

# Storm water management

**I** HAD NOT THOUGHT MUCH ABOUT STORM WATER MANAGEMENT before being charged with compliance at Ensworth School in 2009. Educating myself on what it is, why it is important and what can be done has been challenging yet rewarding. We now have a 10-year plan to implement on our 127-acre campus in Nashville, TN. Our site description begins with the realization that the property was formerly a Devon cattle farm adjacent to the 2,000-acre Warner Park System with a state highway running through part of the property and separating us from a housing subdivision adjacent to our

property on the other side of the highway. We have two rivers bordering and joining in a corner of our property and a blue-line stream that enters from the park parallel to the highway then splits the property running into the river.

Identifying the *storm water outflow* from the now developed portion of our property begins the plan to manage storm water. All the catch basins in the parking lots, the downspouts and the athletic fields feed into these outflows into the *flood plain* and *floodway* not to mention the *floodway buffer*. Yes, learning the terminology is part of the process. We have 48.5 acres of property in the floodway and floodway buffer

bounded by the two rivers. Along the two rivers is a greenway easement coming from the park system and exiting our property to Exchange Club baseball and softball fields. In addition the floodway contains a TVA power line easement, city water-line easement and a gas line easement.

Hawkins Partners, Inc., a landscape architecture firm, was employed to develop the plan. After our site description the area goals needed to be established. We developed six goals:

- To educate the student population of the Ensworth School and the community regarding the use, need and goals of storm water management practices.

- To accelerate the development of a diverse native vegetative cover for long-term stream bank stabilization at the adjacent river edge, to protect and enhance water quality and to provide wildlife habitat.

- To promote native species and eliminate invasive exotic species.

- To provide sports practice fields and cross country track opportunities while minimizing disturbance of grade and use of synthetic fertilizers.

- To allow for access and visibility between sports practice fields for safety purposes.

## Several of our science courses get involved with the property during their curriculum requirements.

- To allow for access to the greenway within the greenway easement while providing a sense of separation from the privately owned and operated portions of the site.

We previously had forested stream and river banks, open meadow and mown grass for athletic fields, cross country course and parking. All had been pasture land previous to our ownership. We had seeded tall fescue into the onions, ironweed, golden rod, ragweed, and wild flowers where we were mowing. The stream banks had trees, river cane, and invasives such as privet and Japanese honeysuckle.

The management zones created that I now keep records of use and cultural practices on separately are: stream bank veg-

➤ **A MAP OF THE ENSWORTH SCHOOLS PROPERTY** defining property lines, rivers, the stream, the highway, buildings, parking lots, athletic fields, greenway, cross country course, the flood plain, floodway, floodway buffer, pond, tennis courts, the storm water outflows and all the management zones.



etation, reforestation type A, reforestation type B, bio-swales A and B, bio-retention, existing meadows, re-established meadows, sports fields, greenway and overflow parking. Each of these zones requires a record of vegetation management. Vegetation management includes exotic removal, under-brushing, Bush hog mowing, raised canopy, landscape planting, turfgrasses, aeration, fertilization and weed management, trash collection and disposal as well as composting.

The Educational Interface involves the Service Learning portion of our curriculum as the students have planted trees the past 2 years and removed exotic invasives. Several of our science courses get involved with the property during their curriculum requirements. We anticipate community signage along the greenway to educate the public about the storm water implementation and impacts to the environment.

### PHASING AND MONITORING

Phasing and Monitoring has been rewarding. Phase one had to be accomplished within the first 2 years. It has included planting wild flowers in the re-established meadows, planting 2-inch caliper, 1-inch caliper and whip trees in priority locations as well as installing 4 x 4-inch posts to define spaces that may be mowed and used regularly such as the sports fields and overflow parking. The posts also define the bio-retention areas so we could excavate and landscape them properly.

Phase two would involve the completion of the reforestation areas over the next 8 years. Our plan during this process calls for quarterly meetings with the National Pollutant Discharge Elimination System (NPDES) staff. In addition we must submit an annual report summarizing our progress over the last calendar year and proposed implementation for the next calendar year.

Some really impressive records have resulted from this whole experience. I feel like we have a master plan for the entire property. This really helps define what we do and why. And that also helps me to transfer that information to other people such as our administration, parents and the community. We now have a color map of our entire property defining the property lines, the rivers, the stream, the highway, buildings, parking lots, athletic fields, greenway, cross country course, the flood plain, floodway, floodway buffer, pond, tennis courts, the storm water outflows and all the management zones I mentioned. We have an aerial photo of our property with nine points marked where we have a photograph documenting conditions in 2009 and at each meeting we have with NPDES.

We had two of our athletic fields moved and two others restricted to spring use. These four fields may not receive grading, drainage, underground irrigation or introduced bermudagrass. The same goes for the two grass overflow parking lots. We had already established bermudagrass on a fifth field and done some minor grading. We are able to keep the bermuda and install irrigation and drainage if we wish and have unlimited use. However, all the bleachers and ancillaries must be portable.

We may not use synthetic fertilizers on any of these spaces and we are restricted to broadleaf weed control. Soil tests are required

for fertilization program dictation. Our overflow parking may only be used a certain number of times each year. We are required to allow the meadows to grow up all year long so that the root systems will grow deep. The deeper roots increase the field holding capacity of the flood plain soil. The infiltration slows the storm waters access to the rivers. This allows the rivers to not swell so quickly and handle the rain event with minimal flooding and erosion.

The increase in hardscapes and direct drainage funnel more volumes of water to our rivers faster which increases flooding potential and erosion. By increasing water infiltration in our soils and increasing the soil field holding capacity we may slow down the storm water's access to the rivers and help reduce the possibility of flooding.

### MOTHER NATURE'S 2 CENTS

The irony of this plan is that we implemented it in February 2009 and Nashville experienced catastrophic flooding in May 2010. Eighty percent of our property flooded from our pond, stream and two rivers. Obviously this storm water was manifest not only from our property but all the properties contributing to the stream and two rivers. All of the athletic fields flooded with water levels of 10 feet or higher. The athletic building lower level flooded also.

My home is located down river and I had more than 3 feet of river in the house. We had experienced 13.57 inches of rain May 1 and May 2. I tell you this because the storm water plan has been viewed it two different ways: 1) It obviously didn't work because look what happened and, 2) This is exactly why we need to implement this plan as soon as possible and encourage our neighbors to be more thoughtful about their storm water management.

Difficulties may or may not be a part of our everyday life or even lifetime; however they will come. Preparation is the key in being able to manage and survive difficult challenges. The deeper the roots the better prepared we are to overcome the challenges. I find this to be true in human beings as well as plants, building foundations and histories of institutions and associations.

I believe athletic fields may become leaders in storm water management, water conservation and pollution filtration. Sod-producing grass root systems are the best pollutant filters. Sports fields catch storm water from many stadiums and parking lots. Catching all subsurface drainage from the fields and air conditioning units and using it to irrigate our fields will help with water conservation. Using central control irrigation systems with flow meters, low volume nozzles, heads that include check valves and flow stop options, and soil moisture sensors and weather stations also helps.

Can you imagine leading your institution down the path of environmental stewardship AND fiscal responsibility? How will you be received when offering your solutions as a problem solver? Do you know what rain gardens are? How about permeable concrete? Please consider offering your athletic fields as solutions rather than problems for the institution you serve. ■

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