

# Stormwater Detention Basin Enhancement

## Friendship Community Center, Lower Paxton Township, Dauphin County, Pennsylvania



Plowing the east basin floor before sowing the area with meadow grasses and forbs

Detention basins have been used for decades to impound and meter out storm runoff captured from adjacent impervious surfaces, such as parking lots and rooftops. The purpose of these basins is to delay and reduce the peak flow in receiving streams in order to both avert flooding and reduce stream erosion. However, because there are a number of drawbacks with this approach, urban stormwater managers are increasingly emphasizing techniques which promote the on-site infiltration of stormwater instead of discharge (delayed or otherwise) to channels. This strategy more closely mimics the forested, pre-development watershed condition, when rainwater and snowmelt infiltration was widespread, a condition which tended to preserve channel stability and minimize flooding. Such infiltration-based approaches to urban runoff management are often collectively called Low Impact Development (LID).

Working under a grant provided by the National Fish and Wildlife Foundation, the Paxton Creek Watershed and Education Association (PCWEA) partnered with the Lower Paxton Township Parks and Recreation Department to undertake several environmental enhancement efforts around the two main detention basins at the Township's Friendship Community Center in 2006. The three main retrofit activities included 1) structural efforts to control

slope erosion at the west basin, 2) conversion of the east basin from an ordinary detention basin into an infiltration basin, and 3) installation of native "re-naturalization" plantings in and around both basins.

Because the basins had been constructed in mixed rocky fill materials (not topsoil), turfgrass growth has always been sparse around the basins. Uncontrolled parking lot runoff along the north edge of the west basin had caused particularly significant soil erosion in this area. With manual labor provided by local Boy Scout Troop 368, erosion-control devices installed here included 1) a rock-filled gabion basket "verge" along the edge of the parking area (to promote infiltration of pavement runoff), 2) plank "checks" to create soil-filled planting benches, and 3) a treated lumber "water ladder" to stabilize a gully.



Installation of the water ladder for runoff erosion control

The east basin was converted to an infiltration basin by plugging the lower orifice in the concrete outlet structure. This will cause runoff collected from all but the most extreme rainfall events to infiltrate into the ground rather than discharge directly to the storm drain and hence to the local stream.

By far the largest enhancement effort at the Friendship Center involved replanting the area around the

basins with native trees and shrubs in order to start the process of reforesting this grass-covered landscape. Planting trees and shrubs represents a good stormwater management practice because they intercept rainfall. This reduces surface runoff by both allowing raindrops to more easily soak into the surface and by encouraging evaporation of a part of the intercepted rainfall back to the atmosphere. This effort also begins the process of creating a more attractive and wildlife-friendly landscape while reducing the need for mowing.



Planting in clusters and within larger plowed zones promotes better plant survival in derelict soils

Planting was conducted in two stages in 2006, first in the Spring by the Boy Scouts and then again in the Fall using other community volunteers. Altogether, 280 native trees and shrubs were installed in the project.

***Shrubs***

- |                     |                 |
|---------------------|-----------------|
| Serviceberry        | Bottlebrush     |
| Bayberry            | Steeplebush     |
| American Elderberry | Red Chokecherry |
| Gray Dogwood        | Arrowwood       |
| Red-Osier Dogwood   | Buttonbush      |

***Trees***

- |                   |           |
|-------------------|-----------|
| Eastern Redbud    | Box Elder |
| Red Buckeye       | Hackberry |
| Wild Black Cherry | Red Maple |

Plant selection (see the box) focused on wildlife food production and on hardy, pioneer species capable of growing in harsh sites. The listed plants are variously adapted to wet or dry soils, so care was taken

to install the plants in the appropriate hydrologic zone in and around the basins.

Ecological restoration planting techniques were utilized to enhance plant survival in the stony, compacted and sterile soils around the detention basins. First, planting areas were thoroughly loosened by either excavating extra large planting pits using a tractor-mounted auger or by plowing up more extensive planting “zones” for cluster plantings. These efforts alone will promote both better rainwater infiltration and improved plant establishment.

To further enhance plant survival, planting pits were backfilled with a mixture of native soil amended with imported topsoil and leaf compost. Along with the added organic matter, organic time-release fertilizer and a root zone bacteria and fungi inoculant were also applied to each planting to improve soil fertility and nutrient uptake. Each planting pit was also dosed with a water-absorbent polymer. By absorbing water when wetted and then releasing this slowly to the plant when needed, the polymer helps newly planted vegetation to weather protracted dry spells during the establishment period. Finally, planted areas were mulched to help retain moisture and suppress weeds.

Numerous lessons are always learned in a pilot project of this type. Not every planned prescription works successfully, but these mistakes provide valuable insights that can be applied to future projects.

The least successful aspect of this project involved the attempt to create a biodiverse wetland and wildflower meadow on the floor of the now-plugged east basin (shown being plowed in the photograph on the opposite page). This effort was largely unsuccessful because rain puddled and re-sealed the cultivated soil surface before volunteers could be mobilized to spread the seed, rake it in, and cover potential ponding areas with mulch and matting (to prevent the seed from floating away). Clearly, retrofitting a more natural wet meadow community on the floor of a functioning detention basin needs to happen as a single and complete activity, with seeding and stabilizing the surface following immediately on the heels of surface tilling.

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