



Introduction



The Town of Big Flats, New York had a challenging series of stormwater channels on a public right-of-way. The series of stormwater channels transported rainwater and snowmelt that originated from a steep hill, crossed right of ways, and eventually emptied into a stream. The long downhill run caused concentrated flows in the channels that temporary rolled erosion control products (RECPs) could not withstand.

The decision was made to protect the land from erosion and scour by investing in a comprehensive overhaul of the failing stormwater channel system (see Figure 1).



Figure 1. Vegetated Stormwater Channel Reinforced by TriNet® Recyclex® TRM

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Background



No modern Best Management Practices (BMPs) were used in the original channel design, so property damage and maintenance problems occurred with each large rainfall and snowmelt event. Extensive soil erosion in the channels was an eyesore, and during large rain events, the stormwater volume exceeded the containment capacity of the existing channels.

To complicate matters, upstream channels that crossed private property were altered for aesthetic purposes over the years. These alterations significantly reduced the system's ability to slow the water velocity entering the lower channels. The existing stormwater channels were lined with rip rap and had eroded swales approximately 4' wide and 24" deep (see Figure 2).

A successful stormwater control plan using modern BMPs was needed to reduce the chance of damage to nearby properties.



Figure 2. Outdated and Eroded Stormwater Channel

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Project Team



After final engineering and design solutions were approved for the site (see Figure 3), Wenzel Contracting began the erosion and sediment control improvements. The erosion control products were supplied by Chemung Supply Corporation. Many of the required erosion control solutions were manufactured by American Excelsior Company.



Figure 3. Aerial View of the Project Site

Design Solutions



Engineers chose to use a vegetated channel solution that incorporated several BMPs. These BMPs included the pairing of heavy-duty turf reinforcement mats (TRMs) with new rock check dams. This combination protected the channel from further degradation. Degradable RECPs, also known as erosion control blankets (ECBs), were installed outside the main channels to prevent erosion and encourage vegetation growth.

Vegetated channels have years of proven benefits and success. When vegetated channels are designed properly and incorporate quality materials, they ensure long-term protection against soil erosion.

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Best Management Practice Specification



Wenzel Contracting chose two products from American Excelsior Company for the project: TriNet Recyclex to line the stormwater channels and AEC Premier Straw® to line the sediment retention pond and protect other areas outside the channels.

TriNet Recyclex is a three-dimensional TRM. The center section consists of 100% post-consumer recycled polyester fibers (green plastic bottles). 80% of the Recyclex® fibers are 5" or greater in length. TriNet Recyclex has three ultra-heavy-duty, UV stabilized polypropylene nets. There are two nets on top of the Recyclex fibers and one net on the bottom. The Recyclex fibers and the three nets are stitched together to form the finished product.

Recyclex fibers differ from the synthetic fibers used in most other TRMs on the market. They are tightly crimped and curled to allow the fibers to interlock. They retain 95% memory of their original shape after loading by hydraulic events. Recyclex fibers have a specific gravity greater than 1.0. This means that unlike other TRMs, Recyclex TRMs will not float during hydraulic events. Keeping TRMs close to the seedbed means less erosion and seed migration.

The benefits of vegetated swales vs. hard armor and rip rap are well documented (see Figure 4).

- **Filter Contaminants**
- **Reduce Flow Velocity**
- **Increase Sedimentation**
- **Increase Infiltration**
- **Safer and Softer vs. Rip Rap**
- **Easier Site Access vs. Rip Rap**
- **Less Destructive Installation than Rip Rap**
- **Lower Carbon Footprint vs. Rip Rap**
- **Site Returned to Vegetated Conditions**
- **Lower Installed Cost vs. Hard Armor**



Pollutant	Median % Removal
TSS	81
Oxygen-Demanding Substances	67
Nitrate	38
Total Phosphorus	9
Hydrocarbons	62
Cadmium	42
Copper	51
Lead	67
Zinc	71

Figure 4. Benefits of Vegetated Swales

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Executing the Plan



Existing channels were excavated, and the existing rock channel bottom was removed. The channels were then reshaped, deepened, and widened to create more stormwater capacity and stormwater infiltration (see Figure 5). After excavation was completed, the channels were compacted and fine graded to remove any rills. The contractor also made sure that the channel was free of obstructions such as tree roots, large rocks, and other foreign objects. Topsoil was evenly distributed at a depth of 4" to prepare for seeding then the TRMs and ECBs were installed.



Figure 5. Removal of Existing Rock and Channel Reshaping

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Executing the Plan - Continued



After the channels were repaired and reshaped, they were seeded and fertilized. A cover crop of grain rye was applied at 20 lb/ac and the specified upland low-growing wildflower and grass mix was applied at 30 lb/ac. After the seeding was completed, the swales were lined with TriNet Recyclex and new rock check dams were installed on top of the TRM. Side slopes were covered with AEC Premier Straw ECBs (see Figures 6-9).



Figure 6. Installation of TriNet Recyclex



Figure 7. New Rock Check Dams Over TriNet Recyclex



Figure 8. TriNet Recyclex and New Rock Check Dams



Figure 9. AEC Premier Straw Installed Outside Channel

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Results



The design team understood the shear stress capability of vegetation alone would not survive the design flows of the channel. TriNet Recyclex TRMs successfully protected the channels and reinforced the vegetation, allowing it to withstand high stress events and to carry runoff from the site. Paired with rock check dams, the BMPs protected the site and surrounding area.

The AEC Premier Straw ECBs protected the soil that was disturbed outside the channels during construction. The resulting vegetation reduced the sediment load flowing to the newly established channels.

In total, more than 6,500 yd² of TriNet Recyclex TRMs and 3,000 yd² AEC Premier Straw ECBs were used on the complex, ecologically sensitive two-mile long project (see Figure 10).



Figure 10. Completed Vegetated Swale Reinforced by TriNet Recyclex TRM

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