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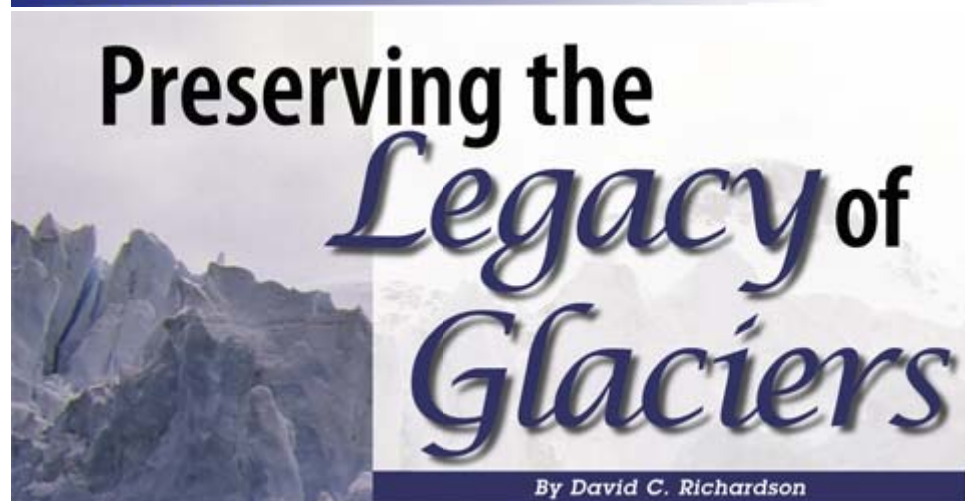
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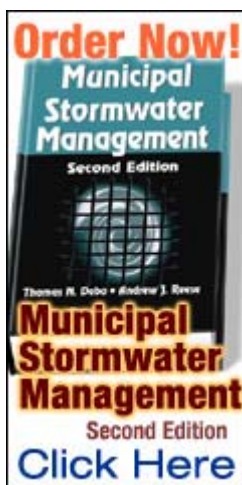
# Stormwater

## FEATURES



### *Six minimum measures in the Great Lakes region*

People who live along the shores of the Great Lakes and those who visit the region know there is something special about the place that goes beyond its obvious beauty. Carved out of the continent by retreating glaciers thousands of years ago, these freshwater seas can be considered real natural treasures of North America. The Great Lakes provide drinking water, food, recreation, and transportation for more than 35 million people in the US and millions more in Canada. Sadly, the Great Lakes have faced misuse and neglect in the past. Though Lake Erie, the most severely impacted of the lakes, has shown a dramatic recovery in the past few decades, the need for continued vigilance and protection for all of the Great Lakes continues. This article explores the implementation of the National Pollutant Discharge Elimination System (NPDES) Phase II stormwater programs from the perspective of EPA officials and stormwater professionals from three communities in the Great Lakes basin.



### **Centerpiece of the Region**

sidebar

Bob Newport, environmental protection specialist with the EPA, says he looks upon the Great Lakes as “one of the most significant resources not only in the country but in the world and as the centerpiece of the region.” Among the pollutant threats he sees facing the lakes are pathogens, oil and grease, and metals and also invisible components such as thermal stresses and volume-induced disturbances that can degrade the ecology of streams and wetlands. He says the EPA’s Region 5 Office “focuses largely on the local streams and lakes with the understanding that any pollutant found there can eventually make its way into the lakes.”

Newport says that according to NPDES regulations, each Phase II community is required to complete a stormwater management plan that includes Phase II’s



six minimum pollution control measures. These measures are public education and outreach, public participation and involvement, illicit discharge detection and elimination, construction-site runoff control, postconstruction runoff control, and pollution prevention and good housekeeping measures. The first measure, public education and outreach, sets the tone for the entire program, Newport says; the public needs to know that “anything you put down the storm drain will eventually end up in the receiving waters.”

### A Different Kind of Lake

“Lake Superior is really different from most lakes,” says Marnie Lonsdale, project coordinator for the stormwater utility for the City of Duluth, MN. “We really live on an ocean, but it’s a freshwater ocean. There’s virtually no hardness—when they built the aquarium here, they actually had to put buffer in the water to avoid shock.” She says the City of Duluth is similarly unique: “We have beautiful water. We have 42 streams that cut through the city. They don’t look like urban streams. They are deep and have wooded edges.” Duluth, she notes, is built on a hillside. “We climb about 600 feet in elevation in a very short time, and our streams cascade down from the top of the hill. They’re quite pretty.”

Paradoxically, according to Lonsdale, this natural beauty is a cause for concern. “In most urban streams, people can point to a problem. In these streams, nothing looks wrong,” and that, she says, is the greatest educational challenge. “Lake Superior has a zero discharge goal,” she explains, and with standards set so high, “We have a high responsibility. We’ve got to sell not restoration but protection.”

To increase public awareness of an invisible challenge, Duluth undertook development of a Web-based educational effort to promote a better public understanding of what was really going on with the lake. The Web site, produced in collaboration with the University of Minnesota and several communities in the Lake Superior region, can be found at <http://www.lakesuperiorstreams.org/>. Lonsdale says it contains a wealth of information, including interactive maps, resource guides, and real-time data on environmental conditions in the lake tributaries. It also includes interactive modules to help illustrate how invisible pollutants such as dissolved salts can adversely affect the lake’s ecology. But, she says, “Education functions on two levels; there’s general information, and then there’s actually doing something.” Duluth partners with the South St. Louis Soil and Water Conservation District, which sponsors activities such as tree-planting campaigns. “Every spring they sell trees, but this year they also sold rain barrels” in cooperation with the water utility, she says. “We also partner with our neighbor across the river, the City of Superior in Wisconsin. They’ve done some really good things with rain gardens. And we’ve been able to use a lot of their materials.”

### Mapping Outfalls

Lonsdale says Duluth’s stormwater permit requires the city to map 20% of its large stormwater outfalls, but the city is going further: “We’re doing them all.” She says the city does have an existing map. “We’re in better shape than a lot of places. But when we put our utility together, one of the things we budgeted for was upgrading our map.”

The City of Duluth has between 600 and 700 stormwater outfalls, depending

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on rainfall conditions. Because the terrain of the city climbs so steeply, many of these outfalls are situated on cliffs along the shore of the lake. In those areas, Lonsdale says, the mapping teams are unable to walk the outfalls in the traditional manner. "The crew went out on boats with the Coast Guard. Using a GPS locator, they mapped every one of the outfalls along the cliffs. It was a very popular activity. Everyone wanted to do it." Although she did not participate in the expeditions, preferring to allow other staff members to enjoy the thrill of sailing with the Coast Guard, she says the activity has proven very informative. "Every year we find a few additional outfalls along with intermittent streams."

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Photo: Todd Carlson, City of Duluth



Photo: Todd Carlson, City of Duluth



Photo: City of Duluth

Ditch restoration in process (top and middle);  
roadside creek edge stabilization (bottom)


### Salt, Snows, and Sand

Due to the City of Duluth's icy winters with accumulations of up to 80 inches of snow, culminating in a sudden thaw sometimes coming as late as June, keeping up with good housekeeping measures can be problematic. "With the salt and sand that builds up over the winter, even street sweeping becomes a challenge," Lonsdale says. However, she sees the long Duluth winter as an additional opportunity for community involvement and participation in stormwater projects. "We received a grant from the Great Lakes Commission to get residents to help remove the snow and debris from the streets. We set up Dumpsters where people could dump their dirty snow as they collected it. In the first year, residents were able to remove enough dirty snow to fill two truckloads."

Roadside drainage ditches and driveway culverts must also get special attention during the colder months. Sand can accumulate in ditches and obstruct drainage, causing flooding or erosion, which can

undermine roads. Lonsdale says that when driveway culverts freeze over, the damage can cost more than \$500 to repair. While homeowners often do what






they can to keep driveway culverts clear, a stormwater utility makes it possible to pursue this work in a systematic fashion. “We have a crew to go out and jet high-pressure hot water through the culverts to keep a channel flowing. Of course, when it’s 10 degrees, the water is just barely warm when it comes out.” She says the job takes real dedication. “It’s cold, wet, and miserable. I really admire the guys who go out there to do this work.” Funding is also a challenge, Lonsdale says. “We are constantly looking for money.” Compounding that situation, she says Duluth is in competition with communities that appear to have more urgent needs: “They can show a picture that looks awful.” Nevertheless, she says, “Since 1998, we have gotten close to \$1 million in grants and other funding.” This funding has allowed Duluth to hire a full-time stormwater engineer.

### **The Hills of Michigan**

Shawn Keenan, water resources coordinator for the City of Auburn Hills, MI, believes that the educational component of Phase II is essential but also realizes that there is a cost involved. He says Auburn Hills’ participation in a Subwatershed Advisory Group has helped defray those costs. The group has provided opportunities to coordinate public education efforts among the various watershed communities, decreasing the costs for each community. “By sharing educational materials, you can avoid the need for each community to develop individual educational tools,” he says. “If one community develops a brochure discussing septic systems, another may do so for lawn care. When we put on a rain garden workshop, it’s open to all the communities. When neighboring communities put on a workshop on pesticides, residents from Auburn Hills can participate.”

### **Gone Fishing**

Auburn Hills is located just north of Detroit. Keenan says the community is made up of 20% residential development and 80% industrial and commercial development. It is home to the US Headquarters of DaimlerChrysler. Two rivers flow through the city before eventually discharging into Lake St. Clair; these are the Clinton River and the Rouge River. Although US I-75, a major expressway, also runs through the city, the city has three major parks. Situated along the Rouge River, the parks allow the public to access the river for fishing and canoeing.



Auburn Hills’ Riverside Park was the site of what Keenan considers the most rewarding Phase II educational activity in which he has a chance to participate. “With the cooperation of the Michigan Department of Environmental Quality, we fenced off a section of the Rouge River,” he explains. “We stocked it with 750 rainbow trout and held back a bit on feeding them. We sent fliers out to all of the schools.” The fliers, he says, announced the Auburn Hills Fishing Derby, an event open to children aged 16 and under. The event was conceived, Keenan says, “to help school children gain an appreciation for the natural streams flowing through town.” Trout Unlimited and the Southeast Michigan Partners for Clean Water provided support, and the derby attracted more than 87 children along with their parents. “There were prizes for the children, and everyone received a grab bag stuffed with fishing lures, educational pieces, and a stormwater refrigerator magnet with the hotline number to report illegal dumping or pollution.”

Keenan considers Auburn Hills’ footing drain disconnect program a public

participation public outreach project with practical benefit. He says disconnecting these footing drains from the sanitary sewer system prevents the essentially clean water drained from residential foundations from overburdening the local wastewater treatment facility. Keenan says the program has been so successful that it is now being modeled by other municipalities in the region. “Every city is trying to tighten up, to keep clean water out of the treatment system during heavy rain.”



### A Gentle Approach

To deal with the detection and elimination of illicit discharges and connections, Keenan says, “We have a crew that goes out with a form to look at the catch basins to determine how full they are or if there’s any maintenance needed. They also take notice of any signs of illicit discharge.” In one area of the city near a number of auto repair facilities, he says, crews once reported spotting a jumble of discarded car parts near a storm drain inlet. “It was impossible to determine who the guilty party was. So I went to each of the garages. There were about five in the area. I didn’t accuse anyone. I just let them know that this is what we found, and I said, ‘We just wanted to make sure you have a good program to take care of your wastes correctly.’” Through this gentle approach, Keenan says, he got the needed cooperation, adding, “Since that visit, there have been no further problems of that type.”



Photo: City of Duluth

Built on a hill, the city of Duluth has 600 to 700 stormwater outfalls.



Photo: City of Duluth

Aerial Lift Bridge over the entrance to Duluth Harbor

Keenan believes, however, that many illicit discharges can be headed off before they occur. One program he says helps facilitate this has been the household hazardous waste day. The public is informed of the designated day to put out items such as used car batteries and other hazardous waste that might otherwise be disposed of improperly. He says the city contracts with a service provider to collect this hazardous waste from residences and arrange for proper disposal.

### Learning Together

Keenan says he made a connection between stormwater management and planning. “We have to look at different techniques that can be used in development. In our section, we get a lot of flashiness, which is typical of urban

environments. We wanted to educate the development community here on the techniques to reduce impervious cover and increase infiltration. However,” he says, “it’s not enough just to educate developers in Auburn Hills.” He says Auburn Hills decided to join in partnership with five neighboring cities and the Southeast Michigan Council of Governments to put on a training workshop. They brought in consultants with expertise in low-impact development to discuss techniques for postconstruction stormwater management. The first workshop was held in the fall of 2003, and 168 people attended. “We had private developers, engineers, and public officials,” Keenan says.

For one exercise, workshop participants broke up into teams for a charrette to come up with plans for a hypothetical site. “Each team had to include at least one developer, one architect, and one public official. We gave them the constraints and said, ‘Using what you learned today, fill in the rest.’ The idea was to let each of the stakeholders see how the others approached the same issues.”

Another session tackled what Keenan terms the myth of clay soils. It recommended an approach to development that takes into account the various soil types on the site from the earliest stages of planning. He says this exercise demonstrated that, contrary to widely held perceptions, by using multiple best management practices (BMPs) and situating structures to accommodate the differing soil types and topographical features of the site, it is possible to get adequate drainage in clay soils.

### Stormwater Forensics

Brian W. Miller describes the setting in Lucas County, OH, the jurisdiction that encompasses Toledo, its suburbs, and surrounding farmlands, in a single word: “flat.” Miller, drainage engineer for the county, adds, “It is so flat that most people laugh when they see it for the first time.”



Photo: City of Duluth

In this community where farmlands are gradually giving way to suburban

Chester Creek is one water body that runs through urban Duluth.

development, where septic systems coexist with sanitary sewers, and where many residents draw drinking water from wells rather than from the municipal water supply, illicit discharge detection has taken on a public health dimension. With the help of two students, each working half-time over the course of a year, the County Engineers Department has tracked down scores of illicit connections, Miller says. The students compared health department records of septic systems with Lucas County engineers’ plots of sanitary sewer lines and connection records. Using GIS imagery, they plotted the location of residences. When the GIS indicated a home on a plot with no corresponding record of a legitimate sewer connection and no health department record of a septic system, they were able to deduce the possibility of an illegal tie-in to the storm sewer system. “So far the program has detected 116 illegal connections,” Miller

says, which he says the county has remedied with “116 disconnections.”

### **Finding a Balance**

Although there is development occurring in some parts of the county, as a whole, Miller says, it could not be categorized among one of the state’s fastest-growing communities. Nevertheless, he expresses concern about development issues.

It’s tough to find a balance. Developers like the idea of higher residential density,” which Miller says is attractive from a stormwater perspective because it would minimize widespread disturbance to the soils and farmlands. If done correctly, he notes, “There are ways you can keep open spaces there that would be common ground for everyone.” But trying to get the message of alternative development strategies out to the township zoning departments is a challenge, he says. “They’ve always thought the bigger the lot, the bigger the home, the better the value. They don’t want to see the smaller lot sizes in their towns.”

Miller knows he’s not the only one dealing with these controversies. “We have a stormwater coalition that includes the Cities of Toledo and Oregon, Ohio, where we talk about these issues. We’ve also worked together to develop a stormwater standards manual, which we would like to see adopted throughout the region, so that developers have a uniform set of standards to deal when working in neighboring communities.”

### **Getting Traction**

Though some municipalities in the Great Lakes region, such as Duluth, began their stormwater programs in the 1990s, implementation is just beginning for many others. “Some of the first fully operational programs are in their first five-year permit term,” says Brian Bell, regional stormwater coordinator for EPA Region 5. “Some measures may be in place sooner than others.”

Postconstruction stormwater management can be seen as a continuation of the ordinances put in place to deal with ongoing construction projects, according to Bell. He says the question to ask is, “How are we going to manage stormwater both in terms of volume and in terms of pollutants?”

“We’re getting traction right now,” says Newport. “If you ask a random sample, you’d find people are beginning to understand not only does this protect the receiving waters but there’s a lot of local benefit. They are seeing fewer problems with the operations of their storm sewer systems, and fewer complaints from citizens.” As a result, he says, “There’s a fair amount of buy-in to the concept that we need programs in place to deal with stormwater issues.” He adds, “We’re in the ramp-up stage. We’re not fully implemented in all cases, but we’re pretty well on our way.”

### **No Boundaries**

“All the rivers here discharge into the lake,” Keenan says. “Every person is really a lakefront owner; whatever goes into the catch basin in your front yard or in the street eventually makes its way into the Great Lakes.” He doesn’t expect it will happen overnight, but he believes that “educating everyone” as well as continuing the other minimum measures of Phase II “will have a part to

play in improving the health of the Great Lakes.”Brian Miller of Lucas County says the important lesson of NPDES Phase II is that “water has no boundaries.”The next installment in this series will explore the implementation of NPDES Phase II along the headwaters of the Mississippi River drainage basin.

*David C. Richardson is a writer based in Baltimore, MD.*

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