STRICTER EPA EFFLUENT LIMITATIONS GUIDELINES CALL FOR NEW SOLUTIONS

Applying Innovative Best Management Practices in Construction and Development Sites

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By Brian H. Whitaker, P.E., CPESC, Kevin Wolfe, Ph.D., P.E., D.WRE

TYPAR Geocells (bottom), silt fences (left), rock check dams (right), and other best management practices can be used in combination.

Construction activities, such as clearing, excavating, and grading, can have a detrimental impact on land and surrounding areas. Disturbed soil, if not managed properly, can easily be washed off the construction site during storms and enter nearby lakes and streams. As a result, sediment runoff rates from construction sites are typically 10 to 100 times greater than those of undisturbed land, and several times greater than rates from natural areas such as forests. In fact, storm water runoff is one of the leading causes of water pollution across the country.

In some areas, especially along the U.S. coastline, polluted runoff from roads and highways may be the largest source of water pollution. For example, approximately 75 percent of the toxic chemicals getting into Seattle's Puget Sound are carried by storm water that runs off paved roads, driveways, rooftops, yards, and other developed land, according to a report by the Washington State Department of Ecology. This, however, does not only affect coastal areas. In Indiana alone, more than 100 million tons of sediment erodes annually from urban and agricultural landscapes, according to the town of Brownsburg, Ind., website. In addition to sediment, as storm water flows through a construction site, it can pick up other pollutants such as debris, pesticides, petroleum products, chemicals, solvents, asphalts, and acids, which also contribute to water quality problems.

Project
Storm water management

Participants
Civil & Environmental Consultants
Fiberweb

Project Application
TYPAR Geocells allow water to flow through the aggregate while soil particles are retained, thereby reducing sediment and turbidity in stormwater runoff.

To help alleviate these problems, the U.S. Environmental Protection Agency (EPA) recently adopted new, stricter regulations for storm water management and runoff from construction and development sites. The effluent limitations guidelines (ELGs) require that outfalls from construction and development sites be monitored for a numeric turbidity standard for precipitation events that are equal to or less than a two-year, 24-hour storm. Specifically, the EPA guidelines, as stated on www.epa.gov, require that the maximum daily average from each outfall not exceed 280 NTU (nephelometric turbidity units).

To move closer to providing a solution to these new mandates, product advancements in storm water management now provide engineers and developers with improved alternatives to capture sediment runoff from construction sites and meet new EPA regulations. For example, **TYPAR Geocells**, manufactured by Fiberweb, an international geotextiles manufacturer based in Tennessee, are composed of a durable, nonwoven fabric in a honeycomb configuration. **Geocells** are three-dimensional geotextiles that can be filled with aggregate or mulch to produce a stable, self-supported, erosion and sediment structure. Water flows through the structure while soil particles are retained, thereby reducing turbidity in storm water runoff.

TYPAR Geocells are designed to survive major storm events and significantly reduce turbidity. During a large-scale field study, a severe and unexpected rain event allowed researchers to evaluate the survivability of **TYPAR Geocells**. The ability of **TYPAR Geocells** to reduce turbidity was evaluated in controlled, small-scale tests and large-scale field studies.

Surviving a 1,000-year rain event

The ability to survive severe storm events without being washed away is one of the most important functions of any best management practice (BMP) used in storm water management. This was put to the test during a two-day span in Nashville, Tenn., where the city experienced an excess of 13 inches of rain - more than doubling the previous record of 6.68 inches. In fact, the rainfall was so severe that the Army Corps of Engineers classified it as a 1,000-year rain event. While the conventional rock check dams made of 4- to 6-inch aggregate at the field study site were washed out, **TYPAR Geocells**, which were filled with 4- to 6-inch aggregate, remained intact.

Debris on top of the solar panel indicates the high watermark from the 1,000-year rain event.

Putting Geocells to the test

To test the efficacy of **TYPAR Geocells** in sediment and erosion control applications, Civil & Environmental Consultants, Inc. (CEC) of Franklin, Tenn., initiated a series of comparative small-scale flume tests. The turbidity reduction capabilities of **TYPAR Geocells** filled with shredded wood mulch was compared with a standard silt fence and a 9-inch straw wattle. **The results indicated that the TYPAR Geocells with mulch outperformed both comparative products when examining effluent quality, relative to suspended solids and turbidity**.

To expand upon the small-scale flume tests, full-scale field studies were initiated. Identical research plots were designed and constructed at a landfill facility in Tennessee. The turbidity-reduction capability of **TYPAR Geocells** filled with shredded wood mulch was compared with 12-inch straw wattles. For the straw wattle, the average daily turbidity limit of 280 NTUs was exceeded 78.6 percent of the time during the study period from September 2009 through April 2010, excluding the data taken during the 1,000-year rain event in May 2010. For **TYPAR Geocells** with mulch, the average daily limit was never exceeded during the study period from September 2009 through April 2010. The study continues to investigate methods for achieving the new EPA guidelines.

Call for innovation

New storm water regulations have created unprecedented challenges for managing construction erosion and sediment control because traditional erosion control products are often overwhelmed by the soil and water movement these solutions are intended to prevent. The practice of storm water management is evolving and now requires innovative approaches applied at the site level to ensure our rivers, streams, and ponds are not contaminated by sediment runoff from construction sites.

Brian H. Whitaker, P.E., CPESC, is the technical sales manager for Fiberweb, based in Old Hickory, Tenn.
Kevin Wolfe, Ph.D., P.E., D.WRE, is the vice president of Civil & Environmental Consultants, Inc., based in Franklin, Tenn.