

“ The cycle of life is intricately tied up with the cycle of water. ”

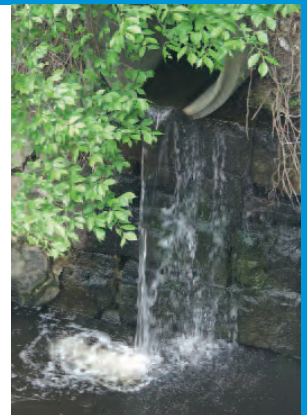
JACQUES COUSTEAU

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# Is Stormwater Headed in the Right Direction?

## STORMWATER RUNOFF

**S**tormwater runoff is a natural part of the cycle of water. For too long, however, urbanization has interfered with this cycle by altering the natural infiltration capability of the land. Urbanization involves replacing vegetation—farmlands, forests, meadowlands—with buildings, driveways, parking lots, roads, and sidewalks. These impervious surfaces prevent rain and snowmelt from soaking into soils and recharging groundwater. Instead, stormwater washes over these surfaces, collecting pollutants, gaining speed and volume, raising water temperatures, and ultimately discharging into the nearest storm drain or surface water. Common pollutants collected in stormwater runoff include pesticides, fertilizers, oils, road salt, litter and other debris, sediment, heavy metals, bacteria, and other pathogenic organisms.



Courtesy of NHDES

Many local governments actively struggle to balance economic development with environmental concerns. Stormwater management is one issue that puts this struggle to the test. How do we effectively control stormwater runoff to reduce flooding and erosion, protect drinking water supplies, maintain the integrity of fisheries, and provide safe water-related recreational activities? How do we preserve the ecological integrity of receiving waters, riparian corridors, and associated wetlands? The good news is that many new, cost-effective solutions are now available to communities if they choose to explore the possibilities.

Your Source Water Assessment report provides your community with a timely opportunity to reevaluate its approach to development, explore the many emerging stormwater management techniques and options, and implement sustainable, cost-effective programs. You can begin by targeting environmentally sensitive areas, such as source water protection areas and wetlands, and move on from there.

## Putting the Limelight on Stormwater

In 1987, Congress amended the Clean Water Act to create, in two phases, a comprehensive national program for addressing stormwater discharges. Phase I, promulgated in November 1990, requires NPDES permits for stormwater discharge from a large number of priority sources, including medium and large municipal separate storm sewer systems (MS4s) and several categories of industrial activity, including construction activity, that disturb more than five acres.



## National Pollutant Discharge Elimination System (NPDES)

*A U.S. EPA surface water quality program mandated by the federal Clean Water Act to control the discharge of pollutants to waters of the United States.*

The Stormwater Phase II Final Rule (December 1999) expands the Phase I program by requiring operators of small MS4s located in urbanized areas and small construction sites (between one and five acres) to implement programs and practices to control polluted stormwater runoff.

Under Phase II, hundreds of urbanized communities in New England, as well as institutions (e.g., public universities, state highway facilities, prisons) that have separate storm sewer systems are regulated. To comply, they must develop comprehensive stormwater management programs that include:

- educating and involving the public
- finding and removing illicit discharge connections
- controlling runoff from construction sites during and after construction
- preventing stormwater pollution at municipal facilities



**FYI**

## Stormwater Runoff BMPs

Stormwater impacts are typically controlled through the use of the following types of best management practices (BMPs) to treat or manage runoff quantity and quality—they are not comprehensive. Implementing these BMPs may require amending zoning ordinances and land development regulations. Field inspection and enforcement are always needed.

**Keep the pollutants released into your source water protection area to a minimum. Implement the following types of pollution prevention measures:**

- collect or properly dispose of waste oil and hazardous waste
- reduce use of pesticides, fertilizers, and herbicides
- manage animal waste properly
- require and enforce erosion and sediment control at all construction projects
- minimize the use of road salt and alternative deicers
- routinely inspect the watershed for hazardous waste materials transport potential
- maintain catch basins and use oil and grit separators
- eliminate combined sewer overflows

**Use the pretreatment capacity of soils and vegetation to intercept and treat runoff before it reaches receiving waters.**

You typically need to require site-specific soil mapping by a professional soil scientist for all land development to accurately identify soil conditions. Site analysis is needed to identify permeable soil suitable for stormwater infiltration. Integrate planning for non-structural stormwater drainage systems with the site layout.

The following BMPs have site-specific applications, generally need to be designed by a civil engineer or landscape architect, and can

be considered provided no impacts to groundwater drinking water sources are anticipated:

- vegetated buffer strips adjacent to waterbodies
- vegetated swales along roadways and in parking lots
- “rain gardens” – small landscaped stormwater infiltration and storage areas
- detention basins
- sedimentation basins
- infiltration basins or trenches
- ponds
- constructed wetlands
- installed filters to treat runoff

**Modify designs of structural drainage systems to minimize impacts to water quality. Examples include:**

- discontinuous pavements with grassy shoulders and vegetated islands
- curbless roads that use roadside swales
- sediment basins and oil/grit separators to trap pollutants
- diverting rooftop runoff to vegetated areas

**Minimize the creation of new impervious surfaces by changing conventional planning and design standards. Improved techniques include:**

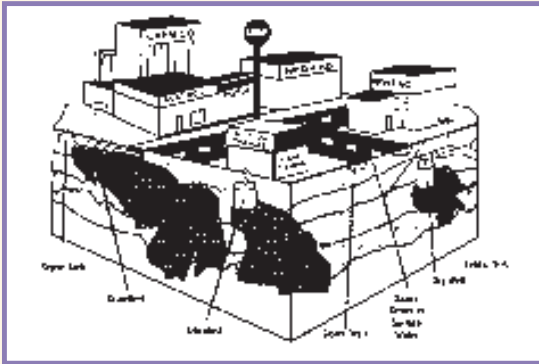
- reducing road widths
- discontinuing the use of classic roadway grid patterns
- using cluster development patterns whenever possible
- prohibiting asphalt driveways in source water protection areas

Clearly the Phase II requirements provide momentum for urban communities to develop comprehensive stormwater management programs. The spotlight is on stormwater, and there is much to be done. If stormwater runoff has been identified as a problem in your Source Water Assessment report, the Phase II requirements can serve as the foundation for creating a comprehensive program that is fine-tuned to your source protection area.



## The UIC Program: A Stormwater Injection Safeguard

The UIC Program provides safeguards so that drains connected to structures designed to infiltrate stormwater, known as Class V stormwater drainage wells, don't contaminate your underground drinking water. There is increased need for state and municipal vigilance of stormwater injection practices due to the dramatic increase in the use of Class V stormwater drainage wells as an NPDES BMP to dispose of stormwater.



Using a stormwater drainage well may be easier and less expensive than obtaining an NPDES permit for surface discharge. A significant percentage of stormwater drainage wells, however, may have the potential to harm local groundwater drinking water sources. The runoff that enters these wells may be contaminated with sediments, nutrients, metals, salts, fertilizers, pesticides, or microorganisms.

By definition, a Class V injection well is a bored, drilled, or driven shaft, or a dug hole that is deeper than it is wide. Class V wells are

designed to inject nonhazardous fluids into or above an underground drinking water source. They are typically shallow injection wells designed to place rainwater or melted snow below the land surface. Example stormwater drainage wells include infiltration structures, such as drywells, infiltration galleries, leaching pits, leaching fields, french drains, and tile drains.

Stormwater drainage wells must be registered, often do not require a permit, must not endanger groundwater drinking water sources, and must comply with state UIC program requirements. New England states have responsibility for regulating these wells, and, in many cases, their regulations are more strict than federal regulations.

Municipalities can help:

- ensure that current and future stormwater system operators using Class V stormwater discharge wells (e.g., car washes, auto repair shops) understand and meet regulatory requirements
- identify stormwater drainage systems that may affect groundwater drinking water sources
- recommend appropriate BMPs, including well siting, design, and operation
- offer an education and outreach effort to prevent misuse

**?** **Underground Injection Control (UIC) Program** State and U.S. EPA program mandated by the Safe Drinking Water Act to protect your underground sources of drinking water.

## Doing What Comes Naturally

Urban development has traditionally relied on constructed, costly centralized plumbing solutions to deal with stormwater. But these approaches typically fail to account for broader watershed and groundwater forces at work in the ecosystem. Cumulatively, these practices have led to major unintended consequences and environmental damage and have robbed watersheds of natural pollutant removal functions.

We've come a long way in understanding the effects of our activities on nature's complex and interconnected processes. Some of the most

promising new water resource management practices seek to mimic nature's ability to process and treat polluted water right where it is produced. These strategies lend themselves to a more integrated water management approach that addresses issues such as drinking water, wastewater, irrigation, and stormwater runoff simultaneously.

## Is Your Community Going Down the Right Path?

Take a closer look at your storm sewer management program and address the following issues:

- how to assess existing stormwater patterns
- how to mitigate existing runoff threats to source water areas
- how to ensure that future development will not exacerbate stormwater impacts in the water supply watershed
- how to take into account the cumulative impacts of runoff on the water supply watershed
- how to change public and political attitudes toward the value of and need for an effective stormwater management program
- how to fund an effective stormwater management program

Let's look at some of the Strategies for Action municipalities can take to minimize threats to their water supply sources from stormwater runoff. As a general rule, always check your state requirements and statutes.



## LID Design Techniques Follow Nature's Path

A new set of tools and techniques has emerged that can be used to meet your stormwater management goals for urban retrofits, redevelopment projects, and new development sites. One such technique is Low Impact Development (LID), pioneered in Prince George's County, Maryland. LID is an approach to stormwater management that strives to achieve good environmental designs that also make good economic sense. It enhances a community's ability to protect surface water quality, prevent depletion of groundwater levels, maintain the integrity of aquatic ecosystems, and preserve the physical integrity of receiving streams. These decentralized and nonstructural solutions are typically less costly than centralized infrastructures.

***"The development of LID ... demonstrates that we can develop without stormwater impacts and that we do not have to settle for just mitigation (lessening) of impacts but can achieve the full restoration of ecological functions."***

LARRY S. COFFMAN, DEPARTMENT OF ENVIRONMENTAL RESOURCES, PRINCE GEORGE'S COUNTY, MD.

LID practices manage runoff by creating a landscape that mimics natural hydrologic functions of water storage, infiltration, and groundwater recharge. This is accomplished by:

- minimizing impacts to the extent practicable by reducing imperviousness, leaving as much undisturbed area as practical, maintaining natural drainage courses, reducing use of pipes, and minimizing clearing and grading
- optimizing infiltration, detention, and interception to reduce runoff volume and discharge
- dispersing runoff storage throughout a site with the use of open swales, flatter slopes, rain gardens, and rain barrels
- strategically routing flows to maintain predevelopment travel time
- encouraging property owners to use effective pollution prevention measures and maintain management measures

## Low Impact Development

**(LID)** *A site design strategy with the goal of maintaining or replicating the predevelopment hydrologic regime through the use of features that accomplish natural hydrologic functions, such as detention, treatment, and infiltration of stormwater.*

## Strategies for Action

**Establish a comprehensive stormwater management program to prevent the contamination of present and future source water from the harmful and destructive effects of stormwater runoff.**

Has your community reviewed the effectiveness of existing stormwater regulations and practices? Have you established source water protection goals that guide your efforts to reduce or eliminate runoff? Has there been any change in hydrologic balance in the watershed (e.g., increased flooding, lower groundwater levels)? Is your community keeping up with Phase II stormwater requirements?

Local responsibility for stormwater treatment oversight rests with such entities as planning and zoning commissions, conservation and wetlands commissions, boards of health, public works departments. If you don't have the expertise on board to evaluate this issue, consider hiring a consultant to work with the community.

Identify and implement pollution prevention strategies, seek out priority pollution reduction opportunities, protect natural areas that help control runoff, and begin ecological restoration and retrofit activities to clean up degraded waters. Target "hot spots" that address pollution runoff and have multiple benefits, such as high efficiency street sweeping that addresses aesthetics, road sweeping, and water quality.

**Take advantage of readily available GIS resources to update information on the stormwater regime (e.g., drains, existing runoff controls, runoff patterns, percent impervious surface) in your source water protection area.**

Work with your water supplier to undertake a program to thoroughly understand stormwater patterns, pollutant loadings, and recharge capacity to provide a basis for addressing any problems in your source water protection area. Such an effort requires the guidance of a professional engineer. Make it a point to keep this information updated so your map can be a useful stormwater management planning tool.

**Update your stormwater management regulatory program so that it incorporates wise land use planning and zoning, creative and careful site design, and appropriate BMPs in your source water protection area.**

Are your planning and zoning officials requiring sustainable development practices for new subdivisions? There are numerous new stormwater management approaches that are in sync with natural processes and systems. It is important that you provide oversight and enforcement of construction, monitoring, and maintenance of BMPs.

Adopt regulations that protect water quality by controlling stormwater runoff. The following are examples:

- Adopt ordinances that incorporate BMPs listed above.
- Adopt "zero-runoff" ordinances that require all runoff to be treated on site for any new construction.
- Set a maximum allowable percentage of imperviousness within a water supply watershed.



- Create a “stormwater utility” to ensure proper maintenance of stormwater management systems.



**Educate developers, construction contractors, homeowners, and local officials about the importance of effective stormwater management and provide them with guidance on the use of appropriate BMPs.**

Take a lead role in public education efforts through signage, storm drain marking, pollution prevention outreach campaigns, and partnerships with citizen groups and businesses. Citizens can help prioritize cleanup strategies, volunteer to become involved in restoration efforts, and mark storm drains with “don’t dump” messages.



Courtesy of NHDES

Let developers know before they submit a new subdivision proposal in a source water protection area that you expect to see a site design that provides for maintenance of predevelopment runoff and groundwater infiltration conditions. Let construction contractors know how to implement specified, appropriate BMPs.

Let homeowners and businesses know how they can protect the community’s water resources by reducing the use of fertilizers, pesticides, and herbicides and moving away from manicured lawns to native plantings, especially along waterbodies and paved areas. There is plenty of information available from such sources as U.S. EPA, state environmental agencies, watershed associations, and garden clubs. Have speakers on hand to spread the word at local business and community functions.



## CASE STUDY

### South Burlington, Vermont’s Stormwater Utility

To help clean up Lake Champlain, the City of South Burlington is forming an innovative “stormwater utility” to assume ownership of the city’s 141 private stormwater systems. This action will ensure that these systems are properly maintained and that stormwater permit backlogs will be addressed and managed. In anticipation of stiffer state and federal mandates to improve stormwater runoff problems, the town is also moving away from fragmented, “stovepipe” management approaches toward more integrated water management planning.



**Explore funding options for the various aspects of your stormwater management program.**

Recognizing that proper stormwater management, oversight, and enforcement do not come free, municipalities need to explore funding options. Check your state statutes to see if your local planning board can adopt regulations to require:

- fees to cover the cost of such services as reviewing plans, ensuring that stormwater BMPs and other structures are built according to plan, conducting ongoing inspections, and enforcement
- construction performance bonds

An alternative to private ownership with public oversight is for the municipality to take ownership and maintenance responsibility for all stormwater BMPs, assessing an annual fee to pay for all costs (e.g., maintenance, repair). A growing number of communities nationwide have established stormwater utilities so that they can assess fees to fund their stormwater programs and provide a wide range of services.

The Pioneer Valley Planning Commission in Massachusetts, in cooperation with the City of Chicopee, Town of South Hadley, Massachusetts Department of Environmental Protection, and U.S. EPA has produced a tool kit called How to Create a Stormwater Utility. For more information, go to: [www.pvpc.org/html/landuse/lu\\_pubs.html](http://www.pvpc.org/html/landuse/lu_pubs.html).

WEB SITE

CASE STUDY



## Plaistow, NH, Calls Upon Its Citizens to Take on Source Water Protection

With the knowledge that “pollution of stormwater will eventually lead to pollution of our drinking water supply,” Plaistow, New Hampshire’s Source Water Protection Committee with the assistance of the Northeast Rural Water Association is implementing an Area-wide Source Water Protection Plan.

The town has 51 public drinking water systems within its boundaries, all of which draw their drinking water from groundwater sources. These include community water supplies (19) as well as smaller transient systems. In addition, many Plaistow residents are served by private wells.

The plan identifies and outlines a structured approach to managing potential sources of contamination and threatening activities that occur within the source water protection area. As part of this effort, the town is working to involve the public in the development, implementation, and review of its stormwater management program.

The town is developing, implementing and enforcing a program to detect and eliminate any stormwater discharge that contains pollution. The town’s Source Water Protection Committee developed maps to identify priority areas for enforcing existing rules to protect water. They used Geographic Positioning System (GPS) technology to locate storm drains and worked with their regional planning commission to develop the maps. Residents are urged to call the Town Manager immediately if they know of any pollution flowing into brooks, streams or catch basins.

One action the Conservation Commission took, working with the Board of Selectmen and Town Manager, was to issue a press release, which included the following type of information:

*“Many construction projects are already underway that involve disturbing the topsoil in one manner or another. Large projects*

*often stockpile loam and then redistribute the loam over several subdivision lots. Proper erosion controls and sedimentation fences must be in place to prevent soil erosion from contaminating surface waters and wetland areas. Often times, what may seem to be harmless during periods of no rain can be disastrous during a heavy rain. If you observe construction projects large or small that do not appear to have the proper erosion controls in place or installed properly please let us know so that we can investigate and get the problems corrected as soon as possible.*

*No one is allowed to discharge any liquids into any surface water without special permits that should insure the discharge is being treated properly and will not be a health or safety risk. If you see any such discharge, please call us so we can investigate the potential problem and work to get the problem fixed.*

*If you have any questions about how to dispose of any kind of material or notice something out of the ordinary that could pose a risk to you or your neighbors, please call us at (603) 282-5200 and report the problem to the Building Inspector or Code Enforcement Officer who will in turn notify New Hampshire State authorities when necessary and will work with the Conservation Commission to get problems fixed in a timely manner.”*

Continuing to follow up on the Source Water Protection Plan, the town obtained a grant to work with the Conservation Law Foundation (CLF) to propose specific changes to its zoning and other land use regulations. CLF’s recommendations address stormwater management by promoting development patterns that limit new impervious areas, discourage sprawl, and encourage infiltration of treated stormwater into the ground.

For more information, go to <http://epa.gov/safewater/protect/plaistow.html>