# Revegetating Waterways with Curlex® ECBs

Case Study – Vegetated Waterway Solutions

## Introduction

A series of swales on a Wisconsin farm are responsible for draining nearly 800 total acres of watershed. Three years ago, remediation work was carried out on the swales, and blown straw was chosen as the erosion control Best Management Practice (BMP). However, precipitation events over the following two years, including a spring downpour of 2.5” of rain within 45 minutes, washed away most of the topsoil and blown straw. Needless to say, the first attempt at completing this project failed because the selected BMP did not protect against erosive forces from concentrated flow, meaning more time and money were required to restore the site.

The swales had since produced some vegetative cover, but years of erosion created visual eyesores and left the farm vulnerable to future flood events (see Figures 1 through 3).

Figure 1: Aerial view of one swale on the property before excavation. Notice the large gully running down the middle of the swale from years of erosion.

Figure 2: Surface view of one of the swales before excavation. The standing water from a prior precipitation event illuminates voids in the subgrade that resulted from years of erosion.

Figure 3: Aerial view of one of the swales before excavation. Notice the large gully running along the right side of the swale from years of erosion.

## Project Scope

To have the ability to withstand future flood events, the swales needed to be cleared of existing vegetation, widened, seeded with cool-season grasses, and covered by an appropriate erosion control BMP. The selected BMP had to be capable of dissipating energy from hydraulic forces, such as those generated by concentrated flow, while maintaining intimate contact with the subgrade and fostering proper seed germination and vegetation establishment conditions.

## The Plan

Curlex® II, a double-netted erosion control blanket (ECB) with a fully biodegradable Great Lakes aspen excelsior (Curlex®) fiber matrix, was selected as the BMP for this project.

Curlex® fibers set themselves apart from other commonly used fibers in erosion control applications through their natural mechanical functions. For example, when combined in the ECB matrix, the curled and barbed fibers have a high Manning's *n* (hydraulic roughness) value. A high hydraulic roughness value allows Curlex II to effectively dissipate energy from hydraulic forces, reducing flow velocity and consequently increasing infiltration during hydrologic events.

Their curled and barbed structure also enables Curlex fibers to interlock, forming a resilient matrix that expands when wet and clings to the underlying soil. This expansion also provides enhanced protection from raindrop impact and creates a "greenhouse effect" for the seed bed. During dry conditions, the fibers attract and hold water molecules from the surrounding environment, known as hydroscopic action. The fibers then slowly release the absorbed moisture back to the soil, which nurtures seeds and promotes vegetation establishment.

## Executing the Plan

Proper installation of specified BMPs is key to the success of any project. The following images highlight some of the key installation processes specific to this project (see Figures 4 and 5).

Figure 4: Heavy equipment performing grading work to widen one of the swales after its vegetation was cleared.

Figure 5: Curlex II ECBs being installed in 8' widths to cover each swale.

## Unforeseen Challenges

The project site experienced above-average rainfall during the months immediately following the excavation, seeding, and ECB installations. When a local conservation official visited the farm approximately two weeks after the ECB installations had been completed, he remarked that there was minimal observable erosion and that vegetation along the swales' sides "came in beautifully". However, they also noted that some of the seeds had failed to germinate in the centers of the swales because they had drowned. Figure 6, taken after a 0.75" rain event, illustrates the reason for this outcome. The combination of naturally shallow gradients (~0.4%), low-infiltration silty soils, and compaction from grading activities resulted in soil saturation issues that drowned the seeds in these areas.

Figure 6: Among other factors, this swale's gradient is ~0.4%, allowing water to pool easily after extensive precipitation.

## Plan of Action and Key Takeaways

The swales were re-seeded in hopes of revegetating the centers before cold seasonal temperatures arrived. Unfortunately, right after re-seeding, the rainy summer ushered in a comparatively dry early fall. Still, the Curlex II's fibers captured moisture from the air and rainfall and returned it to the soil and seed bed, thus fostering vegetation establishment (see Figure 7).

Figure 7: Photo of the swale in Figure 6 taken in November, a few weeks after the drowned seeds were replaced.

# Results

Amidst soil saturation issues, vegetation gradually emerged across the swales into the fall season because of the naturally insulating effect of the Curlex ECBs (see Figures 8 through 10).

Figure 8: Aerial view of one of the swales shortly after Curlex II ECB installation (photo taken in late spring).

Figure 9: Aerial view of one of the swales (photo taken in mid-summer).

Figure 10: Surface view of one of the swales (photo taken in late fall).

# Next Steps

The swales will be mowed at moderate intervals by the property owner for the foreseeable future.

A special thank you goes out to the project planners and laborers for making the project a success. Contact American Excelsior Company regarding questions about this article or for more information at: ccs@americanexcelsior.com.