

Grayling Rain Gardens: An Innovative Approach to River Restoration

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Polluted runoff from city streets, in the form of oils, greases, animal waste, heavy metals, trash, sediment, pesticides, and pathogens, damages our water resources as it runs across the land and is dumped into our lakes and streams. This is a problem which affects everyone – regardless of where they live or how they use the river. Fixing this well-documented, nationwide problem requires a significant transformation in the way communities manage rainwater and snowmelt runoff.

The eagerly anticipated outcomes of the Grayling Stormwater Project are improvements in both water quality and community aesthetics. This is a pilot project for demonstrating the use of natural infiltration – primarily low impact development techniques, such as rain gardens, which are utilized to reduce the amount of polluted stormwater runoff discharging into the river. The goal is to reduce the direct discharge of polluted stormwater runoff to the Au Sable River by 80%. To achieve this end, water is directed to shallow depression areas planted with trees, shrubs and flowers – a win-win for landowners, the City, and the river.

A pilot project

In Grayling, a community that has a long history on the upper Au Sable River, it is clear that a tremendous opportunity exists to significantly



One of 86 rain gardens recently created in Phase I of the Grayling Stormwater Project. Note the curb used to allow water to enter the basin.

A typical rain garden along a Grayling city street, shown right after seeding and mulching. This vegetation will be supplemented with perennials and more shrubs in the spring of 2006.



reduce polluted runoff before the problem becomes too serious to remediate. Rather than directing stormwater into catch basin inlets and discharging it into the river as quickly as possible, a shift in philosophy must be made to a more sustainable approach, one that can benefit both water quality and the community which depends upon it. For the area draining to the Au Sable River, that means directing water in as many places as possible to open land areas and allowing the water to slowly filter back to the river, just as nature intended.

Grayling was selected for a pilot stormwater management project by the State of Michigan's Department of Environmental Quality in order to demonstrate that a small community, situated on a high-quality river, is capable of making this fundamental shift in management and providing the leadership for other communities to do the same.

Approximately 400 acres of the City drain directly to the river; this area, drained by 12 outfalls and including both residential and commercial development, is the focus area of the project. The scale of the project is tremendous – in just the first Phase, 86 rain gardens were created, along with installation of an “end-of-the-pipe” detention basin

and three underground mechanical units to filter out oils and sediments. This will eliminate approximately 80% of the pollution from the south end of the City, including that from a five-block neighborhood and a good portion of the MDOT controlled Business Loop I-75. The end-of-the-pipe treatment, a more traditional approach to stormwater management, is used to complement the work of the rain gardens, helping to filter out some of the pollution in areas where there is too little room available for this more natural approach.

“The conventional approach to stormwater management has been to convey untreated stormwater directly into the nearest stream or lake through a series of pipes, ditches, and other structures. By utilizing Low Impact Development techniques to direct much of the stormwater to vegetated infiltration areas, this cooperative effort between the City of Grayling and its many partners has turned tradition on its head,” notes Rick Shoemaker of the Michigan Department of Environmental Quality’s (DEQ). Shoemaker is working with members of the Grayling Stormwater Committee to help implement the project.

The project design and fundraising effort is coordinated through the Grayling Stormwater Committee. The group includes a representative from the Chamber of Commerce, Michigan Department of Environmental Quality, George A. Griffith Foundation, Huron Pines Resource Conservation & Development Council, a local business owner, Trout Unlimited, USDA - Natural Resources Conservation Service, and the Au Sable River Watershed Restoration Committee. The group has worked for years developing the project.

To help demonstrate the need, in the late 1990s the George A. Griffith Foundation spearheaded a water sampling study. The study documented pollution in stormwater discharging from the outfalls, and also utilized a downstream sampling site to demonstrate the fluctuating flow resulting from surface runoff.

The key concept in managing stormwater runoff in this demonstration project is based on the use of shallow depressions in the street right of way. By

directing water into these areas, the soils and root systems help to filter out pollutants and allow the water to infiltrate into the ground, where it can slowly enter the river.

This natural system helps prevent another set of problems – the rapid change in water levels which occurs when water runs across impervious surfaces. Fluctuating flows lead to downstream erosion; turbid waters; and wider, more shallow channels with warmer water temperatures. For a river system like the Au Sable, with one of the most stable flows in the United States, minimizing surface runoff is essential.

The project will be completed in three phases, with a total cost of just over \$1 million. Most of that funding is provided by a grant to the City of Grayling from the State of Michigan, along with additional contributions from private conservation clubs and some businesses. Huron Pines Resource Conservation and Development Council is handling project coordination and administration of the grant funding for the project. The nonprofit organization, based in Grayling, coordinates a number of river restoration and community projects in Northeast Michigan. Engineering design, for both the rain gardens and end-of-pipe treatment, is being completed by the Traverse City-based firm Gosling Czubak Engineering Sciences.

Use of rain gardens

Early in the development of the project, members of the Stormwater Committee recognized the various budgetary, social, and environmental limitations they had with which to work. Among the top of the list of concerns was that “no one had done such a project before.” For Grayling, an entire city-wide retrofit of the existing storm drain system through a rain garden approach meant that, in the short-term, the City would be under reconstruction and the results would look much different from anything seen before. Depression areas, before plants are established, look more like “holes” than they do rain gardens. With the proper plant selection, some water, sunlight and nutrients, these areas become landscape features and provide aesthetic benefits. To get to that stage where the shallow depression

areas are visually appealing takes patience by the public and everyone involved.

Following planting of some trees and shrubs in early September, the 86 basins created in 2005 were seeded with native grasses and mulched. Winter often comes early in this region, and additional plantings of perennials and more shrubs are on the docket for early spring. This will allow the landscape staff and the City Department of Public Works to observe how well different types of plants hold up in the winter, and allow them to tweak the plant list and make the best investment possible when plants are selected and added in the spring of 2006. Both shrubs and perennials will be added at that time.



A depression used for stormwater retention, immediately after excavation and before plant installation.

The rain gardens were designed with three main concerns in mind: Effectiveness, appearance, and ease of maintenance.

1) Effectiveness

Grayling, like many communities in Northern Michigan, is fortunate to have sandy soils which are a help when it comes to infiltrating rainwater and reducing runoff. The rain gardens for this project are each designed by engineers from the firm Gosling Czubak. Plant mixes are developed by a professional landscape architect and the overall designs go through an approval process by engineering staff with the Michigan Department of

Environmental Quality (the primary funding source of the project). Soils, vegetation types, amount of water anticipated, types of nearby land use, direction of water flow, and the amount of room to work with are all considerations in the design process.

2) Appearance

Because the idea of rain gardens is still new in the Michigan, it is very important that the final product not only performs well, but looks good. Rain gardens observed in other communities in the country and which are similar in design to the ones in Grayling have been extremely popular, once plants have been established. In the Grayling project, the first step is to plant seed in the fall to stabilize the soils. In some basins, this seed has been supplemented by shrubs and trees. After the winter ends, landscapers will return and plant perennials and shrubs. The shrub-perennial gardens can enhance the appearance of both residential and commercial property.



The shallow depression area in the rain garden above is hard to observe because of the lush plant growth that has occurred. This basin in the street right-of-way above is from a project in Seattle similar in concept to the Grayling project.

3) Maintenance

Because one of the long-term costs associated with such a project is the maintenance, sites were designed with “low-maintenance” as a key component. The rain garden sites in the road right-of-way are being planted with trees and shrubs. In

the spring, perennials will be added as well. Once established, a shrub-perennial garden requires nothing more than plants being cut back each fall. To ensure that the plants get a good start, a landscape sub-contractor is handling the installation, watering and maintenance of the plants for the first year of growth. The vortechnic units, such as the one pictured below, will require periodic inspection and occasional pump outs by the City Department of Public Works.



Above, an oil/grit separator, called a vortechnic unit, is being installed near the Au Sable River. This end-of-pipe treatment is used to complement the rain gardens and help filter out pollutants which would otherwise end up in the river.

The City of Grayling's leadership role

In looking for similar project examples to learn from, it was quickly apparent that a project on this scale and of this nature – a complete city-wide stormwater retrofit based on the use of rain gardens – was simply not (yet) being done in other communities. For the project partners, the City and its residents, the Michigan Department of Environmental Quality, the engineers, and the construction contractors, this is new ground.

Following the success of the project, Huron Pines hopes to document the lessons learned from this project and share those tips with other communities

who will be doing similar projects in future years, following the lead set by Grayling. The expectation is that those communities will benefit from the work of Grayling, which is one of the reasons the City received such a large grant award (\$758,000) from the state – so that this first-of-its-kind project could be used as model for other small urban areas situated along the waterfront. (Communities under 50,000 people are not yet required to implement stormwater techniques, but those interested in protecting their water quality and saving money in the long run are motivated to start moving forward voluntarily with this type of project.)

One of the ways Huron Pines hopes to help monitor this project and inform others is through building a Geographic Information System (GIS) for the project, which will allow each site to be tracked year after year to help assess effectiveness and its condition. Through using a computer and by clicking on one of the many sites shown on a map, users will be able to access information about the rain garden, before and after photographs, costs, and engineering designs. In order to help respond to requests from other communities for information about the Grayling Stormwater Project, a DVD is also being produced and will be distributed through Huron Pines both as an interim project report in late fall 2005 and then updated into a final report at the end of the project in 2007.

Huron Pines, an organization whose mission is to build and strengthen partnerships to meet resource conservation and local community needs throughout Northeast Michigan, is providing coordination for the Grayling Stormwater Project. For more information about the Grayling Stormwater Project call 989/348-9319 or visit www.huronpines.org

Funding for the \$1 million Grayling Stormwater Project is through grants from the public and private sector. A Clean Michigan Initiative (CMI) grant administered through the Michigan Department of Environmental Quality is providing \$758,000 in funding. The City of Grayling is funding 1/8 of the overall project cost, along with providing support through their staff and assistance from the Department of Public Works. Matching the City's contribution, support has been provided by the following: Trout Bum Bar-B-Q, Paul Young Chapter of Trout Unlimited (TU), Michigan Fly Fishing Club, Elliott Donnelley Chapter of TU, Kalamazoo Valley Chapter of TU – Stanley Weber Projects Fund, Lee Wulff Chapter of TU, Mason-Griffith Founders Chapter of TU, Mershon Chapter of TU, Ray's Canoeing & The Fly Factory, Spike's Keg of Nails, Upper Au Sable River Preservation Association, and individual donors.

City of Grayling Stormwater Project Phases

