addition, they worked with a limited footprint for barge surface work areas adjacent to the coffer dewatering. Finally, this research helped develop a dewatering guidance document.

This research, ultimately, opens the door for advancements in dewatering bags. The tubes enable faster flow rates while capturing more sediment. This is done by using heat-set non-woven geotextile with a built in woven poly-scrim, which enables multiple layers of the fabric to filter sediment, trash, metals, silica and more by providing a larger number of openings layered atop of one another. The built in polyscrim gives the fabric structural strength, while enabling higher flow rates.

Due to this proof-in-concept success, coffer dewatering into treatment dumpsters was discharged into the tubes along work barge edges to the river during bridge pier repairs below the water line. This was a success, and it provided a safe space for barge surface laydown and work area. Originally, contaminated water was stored on the edge of the barge. Ultimately, the problems resolved included reducing the working footprint, reducing downtime, increased flow rates, ease of maintenance, regulatory-approved clean water releasing into the St. Croix River, and increasing sediment capture to an acceptable rate.

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The Pump-It Tube® Woven Dewatering Bag Specifications

Minimum Average Fabric Values

Properties	ASTM	Value
Mass per Unit Area (oz/yd2)	D-3776	5.2
Grab Tensile Strength, MD x CD (lbs)	D 4632	297 x 223
Grab Elongation, MD x CD (%)	D 4632	58 / 59
Trapezoid Tear, MD x CD (lbs)	D 4533	81 x 75
Puncture (lbs)	D 4833	99
Burst Strength (psi)	D 3786	340
Permittivity (sec-1)	D 4491	2.60
A.O.S. (U.S. sieve – (mm)	D 4751	60
Water Flow Rate (gal/ft2/min)	D-4491	192

Install the Pump-It Tube® Dewatering Bag on a slope so incoming water flows downhill through the Pump-It Tube®, without creating more erosion.
Attach the neck of the Pump-It Tube® with the D-Ring and Strap (secured to the neck of the Pump-It Tube) to the discharge hose.
To increase the efficiency of filtration, place the bag on an aggregate or hay bale bed (elevate Pump-It Tube®) to maximize water flow through the surface area of the Tube.
The Pump-It Tube® is full when it no longer can efficiently filter sediment or pass water at a reasonable rate. Use of manifold enables larger fill capacity per bag, enables the elimination of downtime.
With flow rates at 192 gl/ft2/min, the max flow rate per Pump-It Tube®, varies per size of unit (see below chart), the type and amount of sediment discharged into the Pump-It Tube®, the type of ground, rock or other substance under the bag and the degree of the slope on which the bag lies.
Under comparable circumstances the Woven Pump-It Tube® will accommodate flow rates 2.5 x's that of their non-woven dewatering bag counterparts.
Use of excessive flow rates or overfilling Pump-It Tubes® with sediment will cause ruptures of the bags. Dispose of the Pump-It Tube® as directed by the site engineer.
If allowed the Pump-It Tube® may be cut open and the contents seeded after removing visible fabric.
** Electric Pumps require larger Pump-It Tube, or elevation of Pump-It Tube® due to increased flow rate. ** Pump Size recommendations vary on sediment load, or total suspended solids.
*** Increase in pump size requires user to use larger Pump-It Tubes®, to split flow to multiple Pump-It Tubes®, or to elevate Pump-It Tubes® to flow through entire face of Pump-It Tube®.

Pump-It Tube® Sizing	Pump-It Tube® Max Flo*	Max Gas Pump Size**
FW2005PT (20"x05')	1600 gl/min	3"
FW2010PT (20"x10')	3200 gl/min	4"
FW2020PT (20"x20')	6400 gl/min	4"
FW4005PT (40"x05')	3200 gl/min	5"
FW4010PT (40"x10')	6400 gl/min	6"
FW4020PT (40"x20')	12800 gl/min	6"
FW8010PT (80"x10')	12800 gl/ min	***
FW8020PT (80"x20')	25,600 gl/min	***
FW8030PT (80"x30')	38,400 gl/ min	***
FW8045PT (80"x45')	56,800 gl/min	***