Water is the most critical resource issue of our lifetime and our children's lifetime. The health of our waters is the principal measure of how we live on the land.

LUNA LEOPOLD

It's Time to Take Drinking Water Seriously

If you are a municipal official in a New England community, this booklet is for you. This is your call to action for water supply protection. Chances are your community is already on the case. Chances are you are already up to speed on this subject. But, whether you have just gotten on board in your community or you have been involved for years, chances are this booklet has some useful information for you. If you simply need action tips for a specific water supply threat in your community, go straight to the colorcoded directory below. If you could use some background information, please read on.



Why the urgency?

~Because safe drinking water is central to our health, well-being, and economic viability. ~Because while

public water systems have primary responsibility for water supply protection, communities are essential players in this effort. ~Because our water supplies are limited. ~Because water supply pollutants are widespread and diverse.

rotection efforts need to involve selectmen,

Special Focus Chapters

Why municipal officials?

municipal administrators, planning and zoning boards, wetlands and conservation commissions, departments of public works, boards of health, schools, and other entities. All of you, at some time or other, make decisions that may affect the quality of your community's water supplies and should, therefore, take drinking water protection into account. Municipalities need to: ~Be cognizant of potential threats and adopt appropriate protective policies and measures. ~ Partner with the state, the business community, and their water suppliers to ensure water supply protection.

Check it Out... This document is directed primarily to municipal officials and those who volunteer in their communities. It provides tools you can use to take action in your community to protect drinking water sources in your water supply area, your watershed area, your community, and your backyard.

New England state Source Water Assessments revealed five key areas of vulnerability: inadequate local regulations and ordinances, underground storage tanks, on-site sewage disposal systems, hazardous materials storage, and stormwater runoff. This manual focuses on these critical areas. So check it out. Find out:

How municipal officials can use local land-use regulations, ordinances, and conservation easements	
as important tools for protecting source water	Page 13
How to keep underground and above ground storage tanks out of the picture, or at least out of trouble	Page 19
How you can learn to live with septic systems and protect source water	Page 25
What steps can be taken to manage storage of hazardous materials	Page 33
How your community can begin to solve the stormwater runoff dilemma	Page 39

Keadily available freshwater from surface and groundwater sources represents less than 1 percent of all the water in the world—and it is almost all the same water that was on the earth from day one.

Your Challenge, Should You Choose to Accept It

Today, most of us can turn on the tap whenever we want and enjoy clean, potable water—which is not the case in many parts of the world but what about tomorrow? Increasing populations and associated human activities tax the quality and quantity of our water supplies. Federal and state drinking water requirements are becoming increasingly more stringent to address pollutants, such as mercury, M*t*BE, and microbial organisms (e.g., *E. coli*).

Nonpoint Source Pollution (NPS)

Pollution that occurs when water runoff from rainfall or snowmelt moves over or into the ground, picking up pollutants and carrying them into streams, lakes, wetlands, and groundwater. The U.S. Environmental Protection Agency (U.S. EPA) says the leading cause of water quality degradation is nonpoint source pollution (NPS), which includes sources such as farms, septic systems, construction sites, roadways, parking lots, and fuel storage tanks.

Can we afford to deplete, divert, and pollute our fresh water with little thought for tomorrow? No way! So, let's make it our collective business to protect our drinking water sources—for today and tomorrow.

There is a price to be paid for polluted drinking water. Communities from small rural villages to major metropolitan areas—depend on lakes, reservoirs, rivers, and groundwater for their sources of drinking water. Wherever your tap water comes from, all drinking water sources are vulnerable to an array of contaminants associated with an infinite variety of human activities. If existing or new sources of pollution render the water unsafe to drink, a community will have to choose between building a new or expanded treatment system or finding a new drinking water source. Either option can be very expensive, and these costs are often passed on to consumers.



Source: National Water Quality Inventory: 1998 Report To Congress - Ground Water and Drinking Water Chapters, U.S. EPA.

Our challenge is to pay closer attention to how our activities impact our drinking water protection areas and to take preventative steps. The longterm quality of our drinking water depends on the combined actions of all of us. We all share responsibility for ensuring that our children and future generations—indeed, all living creatures—have access to safe and adequate drinking water.

Your Source Water Assessment

Recognizing the importance of meeting this challenge, Congress called for the establishment of a Source Water Assessment Program (SWAP) as part of the Safe Drinking Water Act Amendments of 1996. The keystone of this program is a requirement for states to assess the susceptibility to pollution for source water at all public water systems and to provide the public with a summary of these findings by 2003.

How Much Is Groundwater Worth?

The University of Rhode Island's (URI's) Nonpoint Education for Municipal Officials (NEMO) program used data from the state's Source Water Assessments to develop a rough estimate of the "retail" value of groundwater underlying a wellhead or groundwater recharge area. Although the report did not include monetary values associated with fisheries, healthy aquatic habitats, and other uses, it estimated the volume of water recharged to the area annually and the price consumers pay for public water, given actual water rates.

The Value of a Major Community Wellhead Protection Area

The South Kingstown, Rhode Island wellhead protection area covers 945 acres. The average annual precipitation for the area is 44 inches. About half of that amount, 21 inches, is lost to evaporation or used by plants, leaving 23 inches of precipitation available to either runoff or seep into the ground. Calculations indicate that average annual runoff would be about 6.1 inches/year*, leaving 16.9 inches as the amount available to seep into the ground and recharge groundwater. This amount, equivalent to 434 million gallons/year, is theoretically available for water supply and baseflow to streams.

The municipal water rate for this supply is \$130 for 5,000 cubic feet (rates based on 2002 and vary slightly for larger amounts). Based on 7.48 gallons per cubic feet, 434 million gallons/year is equivalent to 57,972,915 cubic feet. At a rate of \$130 per 5,000 cubic feet, the current annual value of this resource is \$1,507,296. Any of this water that is polluted or lost to runoff is a lost asset.

The Value of a Future Water Supply Area

www.uri.edu/ce/wq/mtp/html/manage.html.

South Kingstown's groundwater protection overlay district includes 7,185 acres in the still-rural northwest corner of the town currently

*Source Water Assessment Hydrologic and Nutrient Loading Assumptions used to estimate average annual runoff are available in the appendix to SWAP reports for major community supplies at www.uri.edu/ce/wq/program/html/SWAP/reports.html. Full technical assumptions are also available at

without major public wells. This solesource aquifer provides a source of supply for private wells and serves as a potential future site for public supply wells should the need arise. With an average annual precipitation of 44 inches, and with half of this lost to evaporation and plant uptake, about

23 inches is available to either runoff or seep into the ground. In this area, the average annual runoff is estimated to be 8.5 inches, leaving 14.5 inches, or 2.83 billion gallons/year available for water supply and baseflow to streams. This volume is equivalent to 378,182,475 cubic feet based on 7.48 gallons per cubic feet. At a rate of \$130 per 5,000 cubic feet, the current annual value of this resource is \$9,832,744.

Recharge in Developed vs. Forested Areas

In groundwater recharge areas where more intense development is planned, controlling runoff and maintaining infiltration is important to avoid a more significant loss of recharge volumes. For example, the highly developed URI/Kingston wellhead protection area covers 656 acres of campus, and Kingston village and has an estimated groundwater recharge volume of 152 million gallons/year under current development. Under an idealized situation with the entire recharge area forested, the groundwater recharge volume is estimated to be 377 million gallons/year. This represents a potential loss of 225 million gallons per year to surface runoff.

Untreated water from streams, lakes, reservoirs, or groundwater that is used to supply drinking water.

Source





to a groundwater

supply well.

FYI

What Substances Impact Water Quality?

Pathogens – bacteria, viruses, parasites, and other microbes

Nutrients – nitratenitrogen, phosphorus

Particulates – microorganisms, suspended sediments

Heavy Metals – antimony, cadmium, chromium, copper, lead, mercury, nickel, selenium

Hazardous Chemicals and Products – gasoline, oil, petroleum products, pesticides, herbicides, solvents, paint thinner and other cleaning products These Source Water Assessments are designed to encourage and help water suppliers, local officials, and residents to take steps to keep their water supplies safe. Source Water Assessment reports contain detailed information on potential threats to municipal drinking water supplies. (See Chapter 2.)

Assessments are required for all public water systems. These systems include schools, restaurants, and other public facilities that have wells or surface water supplies. They do not include drinking water systems with fewer than 15 service connections or that regularly serve fewer than 25 individuals, as these are not considered to be public water systems. It should be noted, however, that a community's responsibility for protecting drinking water sources extends beyond designated source water protection areas for public supplies and includes groundwater used for private wells.

You're Poised for Action

Now that the Source Water Assessment reports have been completed, what next? Well, that's what this document is all about. Now that your community has some idea about the potential threats to its drinking water, you are poised to work in concert with public water suppliers, watershed organizations, community groups, businesses, and homeowners to develop and implement source protection strategies.



•• One important purpose of these assessments is to inform and motivate local water supply protection activities. Because of the wide diversity of potential contaminants and risks, Congress intended that communities have the flexibility to tailor their prevention actions to local circumstances.

ROBERT VARNEY, REGIONAL ADMINISTRATOR, U.S. EPA REGION I

What Does Your Source Water Assessment Report Tell You?

SOURCE WATER ASSESSMENT REPORT

he state Source Water Assessment programs are tailored to each state's water resources and drinking water priorities. However, each Source Water Assessment report includes the following three key components:

- A map showing the delineation, or outline, of public drinking water assessment areas
- An inventory of known and potential sources of contamination in the delineated areas
- An assessment of the susceptibility of water supplies to the identified potential contamination sources

With this information in hand, public water suppliers are expected to develop management measures to protect their water supply sources from manmade or catastrophic events.

Your Source Water Assessment Map

This map is an invaluable starting point for planning and implementing your source water protection program. For the most part, New England states generated their maps by turning to their Geographic Information System (GIS) databases, accessing various layers of available data to obtain source water area information and locations of potential and known contaminant sources. This information was then overlayed onto a base map.

You will typically find the following information on your Source Water Assessment map(s):

- base map information (e.g., roads and water bodies), an aerial photo, or U.S. Geological Survey (USGS) topographical map
- an outline of the source protection area (e.g., radiuses around groundwater wellhead protection areas, watershed outlines for surface water supplies)
- symbols indicating groundwater sources (e.g., wells, springs)
- symbols indicating surface water inlets

Source Water Assessment

A study and report, unique to each water system, that provides basic information about known and potential sources of pollutants to drinking water supplies and ranks the susceptibility of these waters to future contamination.

What Does Your Source Water Assessment Report Tell You ?

? Geographic Information System (GIS)

A computerized mapping system consisting of a combination of computer hardware and software designed to assemble, store, manipulate, and display an array of geographically referenced information.

- symbols indicating potential sources of contamination (e.g., septic systems/leachfields, businesses, agriculture, forestry, USTs, ASTs) within the source protection area.
- symbols indicating known sources of contamination (e.g., UST releases) within the source protection area.
- uses within the source protection area

In preparing their Source Water Assessment reports, states often took steps to verify the information in their databases (e.g., meeting with public water system and municipal staff and/or conducting drive-by or walking surveys in the delineated areas) to complete the maps. However, municipalities should make it their business to work with their water supplier to review this information, ensure its accuracy, amend it where necessary, and keep it up to date. (See Chapter 3.)



This sample map inventories known and potential sources of contamination.

Source: Consider the Source: A Pocket Guide to Protecting Your Drinking Water, U.S. EPA.

NOTE: Due to security concerns many water suppliers, states, and communities do not post detailed maps showing the specific locations of dams, reservoirs, wells, and facilities on the Internet.

Your Inventory and Susceptibility Assessments

Each New England state has developed its own format for reporting the results of the Source Water Assessments.

The inventory is a list (according to potential risk) of all documented (i.e., known releases into the environment) and potential contaminant sources or activities of concern to drinking water supplies within the source water protection area. Keep in mind that this inventory is a snapshot representing a particular point in time.

The susceptibility ranking indicates the level of concern assigned to each potential risk by ranking, rating, or prioritizing, based on the relative threat of each land use compared to other potential source contaminants.

Rankings of particular contaminant sources can be based on a number of factors, including the type and quantity of chemical generated, characteristics of the contaminants (e.g., toxicity), the behavior and mobility of the pollutants in soil and groundwater, existing regulatory authority to control the threat, existing conditions, and effectiveness of mitigation measures. New England states typically assigned susceptibility rankings of high, medium/moderate, or low to each water source.

The following table illustrates the manner in which this information might be presented in a Source Water Assessment report.

The activities listed in Table <u>improperly</u> , are potential sou It is important to understan are using best management identified in table 2. Many further reduce the risk.	e 2 and mase the arces of contam al that a release practices (BMPs potential source	art typically i inal ion (IPSC) is may never a). If BMPs ar is of contom	se, produce, or store, componentits of concern, which <u>if manages</u> cour (rom the potential source of contamination provided facilities is in place, the actual risk may be lower than the threat ranking nettion are regulated of the federal, state and/or local lowels, to
	Table For more infor	2: Land	Uses in the Watershed r to Appendix B: Regulated Facilities.
Land Uses	Quantity	Threat	Potential Sources of Contamination*
Agricultural			
Fertilizer Storage or Usc	Few	м	Letter, spills, improper handling, or over-application of fertilizers
Pesticide Storage or Use	Few	н	Leaks, spills, improper handling, or over-application of pesticides
Commercial			
Body Shops	2	H	Improper management of vehicle paints, solvents, and primer products
Gas Stations	6	н	Spills, leaks, or improper handling or storage of automotive fluids and fuels
Service Stations/ Auto Repair Shops	4	п	Spills, leaks, or improper handling of nutomotive finids, and solvents
Bus and Truck Terminals	2	0	Spills, leaks, or improper handling of fuels and maintenance chemicals
Cemeteries	Few	M	Leaks, spills, improper handling, or over-application of pesticides; historic embalming fluids (such as arsenic)
Dry Cleaners	1	н	Spills, leaks, or improper handling of solvents and wastes
Formtore Stripping and Refinishing	1	п	Spills, leaks, or improper handling of buzardous chemicals
Golf Courses	3	м	Over application or improper handling of lettilizers or posticides
Printer and Blueprint Shops	0	м	Spills, leaks, or improper handling or storage of printing inks and chemicals
Railroad Tracks and Yarda	2	ũ	Over-application or improper handling of herbieides, leaks or spills of transported chemicals and maintenance chemicals: fuel storage
Sand and Gravel Mining/ Washing	Few	м	Spills or leaks from heavy equipment, fuel storage, claudestin dumping
Industrial		-	
Chemical Storage or Manufacture	Numerous	- ii	Spills, leaks, or improper handling or storage of chemicals or process waste
Hazardons Materials Storage	Numerous	π	Spills, leaks from improper handling or storage of hazardous waste
Industrial Parks	Few	н	Leaks, spills of chemicals from improper handling or storage

Snapshots for the Future

Many of these Source Water Assessments build on and complement other programs already underway. State agencies and the U.S. EPA have a long record of working together to protect public drinking water supplies. It is important that you, as a municipal official and a citizen of your community, become familiar with your Source Water Assessment report, understand what it tells you and what it may not tell you, and then make sure that your community is on the right track with source water protection.

To Obtain a Copy of Your SWAP Report...

Copies of Source Water Assessment reports for each water supply system have been provided to the water systems and to the communities in the source protection areas. Copies of the reports for water supply systems in your community can be obtained from the following sources:

WEB SITES	 Connecticut: http://www.dph.state.ct.us/BRS/water/source_pro- tection/assessments/assessments.htm Maine: (207) 287-2070 or http://megisims.state.me.us/dwp_sdwis/default.jsp Massachusetts: (617) 556-1157 or http://www.mass.gov/dep/brp/dws/swap.htm New Hampshire: (603) 271-0657 or http://www.des.state.nh.us/dwspp/reports.htm
	Rhode Island: http://www.healthri.org/environment/dwa/swap/home.htm
	• Vermont: (802) 241-3400
	To Find Out More About GIS in Your State Contact the following sources:
WEB SITES	• Connecticut: http://dep.state.ct.us/gis/index.htm
	• Maine: http://apollo.ogis.state.me.us/
	Massachusetts: http://www.mass.gov/mgis/
	New Hampshire:
	http://www.des.state.nh.us/gis/onestop/register.asp
	Rhode Island: http://www.edc.uri.edu/rigis/
	• Vermont: http://www.anr.state.vt.us/gismaps/index.htm

•• The wise use of water is quite possibly the truest indicator of human intelligence, measurable by what we are smart enough to keep out of it, including oil, soil, toxics, and old tires.

DAVID W. ORR, EARTH IN MIND: ON EDUCATION, ENVIRONMENT, AND THE HUMAN PROSPECT

Getting Started on Source Water Protection

SOURCE PROTECTION

One thing we can't live without is clean water. Whether your water supply source currently enjoys relatively few potential threats or it has more extensive industrialized land uses, the way to ensure adequate quantity and safe water quality for the future is to act now to protect water supply resources. Your Source Water Assessment report is an excellent starting point for raising the issues associated with source water protection and for getting the planning and action ball rolling. With your Source Water from the outset.



Establish your source water protection action team.

To implement a successful local source water protection program, municipal officials must understand the importance of source water protection. To get the ball rolling and keep it rolling, you need to identify a person, entity (e.g., health department, planning department, conservation commission), or team that has responsibility for keeping water protection goals on the community radar screen. Its responsibility will be to set priorities, work to incorporate key recommendations into town plans and ordinances, identify emerging concerns, work with other communities in the watershed, and keep local officials and the public involved, educated, and informed on a continuing basis.

While larger communities may have the staff and the resources to tackle source water protection in-house, collaboration among stakeholders allows you to draw from the diverse experience and expertise of the community as a whole—municipal departments, regional agencies and associations, businesses, educators, citizen organizations, and residents. The team approach can also help:

- produce advocates
- create powerful and long-lasting partnerships that will facilitate source water planning, implementation, and public acceptance
- provide an action support base

Verify and update your Source Water Assessment report.

Although states used the most current information to identify known and potential source water threats and to rank susceptibility factors, the report should be reviewed carefully by those who know the area best water system personnel and members of the community.

Compare general assessment findings with watershed features and actual water quality conditions to validate results and review technical assumptions. Many of these assessments were completed as early as 2000, so if the information hasn't been verified and updated by now, it should be. Water systems and municipalities are encouraged to forward corrections or new potential sources of contamination in their source water protection area to the state Drinking Water Program on an annual basis.

Establish community water quality goals and action priorities.

Source water protection requires an ongoing community-wide commitment. It is important that communities establish clear source protection goals (e.g., maintaining water quality, improving water quality). With these goals in mind, communities need to employ a science-based strategy for establishing priorities, determining which land uses need attention, and developing a framework for action. Present and future land use decisions can then be made accordingly.

It is important to hone your source water protection program by routinely asking relevant questions and periodically reviewing and updating priorities and strategies to address new information, the changing nature of potential threats, and local needs. Management practices for controlling development impacts are continually evolving and local development standards need to reviewed and updated to reflect state-of-the-art standards.

CASE STUDY

Updating Your Source Water Protection Assessment

Work with water utilities to update Source Water Assessment information and maps. Community volunteers, such as watershed associations, civic groups, high school students, can help verify, enhance, and update your report information. You may also want to add additional features to your maps, such as the 100-year floodplain, tax map information, soils information, and high-density development. Take ownership of your Source Water Assessment. Get in on the action.

In **Rhode Island**, many local Source Water Assessment committees recruited volunteer land use survey teams to update GIS maps used in the assessment of major community supplies. To assist communities with carrying out these surveys, the Cooperative Extension at the University of Rhode Island created a handbook, "A Model for Public Education and Outreach," for working with volunteers. The informative handbook includes instructions for updating maps along with examples. This document can be accessed at: **Vermont** has prepared a simple two-page flyer, "Preparing a Source Protection Plan Update" that includes the following steps:

- Inspect the source protection area and update your potential contamination source maps and inventory.
- Weigh risks from new potential contamination sources and identify risk management measures.
- ✓ Update the landowner list.
- Communicate with relevant landowners in the source protection area about actions they can take to protect water.
- ✓ Summarize progress in reducing threats to your source.

Check out the flyer at:

www.vermontdrinkingwater.org/swapp.htm.

www.uri.edu/ce/wq/program/html/SWAP_LUInv.htm.

Monitor known and potential contamination sources to ensure compliance with federal, state, and local requirements.

Do the owners of some of the identified pollution sources have a good or bad compliance history? A poor compliance history could be a red flag that you need to take measures to ensure that the property or business owner stays in compliance. Contact the enforcement and compliance division of your state environmental agency for compliance data. This would include having the water supplier or municipality conduct compliance visits.

Investigate funding options for implementing your source water protection strategy.

Does your community have a strategy for financing the development and implementation of your source water protection program? If not, see Chapter 9 for details.

Educate the public about your source water protection program.

Do both your community and water supplier have strategies for educating the various sectors of the community about the importance of protecting drinking water sources, steps you are taking, and the kinds of best management practices (BMPs) they can implement? A successful source water protection program relies heavily on public support. Public education should be an ongoing process that is a part of your long-term source protection program. This can be accomplished in many ways, including:

Surveys of the public Assess water knowledge and prioritize activities to address public concerns.

Highway signs Identify watershed and recharge areas.

Guidance Provide BMPs on such subjects as protecting critical areas, storing household hazardous waste, lawn care and gardening, and septic systems.

Speakers Provide experts on various source protection topics with community groups.

Newsletters Keep the public up-to-date on issues and events.

Media coverage Encourage local papers and radio and television stations to help keep the community informed about issues, events, and BMPs.

Schools Encourage school districts to participate in source protection activities and incorporate source protection into their curriculum.

Volunteer monitoring Encourage students and adult community members to participate in collecting and analyzing surface water samples for a variety of constituents, evaluating the health of aquatic biological communities, and inventorying watershed conditions and land uses.

Watershed festivals Create events to celebrate water in your community.

Household hazardous waste collection days Hold a special day for having the community take their household hazardous waste to a central location for proper disposal. This is also a good way to educate the public on these issues.

Local government Make sure all departments of your community are up to speed on and participating in your source protection program.

Make sure you have a security plan and an up-to-date emergency response plan for drinking water sources in your community.

Communities and water suppliers need to ask themselves if there is a plan in place to ensure drinking water security and to respond should their water supply become compromised, vandalized, or contaminated. Recognizing the risk and cost of replacing a water supply source can help you get the public's attention in your efforts to protect source water. Drinking water security relies on many different people working together. For this reason, it is important to communicate with and help educate law enforcement officials and others in your community about drinking water security.

For more information, brochures, and posters about drinking water security, visit *www.epa.gov/ne/homeland*.

WEB SITE



The High Cost of Vandalism at a Community Water System

Vandalism cannot be taken lightly, and addressing a potential threat is time consuming and expensive. An investigation in response to vandalism can cost more than \$10,000. For example, in 2002, the hatch on a finished-water storage tank was found open at a drinking water system in a small northern New England community. State agencies, state police, and the FBI were called in to investigate the situation. Ultimately, five students from a local college were accused of breaking the latch on the hatch to the town's water reservoir.

But it was no joke. Water samples had to be taken to determine if water contamination had occurred. The community was on a "do not drink" order while the water system was shut down for days. Health officials in the state tested the water for total bacteria content, inorganic chemicals, volatile organic chemicals, and semi-volatile organic chemicals. The tests took place over a period of 24 hours to seven days.

After the incident, town officials agreed to have a new hightech security system installed on the water system that would notify authorities of any breaches. In 2003, another water tank in the community was vandalized. Fortunately, the new technology that had been installed triggered immediate notification of the breach. But again state officials had to conduct tests on the water to detect contaminants. As an additional precaution, the town decided to drain the reservoir, a 750,000-gallon tank fully enclosed in concrete.

The new reality faced by communities is that even simple acts of vandalism can have significant effects because state agencies will need to investigate the possibility that the system has been compromised. This unfortunate situation can be a major burden on a community's resources and budget.

Top 10 Steps Municipal Officials Can Take to Ensure Drinking Water Security

- Communicate with your drinking water utility personnel and become familiar with your water utility operations and facilities.
- Prepare for emergency situations by coordinating community emergency plans with utility emergency operating plans.
- Promote the development of vulnerability assessments for drinking water utilities.
- Inform water utilities of any threats or suspicious activities associated with drinking water supplies.



The Bioterrorism Act of June 2002 requires water suppliers to look at the major components of their water systems, identify the threats to each component, and then estimate the potential effects of those threats on their system and its operations.

- Establish "Community Watch Groups" to help notice and report any suspicious activity in and around local water utilities.
- Include community source water protection areas in routine inspections or patrols.
- Fully investigate vandalism or tampering of water supplies.
- Prepare to respond to water supply emergencies, and practice for them.
- Provide funding for security upgrades for drinking water systems and sources.
- Update emergency contact lists for drinking water facilities.

When we try to pick out anything by itself, we find it hitched to everything else in the universe.

JOHN MUIR

Is Your Land Use Agenda in Sync with Source Water Protection?

LAND USE STRATEGIES

to me rule—as it pertains to land use in the New England states—places most of the responsibility for land use regulation and consequently source water protection with local governments. While there are

a variety of federal and state requirements and programs that address water quality issues, the day-to-day decisions associated with land use and resource protection are made by municipal officials—planning and zoning board members, conservation commissioners, wetlands commissioners, health officers, town sanitarians, zoning boards of appeal.

The good news is that most municipalities have sufficient authority to control land use activities and conditions that threaten their drinking water supplies. With this in mind, there are some key questions you should consider up front:

- Do you have clear drinking water protection goals?
- Are you currently doing the best you can to minimize the cumulative risks of land uses to your drinking water resources?
- What authorities and options are available to your community to ensure the future health of your water supply?



Is Your Source Water Protection House in Order?

Your Source Water Assessment report can be a powerful tool for your community. It is a jumping-off point from which you can:

- review existing policies, regulations, codes, standards, ordinances, and other land use controls—if you haven't already—to see if they are helping your community to protect source water
- carefully consider the prospect of discarding or revising outdated and ineffective regulations
- substantiate your Source Water Assessment report with regard to known and potential threat inventories and action priorities
- determine who in your community has the authority to address specific types of threats
- adopt and implement mitigative or protective measures

Best Management Practices (BMPs)

Established practices used to help reduce the impacts of activities (e.g., industrial activities, construction, road building, agriculture) that have the potential to threaten water quality. Resource protection philosophies and strategies have evolved considerably over the past 50 years. Much of what has changed comes as the result of lessons learned about the long- and short-term effects of our land use activities on our environment. Your source water protection strategies should take into account the most current, science-based BMPs available, leaving the door open to effective, innovative techniques.

This chapter provides you with a list of Strategies for Action to protect source water, as well as selected case examples. Many of these strategies may already be in place in your community. *As a general rule, always check your state requirements and statutes.*

Strategies for Action

Make sure your water resource protection goals are in agreement with your comprehensive town plan.

Are your source water protection areas clearly identified in your town plan as a protection priority? If not, update the plan so that these critical areas are given top priority. Work with other communities in the water supply watershed or service area.

Target critical water resource protection areas for land conservation.

Does your community and/or water supply region have a plan for land conservation that is compatible with watershed and recharge area

Connecting Water Resources Throughout Your Water Supply Watershed

In many communities, water supply source areas extend partially or entirely beyond their jurisdictions. Sharing water resources within a given watershed requires the active support and cooperation of the other jurisdictions—even those that may not use the water themselves. Municipal officials and drinking water suppliers in many New England communities recognize the value of communicating with each other about land use proposals that could have an impact on water quality in the watershed as a whole. Such procedures are in place in many communities. In the first example that follows, communication is required by the state environmental agency. In the second example, it is nurtured by the communities within the watershed.

CASE STUDY

The **Massachusetts** Department of Environmental Protection requires public drinking water systems with reservoirs to establish and document procedures for staying in contact with municipal officials in other watershed communities to keep abreast of and respond to proposed development plans and projects. These procedures range from simply assigning a specific person the responsibility of scanning local newspapers for public hearing notices to hiring a person whose job is involved with watershed activities and commenting on new or expanded development proposals before various municipal boards in the watershed. The town of **Meredith**, **New Hampshire** has embarked on a watershed planning project to protect the water resources associated with the Lake Waukewan Watershed. The lake serves as the raw water supply for the Meredith Water Department. There are also several groundwater sources of public drinking water located in the watershed. The timing for this project is perfect, as the lake is still in a relatively healthy condition. However, data provided by the Volunteer Lake Assessment Programs for Lake Waukewan and Lake Winona show that certain ecological indicators (e.g., phosphorus concentrations and conductivity values) are increasing, suggesting that human activity is starting to have an effect on water quality.

With the cooperation of the four other watershed communities, the Meredith Board of Selectmen appointed a 16-member volunteer Watershed Advisory Committee to identify and assess threats to water quality throughout the watershed. The committee prioritized the threats and developed strategies to address these concerns. A recommended Watershed Plan was prepared for the five watershed communities. The Northeast Rural Water Association is providing support services and guidance to the committee under a grant from the federal government.

Is Your Land Use Agenda in Sync with Source Water Protection?

protection? The most effective way to protect a water supply is to limit or restrict how the land can be used.



But the responsibility of land conservation doesn't stop with water suppliers. More and more communities are working with their water suppliers, nonprofit organizations, and neighboring communities to develop regional open space and recreation plans that target specific parcels of land for conservation.

Land conservation is about investing in the long-term health and welfare of the people in your community and their environment. It is also a means of linking existing open spaces, preserving important wildlife habitats, providing the public with low-impact recreational opportunities, and, most important, guiding growth away from sensitive water resources. There are several ways to secure land for conservation:

Purchase land – A strategy for water suppliers, the community, a group of communities, or a land trust. (See Chapter 9 for information on funding options.)

Purchase development rights – Protects the land from development, while allowing the landowner to retain all other rights associated with land ownership.

Select subdivision open space areas (e.g., greenways, habitat corridors, expanded wetland buffers, protected forest fragments) – These are typically identified in the town open space plan and should be targeted during the subdivision approval process.

Planning & Zoning Source Protection Tools

Here are examples of tools communities can use to protect drinking water sources. Additional tools are listed in subsequent chapters.

- Zoning ordinances the primary means by which municipalities control the type of development allowed in a particular area. The assignment of land use "zones" allows a community to, among other things, control incompatible uses, promote public health and welfare, regulate the size of open space and population density, and protect existing and potential drinking water supplies.
- Subdivision and site-plan review regulations local guidelines for the control of development. This authority sets forth design and engineering standards and construction practices that must be met to gain subdivision or site-plan review approval. These regulations are powerful tools for controlling stormwater runoff and erosion and sedimentation.
- Cluster zoning and conservation development options that can significantly reduce the amount of additional impervious surfaces in a source protection area. Developers can "cluster" housing units together in less sensitive areas and leave more vulnerable areas (e.g., riparian zones, wetlands, buffers, areas with highly erodible soils) as permanent open spaces. (See http://www.state.ri.us/dem/programs/bpoladm/suswshed/ConDev.htm for more details.)
- Vegetated buffer zones highly effective means for protecting critical areas around surface water supplies by requiring vegetated (e.g., shrubs, tall grasses, trees) areas between development and sensitive waterbodies. These zones can be created through such mechanisms as zoning ordinances, subdivision regulations, conservation easements, and landowner agreements.
- Overlay protection zones watershed or recharge areas that are classified as environmentally sensitive and where development and high-risk land uses would threaten source water quality. These zones are designated (e.g., wellhead protection zone) by a community and can be used as a basis for prohibiting land uses.
- Low impact development (LID) techniques use various site design practices simultaneously to conserve and protect natural resource systems and reduce infrastructure costs. This is a highly effective and creative approach to controlling nonpoint source pollution and preserving groundwater recharge. (For more details on LID, see Chapter 8.)

Use conservation easements – A transaction whereby the landowner transfers rights to develop a given area of land to a recipient organization (e.g., municipality, water utility, land trust) that assumes responsibility for monitoring the land to ensure that easement restrictions are met.

Transfer of development rights – Establishes special zones whereby development rights (through donation or purchase) are transferred away from sensitive areas to other areas in the community that are better able to accommodate growth.

Review your land-use ordinances and bylaws to see if the areas identified in your Source Water Assessment report are protected from incompatible land uses now and in the future.

One of the most difficult challenges communities face is determining how much risk they are willing to accept. If you can't keep a potential contamination source out of the source protection area—the most riskfree solution—you can limit the size or scale or ensure that BMPs are being used. Take measures to minimize risks as much as possible.

Are **zoning ordinances** adequate to minimize threats in high-risk areas? Have build-out, or future growth, analyses been conducted to determine future risk to critical areas? Where future risks are notably higher than current conditions, are permitted uses consistent with source water protection goals? Is there an opportunity to re-zone threatened areas to lower-density land uses? If not, are there standards for site design and best management practices to minimize risk?

Do **subdivision and site-plan review regulations** help minimize impacts to source protection areas by setting forth design and engineering standards and construction practices? To protect water quality, these regulations should include provisions and standards for effective stormwater

CASE STUDY

Mutual Source Protection Interests – Connecticut

New State Aquifer Protection Regulations

In 2004, the State of Connecticut took an important step toward increasing the protection of public water supply wells serving over 1,000 people by adopting statewide Aquifer Protection Land Use Regulations. The new regulations include a list of 28 regulated activities consisting of high-risk industrial and commercial land uses and activities that can contaminate groundwater.

The program will be administered at the local level by an existing municipal board to be designated as the local Aquifer Protection Agency and at the state level by the Department of Environmental Protection (DEP). In general, new regulated activities will be prohibited within the mapped boundaries of public water supply stratified drift aquifers.

Businesses with existing regulated activities can continue to operate but must register with the local Aquifer Protection Agency and certify that they are in compliance with BMPs intended to minimize the possibility of a contaminant release. These businesses can also apply for a permit to add a new regulated activity to their site. DEP will publish a Model Municipal Ordinance and approve maps of aquifer protection areas prepared by water utilities. It is anticipated that individual municipalities will have their local regulations in place sometime between 2005 and 2007.

Why the New Law?

The Connecticut General Assembly set forth some compelling reasons for its new aquifer protection regulations (Section 22a-354g of the General Statutes):

- Aquifers are an essential natural resource and a major source of public drinking water.
- Reliance on groundwater will increase because opportunities for development of new surface water supplies are diminishing due to the rising cost of land and increasingly intense development.
- Numerous drinking water wells have been contaminated by certain land use activities and other wells are now threatened.
- Protection of existing and future groundwater supplies demands greater action by state and local government.
- A comprehensive and coordinated system of land use regulations should be established that includes state regulations protecting public drinking water wells located in stratified drift aquifers.
- The state should provide technical assistance and education programs on aquifer protection to ensure a plentiful supply of public drinking water for present and future generations.

Cheshire Establishes Aquifer Protection Overlay Zones

In the late 1970s and early 1980s, two wellfields in Cheshire, Connecticut, owned by the South Central Connecticut Regional Water Authority (RWA) were found to be contaminated with tricholoroethylene (TCE), a common industrial solvent. TCE can be found in many household cleaning products and is used in industrial applications to clean or degrease metal parts prior to painting or plating. Another chemical, 1,2-dichloropropane (DCP), used as drainage and runoff controls, sewage disposal, erosion and sedimentation controls, vegetative cover and buffer zones, and storage of hazardous materials.

Consider hiring a local or regional environmental enforcement officer.

In many cases local plans and regulations are comprehensive, but there is no identified staff member to monitor and enforce current activities. Municipalities and water suppliers should identify ways to ensure compliance with local regulations, including hiring a local or regional environmental enforcement officer or designating existing town staff (e.g., health director, building inspector, planner, conservation commission officer) to conduct field inspections, educate landowners, home owners, businesses, and developers, and pursue enforcement actions. In some cases a conservation agent works part-time for more than one community, providing a comprehensive background that benefits all the communities.

Maintain forested buffers to wetlands and surface waters.

Are inland wetlands and watercourses adequately protected from the impacts of activities such as new housing, industrial and business

an agricultural pesticide, was detected in the groundwater at the north wellfield.

In both the TCE and DCP investigations, the exact sources of the contamination could not be pinpointed. Immediate steps were taken to reduce the amount of contaminated water entering the distribution system through the use of barrier wells to intercept the groundwater or by shutting down selected production wells. Aeration treatment facilities costing millions of dollars were subsequently constructed to remove volatile compounds from the groundwater.

In the years following these contamination incidents the RWA embarked on an effort to map its water supply aguifers using hydrogeologic modeling techniques and to promote the development of land use regulations in Cheshire to protect these critical groundwater sources. In 1994, the Cheshire Planning and Zoning Commission adopted an overlay Aguifer Protection Zone that included a list of 21 categories of land uses prohibited from establishment as new uses within the defined Aguifer Protection Overlay Zones. Since the adoption of Cheshire's regulations, the RWA has worked closely with town planning staff, the Economic Development Director, and the DEP in evaluating new land use proposals within the overlay zones. Counter to fears that these regulations would stifle economic development, a number of new major industrial uses have become established since 1994. In response to increased citizen involvement in drinking water protection issues, the regulations were strengthened with amendments adopted in 2003.

The Water Utility's Work

The RWA provides public water service to 12 municipalities in the greater New Haven area. The majority of the RWA's water comes from nine reservoirs. However, in the northern part of the distribution system, wells associated with aquifers located in the towns of Hamden and Cheshire are a significant component of the water supply. The RWA owns nearly 400 acres of land on its mapped aquifers to protect the quality of its groundwater supplies.

The RWA closely monitors the water coming from its wellfields and reservoirs and has an extensive sampling program to assess water quality throughout its water supply watershed and aquifers areas. The RWA owns over 25,000 acres of land and since 1997 has had an active land acquisition program in place to identify and acquire additional parcels to increase the level of long-term protection of its water supplies.

Other components of the RWA's source water protection program include site-plan reviews of proposed developments on water supply watersheds and aquifers, watershed and aquifer inspections, and a household hazardous waste collection center. Annual efforts typically involve reviewing over 200 site plans, conducting 2,500 watershed inspections, and collecting about 7,000 gallons of household hazardous waste from 6,000 households. development, highway construction, logging, golf courses, and mining? Have setbacks from wetland and surface waters in drinking water protection areas been established and updated?



Establish service boundaries for water and sewer facility plans.

Do you have water and sewer districts that set limits for future sewer and water extensions into source water areas? Review and update the process for how applications to change established utility districts are handled in your state.

CASE STUDY

Tools for Managing Rhode Island's Scituate Reservoir

Providence Water, manager of the Scituate Reservoir, which serves 60 percent of Rhode Island's population, has teamed up with the Rhode Island Department of Environmental Management to fund a consultant to work with the three primary watershed towns of Scituate, Foster, and Glocester to promote the use of conservation development techniques. This approach to open space, or cluster, development uses flexible and creative designs to protect 50 percent or more of a parcel being developed.

The Source Water Assessment analysis identified the individual use of large parcels as a key concern for future impacts. Although density in these areas is low, impacts can be much greater than estimated if conventional development practices are used with existing frontage requirements, roads and other impervious surfaces, and large areas that are cleared for lawns. Conservation development subdivisions can allocate open space to increase wetland buffers and avoid backyard encroachment, which is very difficult to control—unprotected wetlands and tributaries are a key concern in this watershed.

As a result of leveraging funds, Providence Water agreed to contribute additional funds to cover the cost of a planning consultant to convert water quality recommendations (as approved by the towns) into ordinance language in all three towns. Funds were approved in 2004.

What have I learned about underground storage tank systems? They leak! Lynn Woodard, New Hampshire Department of Environmental Services

Are Fuel Storage Tank Owners Compliant and Vigilant?

LEAKING FUEL STORAGE TANKS

Leaking underground storage tanks (LUSTs) are a significant and widespread threat to groundwater quality in the United States. Petroleum storage tanks, both above ground and underground, can be found in virtually every community in New England—and each and every tank has the potential to leak. New England states have made great progress in developing programs to prevent releases of gasoline and other petroleum products into the soil and groundwater environment. For the most part,



municipalities have relied on their state underground storage tank (UST) programs to regulate these pollution sources. But in your source water protection areas, relying solely on the state to protect your drinking water from petroleum releases may not be enough.

Here a Tank, There a Tank, Everywhere a...

In 1983, the CBS program *60 Minutes* aired a story that brought national attention to families suffering from the effects of leaking USTs on their groundwater supplies. Less than a year later, Congress enacted the Subtitle I RCRA Amendments, calling for the U.S. Environmental Protection Agency to develop UST regulations to protect human health and the environment. The resulting rules spelled out a number of technical and financial responsibility requirements and timetables.

But the federal rule did not cover all storage tanks. Tanks *not* regulated by the federal rule include:

- farm and residential tanks holding 1,100 gallons or less of motor fuel used for non-commercial purposes
- tanks storing heating oil used on the premises where it is stored
- aboveground tanks not covered by federal Spill Prevention, Control, and Countermeasure regulations
- tanks holding 110 gallons or less
- emergency spill and overfill tanks

Are Storage Tank Owners Compliant and Vigilant?

While the New England states adopted UST regulations that were more stringent than the federal program, there are still gaps and unsolved problems. For example:

- Many abandoned USTs are still in the ground and may still contain petroleum product.
- Some owners are not properly operating and maintaining their UST systems.
- No tank system is "leak proof." Even if a system has state-of-the-art secondary containment, leak detection, and all the bells and whistles, leaks can still go undetected. It has now become apparent that vapor leaks from piping systems are an avenue for gasoline releases.
- Careless fuel-delivery and vehicle-fueling practices can compromise a tank owner's best efforts.

Unfortunately, states often do not have sufficient resources to conduct on-site compliance inspections as often as necessary. According to a 2000 survey of the New England states, UST facilities were inspected once every 9 years, on average.

Take a Closer Look

The work of keeping petroleum products out of the environment is far from over. If your municipality is serious about source water protection, you need to take a closer look at your petroleum storage tanks and address the following issues:



What Tanks Are Covered by Federal SPCC Regulations?

Very large storage tank facilities are subject to the requirements of federal Spill Prevention, Control, and Countermeasure (SPCC) regulations, under the authority of the Clean Water Act. Clearly, it is best if any such facility is not located in a source water protection area. These are the only aboveground storage tanks regulated at the federal level.

A facility subject to SPCC rules must meet three criteria:

- It must be non-transportation-related.
- It must have an aggregate aboveground storage capacity greater than 1,320 gallons or a completely buried storage capacity greater than 42,000 gallons.
- There must be a reasonable expectation of a discharge into or upon navigable waters of the United States or adjoining shorelines.

The plan must show how facility owners will prevent any discharge of oil into navigable waters. Preparation of the SPCC plan is the responsibility of the facility owner and must be certified by a licensed professional engineer.

- what to do about tanks not subject to state or federal regulations (e.g., home heating oil, aboveground storage tanks)
- what to do about abandoned, or "orphaned," tanks that have not been properly closed and removed
- how to ensure that tank systems in source protection areas are designed and installed such that the risk of a release is minimized to the greatest extent possible
- how to ensure that tank systems in source protection areas are in compliance with all applicable regulations and are properly operated and maintained on an ongoing basis
- how to reduce or eliminate current and future threats from the source protection areas

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

Strategies for Action

Consider establishing a comprehensive program to prevent the contamination of present and future drinking water from fuel storage tank releases.

If your community's Source Water Assessment report has identified land uses that are likely to have USTs or above ground storage tanks (e.g., gas stations, automobile dealerships, trucking and busing companies, public works facilities, homes with heating oil tanks), this is your cue to pay attention to these potential threats to your source water area. How many

such storage tank systems are identified in your report? Are there other regulated and non-regulated tanks in the source water protection area that are not identified in the report? And...are all of your municipally owned tank systems in compliance with state regulations?

Ultimately, it is up to your community and your water supplier to determine how much risk you are willing to accept in your watershed or groundwater protection area. Communities are able to adopt more stringent regulations (than federal or state) for all tanks, including those not regulated by the state. Many local governments address residential USTs through board of health regulations, zoning bylaws, or general bylaws or ordinances. Begin by reviewing your state UST/AST regulations to see what is covered and what might be lacking.

The initial effort of establishing a municipal tank program can be time-consuming, depending on the tank population, and it requires a long-term commitment. Also, it is important to identify a local entity that has authority over tanks. In New England, these authorities tend to be with the board of health, planning department, or fire department.

When Bad Things Happen to Nice Wellfields

All it takes is one leaking tank to create a water supply emergency. The federal UST program was created in hopes that we could prevent such disasters, but they can and do still happen. In the summer of 2001, a resident of the village of Pascoag, Rhode Island, had his tap water sampled because it tasted bad. When it was confirmed that the water had high levels of methyl *tertiary*-butyl ether (MtBE), an additive in gasoline, a protracted nightmare ensued for the residents, businesses, and the utility district.

The source of the gasoline release was a Mobil station located on Main Street, not far from the public wells. After months of bottled water and health advisories from the state Department of Health, informing residents that the water should not be used for drinking, cooking, and bathing small children, a longterm solution was provided by a neighboring village of Harrisville. The two water districts merged, the court ordered the Pascoag wellfield shutdown, and the water began flowing from Harrisville to Pascoag.

Ultimately, the village of Pascoag found a water supply solution, but every community should ask itself:"What if...?

Take advantage of readily available GIS map resources to inventory all storage tanks in your source protection area.

Do you know where all the USTs and ASTs are in your source water area? If your community doesn't have information on UST and AST locations, your state program may. When a petroleum release occurs, state and local regulators can use GIS mapping information to identify proximity to source protection areas. It is also easy to update GIS maps as new information is available.

To conduct the inventory, make it a point to first verify your Source Water Assessment by conducting drive-by surveys, consulting sources such as local fire department records, and questioning residents, businesses, public works officials, and fuel distributors. For each tank facility, identify the owner or operator, number of tanks, location of tanks

Are Storage Tank Owners Compliant and Vigilant?

(usually on a plot plan), age of tanks, type of construction and material, and location on a GIS map.

Make a special effort to locate and remove or properly close all abandoned tanks.

A surprising number of abandoned or orphaned USTs lay buried and forgotten throughout New England. These tanks are of interest because they are old, made of bare steel, prone to corrosion, and likely to eventually spill their contents into the environment. They may be identified on existing maps, but you may also want to investigate further by checking with long-time residents and going back to historic municipal records, maps, and aerial photos. Many state or local authorities insist that these tanks be removed and allow abandonment in place only if a tank is in or near a building and removal would compromise the structure of the building. Check with your state to find out if there are programs to help pay for the removal of these tanks.

Contact your state UST program to find out:

- which UST facilities in your community's source protection area are in the state regulatory database
- when those facilities were last inspected
- facility compliance records
- how you can work with the state to address facilities of concern

Municipalities should not assume that state-regulated USTs are inspected regularly or that they are in compliance. Some states try to prioritize their UST facility inspections based on environmentally sensitive areas, but it is no secret that state and local governments are painfully short of enforcement resources. It is a good idea to crosscheck your UST-facility database with the state's so you can capture facilities that may have been overlooked in your databases. Work with the state to target facilities of concern for more frequent inspections, and make sure enforcement action is taken where necessary. Establish a schedule for checking with the state.

Develop municipal ordinances, overlay zones, best management practices, or regulations to address potential threats from petroleum storage tanks in your source water protection area.

Local governments have various options for controlling potential water supply threats, including:

- prohibiting new USTs in sensitive areas
- establishing rules for storing residential heating oil tanks, including prohibiting underground storage
- registering tanks
- requiring the upgrade or removal of existing tanks
- restricting the location of new storage tanks
- establishing installation, construction, testing, and monitoring requirements

- ensuring that tanks are inspected to enforce the rules
- reviewing system designs with state UST program staff
- requiring certification of UST installers and removers (if the state doesn't have a program)
- requiring installation of groundwater monitoring wells near tanks located in source water areas
- providing a cost-share arrangement for removing tanks

If your community is not ready to adopt a comprehensive storage tank program to protect your water supplies, consider adopting some protective measures. You could start with a requirement to register all tanks or just heating oil tanks, which enables you to more accurately assess the problem and alert officials of the location of the tanks in the event of a leak, spill, and contamination situation.

Registration information can be linked with source water protection areas and be used to establish an effective tank management and education program. It can form the basis for further regulation, such as testing and removal requirements.

Educate all tank owners about the need for enhanced vigilance in source water protection areas.

Do tank owners know if their tanks are in a source water protection area? Do they know that their tanks are a threat and a liability? Education is a key way to help prevent a problem from happening. Work with your state, local businesses, oil distributors, and homeowners to develop a

Keeping Bad Things Away from Good Drinking Water

Maine's UST Siting Law

In 2001, the State of Maine passed An Act to Protect Sensitive Geologic Areas from Oil Contamination, which prohibits or modifies the installation of UST facilities in proximity of existing water supplies (public and private wells) and future water supplies (significant sand and gravel aquifers). The requirements apply only to motor fuel and bulk plant USTs, not to the expansion of USTs that existed at a site prior to the implementation date.

Under the law, tanks cannot be installed:

- within 300 feet of a private well, other than the well used to supply water to the business with the UST
- within 1,000 feet (or within the source water protection area, which ever is larger) of a community water supply (e.g., municipal well, mobile home park well, condominium) or a school well
- over a high-yield (more than 50 gallons per minute) sand and gravel aquifer
- within 1,000 feet (or within the source water protection area, which ever is greater) of a transient (e.g., restaurant, highway rest stop) or non-transient (e.g., school, office park) public water supply

• over a mapped moderate-yield (between 10 and 50 gallons per minute) sand and gravel aquifer

CASE STUD

A New Water District and Some New Rules

The small town of East Pittston, Maine, established a new water district after a release from a local "mom and pop" fueling operation knocked out a number of private wells. The new district, with the help of the state, drilled two new wells outside the contaminated area, and, with the help of Maine Rural Water Association, developed the Town of Pittston Wellhead Protection Ordinance.

In Zone 1, a 300-foot protective area around the wells, no tanks are allowed; in Zone 2, which covers the whole recharge area, tanks greater than 500 gallons are prohibited, and any development is controlled through a permit process.

The Maine Department of Environmental Protection (DEP) has long encouraged communities, businesses, and homeowners to get buried heating oil tanks out of the ground, and the citizens of East Pittston had done that too. Between having a significant petroleum release from a fuel tank and being well educated about home heating oil tanks, the town has adopted a very cautious outlook about storage tanks. message that will help people recognize that it is in their interest to be vigilant in preventing leaks, to avoid the high cost of future contamination, and to support local efforts to reduce risk.

Encourage homeowners to replace their USTs with above ground tanks located either indoors or outdoors on a concrete slab in a protected area. Make sure they know that most homeowner's insurance policies do not cover LUSTs and self contamination. (See Self-Inspection Checklist below.)

Tanks may be everywhere, but do they need to be? If tanks need to be there, let people know that extra precautions are a must in source water protection areas. Target commercial tank owners and residential heating oil tank owners. Provide clear and simple guides for such topics as removing tanks and BMPs for residential heating oil—checklists, brochures, and Web site addresses—so no one can say: "But I didn't know."

Self Inspection Checklist for Home Heating Oil USTs

If you answer "YES" to any of the following questions, call your oil burner technician for a more detailed inspection and corrective measures. (Of course, the best thing to do is to remove your UST and switch to aboveground storage.)

- Are you using more fuel than normal?
- □ Is your tank taking on water—a rise in water level greater than 1/2" for an 8-to 12-hour period? (Your oil burner technician can check for water or provide you with water-finding paste so you can check yourself.)
- Are there signs of oil sheens in nearby streams, wetlands, or drainage ditches?
- Are there signs of distressed (withered) vegetation over or down slope of the tank?
- Is the tank vent clogged or restricted because of ice, snow, or insect nests? (Screened vents can be used to prevent insect nest problems.)
- Is the overfill whistle silent when the tank is being filled? (Ask your delivery person.)
- Are there signs of spills around the fill pipe or the vent pipe?

CASE STUDY

What Cape Cod Towns Did about Their Residential USTs

All 15 towns in Barnstable County, Massachusetts have local health regulations for residential heating oil USTs. These towns comprise Cape Cod, whose entire geographic area is a source-water aquifer. Shaken by a devastating UST release in 1977 that contaminated Provincetown's public water supply, many towns adopted UST regulations in the early 1980s. In 1986, the Barnstable County Health and Environmental Department (BCHED) saw the need to initiate a comprehensive program to prevent the contamination of ground-water from underground fuel storage.

BCHED developed a model Board of Health regulation that covered mandatory tank registration along with various installation, testing, spill/leak reporting, and removal requirements for home heating oil tanks. The department has no authority to mandate towns to adopt regulations; it is strictly advisory. Typical regulations adopted by the towns included requirements for the registration and tagging of all heating oil USTs, oil dealers to report any unregistered tanks to the local health department, removal of tanks that are 30 years old or more (20 years in a few cases), and a soil vapor test (for petroleum hydrocarbons) for tanks 15 years old or more. The BCHED runs the programs for all but two towns.

When the program began, about 3,000 tanks were registered under the program, now fewer than 300 home heating oil tanks remain buried underground. Most homeowners installed new tanks in their basements, while others switched to an alternative fuel source. It is a question of discipline," the little prince said to me later on.
 "When you've finished your own toilet in the morning, then it is time to attend to the toilet of your planet, just so, with the greatest care.

ANTOINE DE SAINT EXUPÉRY, THE LITTLE PRINCE

Are Septic Systems Up to Speed?

SEPTIC SYSTEMS

For more than 6,000 years, humankind has sought—in fits and starts—to improve the art and science of sanitation. The removal of human wastes from indoor areas has advanced rather well. The ultimate treatment and disposal of these wastes to reduce threats to public health and the environment has also progressed, but some serious challenges persist, particularly with regard to decentralized wastewater treatment



systems—on-site systems (i.e., individual sewage disposal systems) or cluster systems (i.e., serving one or more dwelling units or businesses).

Decentralized systems collect, treat, and release about four billion gallons of effluent per day from an estimated 26 million facilities nationwide. More than half of these systems are more than 30 years old, installed when septic system rules were nonexistent, substandard, or poorly enforced. On-site systems serve about 25 percent of the nation's households and account for about 33 percent of new construction. In the more rural New England states of Vermont, Maine, and New Hampshire, on-site systems serve closer to 50 percent of all households. On-site systems at converted seasonal camps and auto repair/service businesses that use engine fluids, fuels, and cleaning solvents are of particular concern.

While many municipalities have made important strides in establishing effective on-site sewage disposal regulatory programs, most have not adopted comprehensive management approaches that oversee the full range of issues—planning, siting, design, installation, operation, monitoring, and maintenance. Most do not require homeowner accountability for system performance. Improving the management and performance of decentralized wastewater treatment systems should be an essential component of your community's source water protection program if your Source Water Assessment report has identified threats of nitrate, nutrients, and microbial contamination.

Plan for the Long Haul

Today, many on-site systems perform well, but many don't. When they don't, they present a serious threat to public health, drinking water resources, and aquatic life. Septic systems are among many known contributors of pathogens and nutrients to surface and groundwater. They have contributed significantly to the eutrophication of ponds, lakes, and coastal estuaries—not to mention the degradation of property values.

On-site Wastewater Treatment System

A passive or active method for treating and disposing of wastewater into the soil.

Decentralized Wastewater System Management

A comprehensive, life-cycle series of elements and activities that address public education and participation, planning, performance, site evaluation, design, construction, operation and maintenance, residuals management, training and certification/licensing, inspections/monitoring, corrective actions, recordkeeping/ inventorying/reporting, and financial assistance and fundina.

The *National Water Quality Inventory 1996 Report to Congress* states that "improperly constructed and poorly maintained septic systems are believed to cause substantial and widespread nutrient and microbial contamination to groundwater." For many years, these systems were regarded as temporary installations to be replaced eventually by centralized wastewater treatment facilities. This mindset has been eclipsed by the reality that on-site systems are, for the most part, permanent approaches to treating wastewater for release and reuse in the environment.

The good news is that properly managed septic systems are a viable longterm solution for wastewater disposal. Communities that depend on septic systems need to recognize this and, if need be, take steps to adopt and implement creative, disciplined, and comprehensive management programs designed to achieve long-term sustainability.

While state and local health officials and state and federal water pollution control agencies recognize that on-site systems must be sited, constructed, and managed for the long haul, the regulation of these systems is often fragmented among state, county, and local jurisdictions. Most communities do not routinely oversee septic system operation and maintenance or detect and respond to changes in wastewater loads that can overwhelm a system. The decentralized nature of septic systems also makes it difficult to link on-site system planning and siting to larger groundwater and watershed protection efforts.

The New Approach to Wastewater Management

A conventional gravity-based on-site treatment system, which consists of a pipe from the home, a septic tank, a drainfield, and the soil, is essentially the responsibility of untrained and often uninformed system owners. As a result, system performance is monitored primarily by complaints or failures. Failures are typically caused by unpumped and sludge-filled septic tanks, which lead to clogged absorption fields and hydraulic overloading.

But decentralized wastewater management systems can be a fine solution if they are managed so that they perform effectively. In fact, many community development strategies are leaning toward the use of decentralized management approaches rather than traditional centralized infrastructures that often give rise to sprawling development, traffic congestion, environmental degradation, and diminished quality of life.

NEW IDEA

A Creative Decentralized Approach

The 120-home village of Warren, Vermont has charted an innovative path to cleaner water. It recently received a \$1.5 million grant from U.S. EPA to demonstrate a decentralized approach to planning and engineering the village wastewater system, maximizing the use of on-site systems to save money and improve community support. The new system combines management of on-site systems with a small, conventional central system, and the approach has garnered strong community support. Decentralized management can deliver communities significant up-front and long-term financial savings and provide benefits in the form of preserved and restored waterways and more open space.

The new wastewater management paradigm involves a cooperative, coordinated, integrative approach to protecting public health and water resources. It includes the use of performancebased management approaches rather than traditional prescriptive code requirements for system siting, design, and operation. Already, some communities are experimenting with performance-based approaches, while retaining prescriptive requirements for technologies that have proven to be effective under a wide range of site conditions. Newer or "alternative" on-site treatment technologies are more complex than conventional systems and incorporate pumps, recirculation piping, aeration, and other features that require ongoing or periodic monitoring and maintenance.



Take a Closer Look

It is important for municipalities to take a closer look at their septic system management programs and address the following issues:

- how to be sure that septic systems are not impacting drinking water sources
- how to make sure existing septic systems will not impact source water in the future
- how to address future development so that decentralized wastewater treatment system siting, design, operation, and maintenance are optimized
- how to take into account the cumulative impacts of on-site systems on the water supply region or watershed
- how to change public and political attitudes toward the value of and need for an effective decentralized sewage management program
- how to fund an effective decentralized wastewater management program

Let's look at some of the Strategies for Action municipalities can take to minimize threats to their water supply sources from on-site wastewater treatment systems. *As a general rule, always check your state requirements and statutes.*

Strategies for Action

Consider establishing a comprehensive decentralized wastewater system management program to prevent the contamination of present and future drinking water from septic systems.

If your water system's Source Water Assessment report has highlighted a potential source water pollution threat from septic systems, top priority should be given to this potential source of contamination. Ask some key questions:

- Have we reviewed the status of existing septic systems and projections for future development?
- Do we know the frequency of septic system failures in the community?
- Do we have an on-site system inspection program?
- Do we have septic tank pump-out requirements?
- Are we addressing wastewater management adequately to protect drinking water sources?

Responsibility for on-site wastewater treatment oversight rests with local boards of health, health directors, or sanitarians. If you don't have the expertise on board to evaluate this issue, consider hiring a consultant to work with the community on developing a comprehensive on-site management program.

Take advantage of readily available GIS map resources to inventory all septic systems in your source water protection area.

Does your Source Water Assessment report accurately depict the septic system population in your source water area? Does your municipality have up-to-date locational information for septic systems on GIS? Has the information on your Source Water Assessment map been verified by your town sanitarian or health director? Make it a point to keep this information updated, so that your map can be a useful wastewater management planning tool.

Develop a municipal regulatory/best management program to address potential threats from on-site wastewater treatment systems and cesspools in your source water protection area.

Cesspool ce

Take the following steps:

- evaluate existing conditions and problem areas
- evaluate future wastewater needs
- identify septage (pump-out material) disposal areas
- evaluate future growth to determine how treatment needs will be met
- identify funding sources
- propose a long-term strategy for meeting treatment needs

Such a program could include a public education strategy, a voluntary compliance program in low-risk areas, a mandatory septic system inspection and maintenance program for high-risk systems (e.g.,

A buried, usually cylindrical, vault that acts as both a septic tank and leaching system. It is bottomless and/or has holes in the side to allow the wastewater to go into the ground. Cesspools do not provide proper primary treatment prior to discharge and are prohibited in New England states. advanced treatment systems, large-flow systems) and high-risk locations (e.g., drinking water supply watersheds, aquifer recharge areas, nitrogensensitive coastal waters), and installation specifications or guidelines.

Local governments have various options for controlling potential water supply threats. Here are a few examples:

- A **septic system maintenance ordinance** helps ensure that septic systems are inspected and pumped periodically to prevent malfunction. This type of ordinance could require that system owners:
 - hire a certified inspector to inspect their system
 - send inspection results to the town
 - use trained, certified/licensed system installers
 - · have systems inspected during installation
 - close out cesspools
- A septic system tracking program is the computer software system a town uses to keep track of inspection reports and results, monitor compliance, and send reminders and other notices to system owners. New Web-based programs help minimize the local staff effort needed to manage the program, enabling staff to concentrate on monitoring results. Town staff may conduct spot checks to ensure local inspectors are conducting inspections properly.
- A municipal septic system maintenance program has the municipality assume responsibility for the maintenance and repair of septic systems. Homeowners are charged an annual fee and the municipality ensures that a pumping and maintenance schedule is followed. Or, short of the municipality taking responsibility, offer a municipally sponsored pump-out program, where the town organizes a reducedrate pump-out program, and participation is voluntary.
- Standards for installing and siting new septic systems ensure that siting and design is such that potential threats to source water are minimized. Some states have very strict standards. At a minimum, these standards should include siting systems away from unsuitable areas (e.g., close to surface waters, floodplains, shallow water tables, public supply wells, poorly or excessively drained soil, areas where effluent

Rhode Island Communities Take On Onsite Wastewater Management

CASE STUDY

Several Rhode Island communities have adopted comprehensive ordinances for on-site wastewater management, most for the express purpose of groundwater protection. Block Island, South Kingstown, Charlestown, and Jamestown all mandate regular inspections by certified inspectors—frequency of inspection and maintenance is scheduled, as needed, based on the size, type of system, and water use.

The Block Island ordinance includes treatment standards requiring advanced treatment in drinking water supply areas, based on site conditions. Jamestown also has requirements for advanced treatment in selected areas with small lots of record and wells, and it also integrates wetlands buffer limits and stormwater controls requiring no more than 15 percent impervious cover and no net increase in runoff. Block Island, South Kingstown, and Charlestown have rules phasing out cesspools by a certain deadline.

Many elements are in place at the state Department of Environmental Management and University of Rhode Island (URI) Cooperative Extension to support town wastewater management planning and regulation, including training and certification programs for wastewater system designers, installers, and maintenance providers. URI has installed more than 50 working alternative demonstration systems on private property as repairs on difficult sites in the state. These are monitored for performance and used in training.

For more information on creative approaches to on-site wastewater approaches, see URI's Creative Community Design and Wastewater Management Manual on the Web at: www.ndwrcdp.org/publications.cfm.

ent can't be sufficiently treated before it reaches a water body).

Explore new approaches for siting and managing decentralized wastewater systems.

On-site wastewater treatment authorities should routinely reevaluate and improve their standards to ensure that public health and environmental concerns are being addressed. The protection of source water protection areas may well require the application of more advanced wastewater technologies and innovative solutions.

The new direction for on-site systems involves more creative approaches to systems siting and the use of alternative systems to support more compact development on smaller lots to reduce site disturbance, minimize runoff, and preserve open space. Regulators must be attuned to current research technologies and practices, evaluate this information, and incorporate appropriate technologies into their program.

U.S. EPA's new Voluntary National Guidelines for Management of On-site and Clustered (Decentralized) Wastewater Treatment Systems provide a risk-based conceptual approach to on-site wastewater management. They outline a series of five management tiers in the form of model programs. Areas of a community with few problems and relatively low risk to water resources may choose to opt for a simpler, less comprehensive approach, while those with higher system densities and greater threat to source water may adopt a more protective program. These guidelines can be used to help states and communities meet water quality and public health goals, and they provide a range of cost-effective options.

Coordinate on-site system management with watershed protection efforts.

Coordinating your on-site wastewater management activities with programs and projects conducted under a watershed approach greatly enhances overall land use planning and development processes. These watershed partnerships provide mutual benefits for the participants, operating efficiencies, and public education opportunities.

Educate homeowners, businesses, and local officials about the importance of proper wastewater management and provide them with guidance on proper operation and maintenance.

Are your homeowners and businesses with septic systems fully informed about what they need to do to properly operate and maintain their systems? Are local officials in your community aware of the seriousness of protecting source water supplies and the importance of managing the widespread threat of on-site systems?

Public involvement and education are critical to successful on-site wastewater management. Engaging the public helps build support for funding, regulatory initiatives, and other elements of a comprehensive program. Educational activities directed at increasing general awareness and knowledge of on-site management procedures can improve the probability that simple, routine operation and maintenance tasks are carried out by system owners.

Sadly, the value of effective on-site wastewater management is often dismissed out of hand because it is perceived to lack political viability. This



CASE STUDY

The Massachusetts Community Septic Management Program

In 1995, the Massachusetts Department of Environmental Protection (DEP) with the help of key stakeholders revised Title 5 of the State Environmental Code to protect public health and the state's natural resources. These revisions reflect a new understanding of the impact of septic systems on the groundwaters and surface waters. Title 5 requires inspection of private on-site sewage disposal systems before properties are sold, expanded, or undergo a change in use.

To help people comply with the rules, DEP established a Community Septic Management Program to provide funding of up to \$200,000 in the form of low-cost loans to allow communities to devise a Community Inspection Plan or a Local Septic Management Plan. Both plans must always include the provision of financial assistance to homeowners using **betterment agreements**.

Community Inspection Plan

Under this plan, a community devises a plan to protect environmentally sensitive areas from contamination from on-site systems (conventional septic systems, innovative/ alternative (I/A), or cesspools). Inspections must be performed every seven years.

Community Inspection Plans must include:

- the scope and basis for the plan
- prioritization of areas to be inspected
- · a proposed schedule for system inspections
- interim maintenance measures
- legal and jurisdictional bases for establishment and enforcement of the plan
- a system for monitoring inspections
- a proposed source of funding for administration and identification of revenue sources
- a proposed budget for administration and inspection
- a staffing plan
- an outreach and education strategy
- an annual status report
- an evaluation report to DEP after completing first time inspections

Local Septic Management Plan

This plan identifies, monitors, and addresses the proper operation, maintenance, and upgrade of on-site systems in a comprehensive manner. It does not require periodic inspection, neither does it relieve the obligation to have the system inspected at the time of property transfer. Local Septic Management Plans must include:

- identification and prioritization of areas containing systems that warrant more regular monitoring and maintenance and/or upgrade
- development of a DEP-approved database system for tracking the inspection of septic systems; this database must also track whether failed systems are being upgraded in accordance with timelines outlined in Title 5
- development of requirements and a schedule for periodic pumping and other routine maintenance of systems covered by the program

Community activities suggested under the Management Plan include:

- create administrative structure to manage program
- prioritize environmentally sensitive or threatened areas
- notify the public
- prepare a priority list
- determine selection criteria for loans
- develop betterment agreements
- administer the repair of septic systems
- administer loan repayment

Betterment Loans to Homeowners

After a community has adopted an inspection or management plan of its own and has been awarded the loan amount, it is now ready to provide financial assistance to homeowners within the community. A Betterment Agreement between the community and a homeowner may be used for all costs necessary to repair or replace a failed on-site system including:

- renovating the existing system
- · hooking up to existing sewer lines
- replacing traditional septic systems with an approved Title 5 innovative/alternative system

To apply for a betterment loan, the homeowner must submit an application and petition the local Board of Health. The systems that need work and that will be funded by a loan will be selected according to the priority list of that community. In addition, the municipality has the right to inspect the project, and the owner agrees not to sue the municipality for any damage to or loss of property. For a more detailed description of this program, visit the DEP Web site at:

www.mass.gov/dep/brp/wwm/localoff/files/cmspimpl.htm.

short-term thinking often only changes as the result of a crisis, but it can also change due to an aggressive community education effort.

Every owner of an on-site wastewater treatment system should have the facts on operation and maintenance on hand. U.S. EPA, the National Small Flows Clearinghouse, and New England state health and environmental agencies have prepared various fact sheets for septic system owners. Communities can use this material or adapt it and then make sure it is distributed appropriately. Septage haulers are usually willing partners in the education and distribution process. Local papers can be encouraged to cover the topic periodically.

Key benefits to a comprehensive (or at least adequate) on-site wastewater management program that should be emphasized include:

- protection of water quality and public health
- protection of the owner's investment in home and business
- increased life of the on-site service system and cost savings if a system does not need to be replaced
- avoidance of transferring water away from the source by conserving groundwater
- avoidance of the need to use a community's tax base to finance a centralized sewer system

Explore financing options.

Financing the installation and management of onsite systems can present a significant barrier for homeowners and small communities. While centralized wastewater treatment options are very expensive for communities, properly functioning decentralized management programs also come at some cost. U.S. EPA and other federal and state agencies have developed loan, cost-share, and other programs to help homeowners pay for new systems, repairs, or upgrades.

Some major federal initiatives include the Clean Water State Revolving Fund (CWSRF), the Hardship Grant Program, the Nonpoint Source Pollution Program, USDA Rural Development programs, and the Community Development Block Grant (CDBG) program. Check with

> your state source water protection program to learn about other funding sources. (See Chapter 9.)



Source: A Homeowner's Guide to Septic Systems, U.S. EPA

…A universal environmental ethic is the only guide by which humanity and the rest of life can be safely conducted through the bottleneck into which our species has foolishly blundered.

EDWARD O. WILSON, THE FUTURE OF LIFE

Do Keepers of Hazardous Materials Know Who They Are and What to Do?

HAZARDOUS MATERIALS

Gontemporary society is perpetually engaged in manufacturing, purchasing, storing, using, generating, and discarding chemical products and wastes that pose varying degrees of risk to human health and the environment. Chemicals are everywhere, and one of the most difficult problems we face is determining how much risk we are willing to accept. In the case of source water protection areas, it is clearly important that we accept as little risk as possible.



To address the huge volumes of municipal and industrial

solid waste generated nationwide, Congress enacted the Resource Conservation and Recovery Act (RCRA). Since 1980, under Subtitle C of RCRA, U.S. EPA has developed a comprehensive program to ensure that hazardous wastes are managed safely from the time they are generated to their ultimate disposal—from cradle to grave. Most New England states have authority to implement their own RCRA programs that are consistent with, if not more stringent than, the federal program.

This cradle-to-grave management program is one of the most comprehensive requirements that EPA has ever developed. It addresses issues such as the following:

- hazardous waste identification
- large and small hazardous waste generators



- hazardous waste transportation
- recycling, treatment, storage, and disposal
- land disposal restrictions
- hazardous waste permitting
- cleanup of hazardous spills or releases

U.S. EPA and the states continue to improve the RCRA program by promoting new initiatives, such as encouraging waste minimization, improving the federal/state partnership in the hazardous waste program, and aiding state and local governments in reaping the environmental and economic benefits of source reduction and recycling. Yet, water suppliers and local governments still have their work cut out for them.

Where Are the Hazardous Materials and What Can You Do About Them?

Chemical waste materials can reach source waters through spillage or disposal—intentional or accidental. Chemical use includes, but is not limited to, activities associated with combustion, degreasing and other cleaning, mixing, dilution with other chemicals or water, and catalytic reactions. Some waste materials are recycled on a limited scale during the process.

RCRA programs regulate the generation and storage of hazardous waste, but they typically do not have jurisdiction over facilities that use hazardous non-waste materials or the location of facilities. Many hazardous materials (e.g., those used at homes, schools, public works facilities) are not subject to RCRA regulations—this is where community efforts are particularly important!

For a municipality, any threat to drinking water is a concern, so consider following some basic common-sense tenets:

Be aware. Make sure that you know what types of materials are located in the source protection area and how to deal with any spills, accidents, and fires. Businesses and other facilities that produce, use, or store hazardous materials in significant quantities are considered potential contamination sources. Homeowners are of particular concern because they may be engaging in activities that threaten source water (e.g., lawncare, disposal or storage of hazardous materials), but they aren't regulated. Make sure homeowners and businesses know about such threats and what they can do to protect the water supply. Meet in person with owners, or communicate by letter, and provide them with a map of the source protection area.

Keep contamination out. The best way to protect your water supply is to keep potential contamination sources out of the source protection area. If you can't keep a potential contamination source out of your source protection area, you can limit the size or scale. Try to keep the risks as small as possible.

Enforce proper maintenance and practice. If a business or facility is using a potentially hazardous material, make sure proper best management practices (BMPs) are in place to protect the water supply. Use a multi-barrier approach, so that if there is an accident (e.g., a problem with a holding tank or containment structure, or one person fails to do what they are supposed to) there is a backup to protect the water supply.

For example, water suppliers or municipal entities can work with local industries/commercial businesses by setting up a voluntary inspection program where the entity meets with the business periodically to review the types of chemicals stored on-site and how they are used, stored, and disposed of. New Hampshire has a program where water systems can reclassify their groundwater sources for greater protection for their important groundwater resources. (*Groundwater Reclassification and How It Affects the Property Owner*, WD-WSEB 22-3 - *http://www.des. state.nh.us/factsheets/ws/ws-22-3.htm*) As part of this program, if water sources are reclassified, water suppliers or municipal entities must complete inspections of local potential contaminant sources every three years.

Co

Conservation and Recovery Act (RCRA)

Resource

A federal law that encourages environmentally sound methods for managing commercial, industrial, household, and municipal waste and regulates facilities that generate, transport, treat, store, or dispose of hazardous waste (CFR Title 40, Parts 260 to 279).

WEB SITE

Know when there is a problem. Require facilities with hazardous materials located in the source protection area to promptly notify the town and water supplier when there are spills or accidents involving hazardous materials.

Consider potential future uses. It is tempting to allow structures or uses in your source protection area because they seem innocent enough when they are proposed...or you know the owner to be responsible and careful. But remember to consider future uses. What happens when the property changes hands? That three-bay garage for the hobby woodworker may look like the perfect place for an auto body shop when the property goes on the market.

The work of keeping hazardous wastes and materials out of the environment is far from over. So take a closer look at these sources and address the following issues:

• what to do about hazardous waste generators and hazardous materials users that are frequently overlooked (e.g., hazardous products in households, schools, golf courses, farms, public works operations)

What Is a Hazardous Waste?

To be considered a hazardous waste under RCRA, a material must first be classified as a solid waste. U.S. EPA defines solid waste as garbage, refuse, sludge, or other discarded material (including solids, semisolids, liquids, and contained gaseous materials). *Note: Each state has specific hazardous waste laws, so be sure to check with your state program.*

If a waste is considered to be solid waste, businesses must then determine if it is a hazardous waste. Wastes are defined as hazardous if they are specifically named on one of four lists of hazardous wastes, or if they have certain characteristics:

Listed wastes – known to be harmful to human health and the environment when not managed properly, regardless of their concentrations.

Characteristic wastes – If a waste does not appear on a hazardous waste list, it still might be regulated as a hazardous waste if it exhibits one or more of the following characteristics:

- Ignitability
- Corrosivity
- Reactivity
- Toxicity

How Are Hazardous Waste Generators Regulated?

Hazardous waste generators must manage their wastes according to regulations for three specific generator types, based on how much waste they generate in a calendar month.

Large Quantity Generators (LQGs) – generate 1,000 kg or more of hazardous waste per month, or greater than 1 kg of acutely hazardous waste per month.

Small Quantity Generators (SQGs) – generate more than 100 kg but less than 1,000 kg of hazardous waste per month.

Conditionally-Exempt Small Quantity Generators (CESQGs) – generate 100 kg or less of hazardous waste per month, and 1 kg or less of acutely hazardous waste per month. (Some states do not recognize this class.)

Generators must comply with whichever standard is applicable for a given month. In many cases, small businesses that fall into different categories at different times choose to always satisfy the more stringent requirements. Certain wastes, such as those that are reclaimed or recycled continuously on site, are not counted under the federal regulations.

What Types of Businesses Are Likely to Produce Hazardous Wastes?

- automobile maintenance and body shops
- electroplaters and metal fabricators or finishers
- printers
- photographic and x-ray processors
- dry cleaners
- chemical laboratories (including schools and universities)
- furniture manufacturers and strippers
- construction
- pest control
- chemical manufacturing
- textile manufacturing
- funeral services
- arts and craft studios

- how to ensure that the risk of a release of a hazardous waste or hazardous material is minimized to the greatest extent possible
- how to ensure that regulated businesses in source protection areas are in compliance with all applicable regulations and are properly operated and maintained on an ongoing basis
- how to reduce or eliminate current and future threats from the source protection areas

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

Strategies for Action

Consider establishing a comprehensive hazardous materials management program to prevent the contamination of present and future source water.

Have you reviewed your Source Water Assessment report to determine the extent to which potential threats from hazardous materials have been red-flagged? Have you set goals and priorities for addressing potential risks in source protection areas? Is there a local or watershed official who is responsible for inspecting hazardous materials facilities and educating owners? Do you have a household hazardous waste disposal program? Do you have local ordinances and BMPs that address hazardous materials users and hazardous waste generators? Does your town comprehensive plan locate high-risk land uses away from vulnerable areas? Is your municipality doing hazardous waste housekeeping at its own facilities?

Take a close look at existing hazardous waste threats in your source protection area and review existing ordinances, programs, and policies to see if you can do more to prevent water supply contamination.

Take advantage of readily available GIS map resources to inventory all land uses that might handle hazardous wastes/materials in your source protection area.

Does your Source Water Assessment report accurately depict the potential hazardous materials threats in your source water area? Does your municipality have up-to-date information on the location of hazardous waste generators on GIS? Verify and update this information on your Source Water Assessment map and any other planning map. Make it a point to keep this information updated, so that your map can be a useful planning and emergency response tool.

Review municipal regulatory/best management requirements to see if potential threats from hazardous materials and hazardous wastes are addressed adequately in your source protection area.

Zoning is the most powerful tool local governments have to ensure that new hazardous materials and waste sources are not located in source water protection areas, so you can focus your management activities on existing facilities. Take the following steps:

- Review and update zoning in source protection areas and consider prohibiting the siting of new facilities that use, store, or generate hazardous materials and wastes.
- Regulate storage of hazardous materials in the same way that hazardous waste is regulated.
- Identify areas where new lower-risk commercial/industrial facilities may be permitted by right or by special exception in less critical portions of the source water protection area.
- Establish a hazardous material and waste management ordinance that includes performance standards for design, siting, management, recordkeeping, and monitoring for both proposed and existing uses.
- Encourage businesses and municipal operations to train employees so they understand the regulations and why they are important.

The following are examples of BMPs for chemical use that communities can use as guidance when putting together their own set of land use regulations:

- Recycle, reuse, and reduce hazardous materials, using non-hazardous chemicals whenever possible.
- Identify, store according to hazard, and properly dispose of waste materials that are abandoned on the property or awaiting pickup.
- Store drums of materials and wastes outside of the building on an impervious surface and have secondary containment (e.g., berms), if drums are stored outside. Roofed coverings are advisable. Empty and clean drums.
- Store road salt in a shed so that stormwater cannot wash it into a water body or contaminate groundwater.
- Label drums, tanks, and other containers with the name of the material they hold (e.g., waste oil), the type of hazard they present (e.g., flammable), and the date when contents were first added.
- Be sure lids are tight-fitting and sealed, and bungs are closed.
- Ensure that there are no leaks or spillage in chemical or waste storage areas, including around solvent sinks, pumps, pipes, hoses, and valves.
- Connect floor drains to the sewer (with approval from sewer authority) or connect them to an approved tight tank that is pumped regularly by a licensed hauler.
- Ensure that there are no cracks in the floor that would allow spills to penetrate.

Promote School Chemical Cleanouts

NEW IDEA

Stocks of outdated, unidentified, excessive, or unnecessarily hazardous chemicals are present in many schools. These chemicals can pose safety and health risks to students and staff, and a number of widely reported incidents involving such chemicals have resulted in school closures and costly cleanups. In some cases, bomb squads have been called in to remove shock-sensitive chemicals from schools.

Identifying and removing these regulated wastes from schools is a key step in preventing accidents and protecting the environment. Once a school has removed its unnecessary chemical hazards and good purchasing and management practices are in place, periodic cleanouts can be a final touch in ensuring a chemically safe school environment. It is important that chemical inventories be conducted prior to cleaning out chemicals from schools. Chemical inventories and cleanouts should only be undertaken by those with the technical qualifications to identify potentially dangerous situations and properly handle the chemicals.

New Hampshire's Pollution Prevention in Schools Project

The New Hampshire Pollution Prevention Program (NHPPP) is helping schools address their hazardous materials management responsibilities through outreach, site visits, and assistance with school cleanouts. NHPPP staff are available to provide on-site assistance in schools, focusing on the science, art, industrial arts, technology education, and custodial departments.

To learn more about DES environmental education programs and publications for teachers, visit *www.des.state.nh.us/teachers/.* This Web site provides guidance to school administrators and staff on common questions NHPPP receives regarding managing hazardous and universal wastes, disposal of unwanted chemicals, elemental mercury and mercury compounds, and energy and water conservation strategies.

- Ensure that a spill prevention (SPCC) plan has been prepared and is on file at facilities that store over 660 gallons of petroleum in any one above ground tank, or over 1,320 gallons aggregate, where a spill could reach water. (See page 20 for more SPCC information.)
- Permit waste oil furnaces by appropriate state agency or local fire departments (as required).
- Be sure the facility has written contingency plans for fire prevention, emergencies, and spill control, posted near phones and potential sources of spills.
- Be sure spill-control materials are available on-site.
- Be sure Materials Safety Data Sheets (MSDSs) are available for all chemicals.
- Store drained waste fluids such as waste oil, antifreeze, and solvents in separate drums or tanks.
- Ensure that waste oil is removed by a licensed transporter or burned on-site in an approved heater.
- Puncture oil filters and hot drain them over a waste oil drum for the required amount of time, and recycle or dispose of them properly.
- Use a licensed transporter to pick up and recycle solvents or dispose of solvents as hazardous waste.
- Handle parts cleaner filters as a hazardous waste.
- Store batteries in a single layer on pallets of shelving with a noncorrosive base, and properly recycle them.

Establish a program to reduce, eliminate, recycle, or reuse hazardous materials and wastes in all municipally owned facilities.

Identify town-owned facilities that use or store hazardous materials. Evaluate management practices at these locations as well as in routine operations, such as road maintenance and landscape care. Install model practices at town facilities. Coordinate these activities with Phase 2 stormwater planning. (See Chapter 8.) U.S. EPA provides information for municipalities and public works departments on how to comply with environmental requirements and how to prevent pollution at *http://www.epa.gov/ne/ municipalities/ index.html*.

Educate homeowners, businesses, and local officials about the importance of proper hazardous materials and waste management, and provide them with guidance on proper operation and maintenance.

Prepare and distribute audience-specific outreach materials on hazardous materials/waste management requirements and practices. Educate the regulated community through inspections and presentations to civic group and business association meetings. Your state may have outreach materials or other guidance to support such activities. Hold hazardous waste collection days for businesses and residents.

Explore financing options for the various aspects of your hazardous materials management program.

For information on financing your community's hazardous waste materials program, see Chapters 9 and 10.

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

Is **Stormwater** Headed in the Right Direction **?**

STORMWATER RUNOFF

Stormwater 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.

Is Stormwater Headed in the Right Direction ?



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



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 nonstructural 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 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. from the drains and ti



Program State and U.S. EPA program mandated by the Safe Drinking Water Act to protect your underground sources of drinking water.

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

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 infrastuctures.

"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

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.

- 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

Strategies for Action

Establish a comprehensive stormwater management program to prevent in 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.

Is Stormwater Headed in the Right Direction ?

• 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 pro-



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.

vides 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.

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.



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

9 Financing Source Water Protection

Environmental Finance Center – www.efc.umd.edu/

This organization, located in Falmouth, Maine, works with communities to develop innovative funding and financing strategies for environmental and community development projects. The Center is supported through a partnership with the U.S. Environmental Protection Agency. This list of funding sources was prepared by the Center.

The Center's *Guidebook of Financial Tools* provides a wide-ranging list of funding and financing methods, assembled to assist those faced with the challenge of paying for sustainable environmental systems (*www.epa.gov/efinpage/guidbkpdf.htm*).

Environmental Systems Research Institute (ESRI) – www.esri.com/grants/

ESRI's grant program, Community Development/Public Works Grants for Livable Communities, designed to foster and support the integration of GIS technology within community development agencies throughout the United States. The awards provide software solutions, data, and training to local governments and communities for projects for a host of applications that include environmental protection and utilities.

EPA Catalog of Federal Funding Sources for Watershed Protection – http://cfpub.epa.gov/fedfund/

A searchable database of financial assistance sources (e.g., grants, loans, cost-sharing) available to fund a variety of watershed protection projects.

Directory of Watershed Resources, Environmental Finance Center, Boise State University – *http://sspa.boisestate.edu/efc/*

A searchable database of funding sources to assist communities and watershed groups in finding creative funding solutions to support their own plans for environmental protection.

EPA Drinking Water State Revolving Fund (DWSRF)

The Safe Drinking Water Act, as amended in 1996, established the Drinking Water State Revolving Fund (DWSRF) to make funds available to drinking water systems to finance infrastructure improvements. The program also emphasizes providing funds to small and disadvantaged communities and to programs that encourage pollution prevention as a tool for ensuring safe drinking water.

Federal	(800) 426-4791	http://www.epa.gov/safewater/dwsrf.html
Connecticut	(860) 509-7333	http://www.dph.state.ct.us/BRS/Water/DWD.htm
Maine	(207) 287-5684	http://www.state.me.us/dhs/eng/water/srf.htm
Massachusetts	(617) 292-5523	http://www.mass.gov/dep/brp/mf/dwsrf.htm
New Hampshire	(603) 271-0655	http://www.des.state.nh.us/dwspp/grants.htm
Rhode Island	(401) 222-6867	http://www.ricwf.state.ri.us/
Vermont	(802) 241-3400	http://www.vermontdrinkingwater.org/

EPA Clean Water State Revolving Fund (CWSRF or 319 grant funding)

Clean Water State Revolving Fund (CWSRF) programs provided an average of \$3.8 billion over the past five years in low interest loans to fund water quality protection projects for wastewater treatment, nonpoint source pollution control, and watershed and estuary management.

Federal	(202) 564-0752	http://www.epa.gov/owmitnet/cwfinance/cwsrf/
Connecticut	(860) 424-3746	http://dep.state.ct.us/wtr/cwa/cwfund.htm
Maine	(207) 287-3901	http://www.state.me.us/dep/blwq/docgrant/319.htm
Massachusetts	(617) 292-5800	http://www.mass.gov/dep/brp/mf/cwsrf.htm
New Hampshire	(603) 271-3448	http://www.des.state.nh.us/wwe/srf.htm
Rhode Island	(401) 453-4430 ext10	http://www.ricwf.state.ri.us/
Vermont	(802) 241-3742	http://www.vermontdrinkingwater.org/

On-site Wastewater Management Funding Resources

- Federal Funding Sources for Small Community Wastewater Systems (EPA 832-F-97-004)
- Fact Sheet: Funding Decentralized Wastewater Systems Using the Clean Water State Revolving Fund (EPA 832-F-03-003)
- Fact Sheet: Clean Water State Revolving Fund Program (EPA 832-F-96-003)
- Fact Sheet: Rural Community Assistance Program (RCAP) Help for Small Community Wastewater Projects (EPA 832-F-97-003)

Rural Utility Service (RUS) - Water and Environmental Programs - *http://www.usda.gov/rus/water/index.htm* Water and Environmental Program (WEP) provides loans, grants and loan guarantees for drinking water, sanitary sewer, solid waste and storm drainage facilities in rural areas and cities and towns of 10,000 or less. WEP also makes grants to nonprofit organizations to provide technical assistance and training to assist rural communities with their water, wastewater, and solid waste problems.

Rural Community Assistance Program (RCAP) - *http://www.rcap.org/programs/sdwap.html*

Provides technical assistance grants to rural communities with population of 10,000 or less. Relevant projects include watershed surveys, delineation of wellhead protection areas, inventories of existing land uses and potential risks to water supplies and designation of land use controls to minimize the risks of resource degradation from future development.

Natural Resources Conservation Service (NRCS) – http://www.nrcs.usda.gov/programs/

Provides assistance in a partnership effort to help people conserve, maintain, and improve our natural resources and environment. Three such programs include: Watershed Protection and Flood Prevention Program; Resource Conservation and Development Program; and Community Planning Initiatives.

Model Ordinances to Protect Local Resources – *http://www.epa.gov/owow/nps/ordinance/* A U.S. EPA Web site that provides ordinances, BMPs, and links with the Local Government Environmental Assistance Network.

Non-Regulatory Tools for Watershed Management – http://www.horsleywitten.com/

The Horsley Witten Group's Sustainable Environmental Solutions Web site. What types of approaches are available? Which are the most effective? Click on publications, look at the non-regulatory tools pdf. There is a chart that lists education/outreach tools and their effectiveness.

10 **Resources** for Source Water Protection

Please note that all U.S. EPA program Web sites include links to other related Web sites.

Source Water Protection

Federal and State Source Water Programs

U.S. EPA Region 1 http://www.epa.gov/ne/topics/water/drinkwater.html

U.S. EPA National *http://www.epa.gov/safewater/*

Connecticut	(860) 509-7333	http://www.dph.state.ct.us/BRS/water/Source_Protection/ source_protection.htm
Maine	(207) 287-2070	http://www.state.me.us/dhs/eng/water/
Massachusetts	(617) 292-5770	http://www.mass.gov/dep/brp/dws/dwshome.htm
New Hampshire	(603) 271-3139	http://www.des.state.nh.us/dwspp
Rhode Island	(401) 222-7769	http://www.health.ri.gov/environment/dwq/ swap/index.php
Vermont	(800) 823-6500 or (802) 241-3400	: http://www.vermontdrinkingwater.org/swapp.htm

Non-Regulatory Tools for Watershed Management – *http://www.horsleywitten.com/*

Horsley Witten Group: Sustainable Environmental Solutions. What types of approaches are available? Which are the most effective? Click on publications, look at the nonregulatory tools pdf. A chart lists education/outreach tools and their effectiveness.

Report: Protecting the Source – *http://www.tpl.org/*

Part of an ongoing effort by the Trust for Public Land and the American Water Works Association to promote land conservation as a critical approach to drinking water protection. *Protecting the Source*, authored by Caryn Ernst, explores scientific, economic, and public health rationales for using land conservation for drinking water protection and presents best practices for successful implementation locally.

Source Water Stewardship: A Guide to Protecting and Restoring Your Drinking Water – *http://www.cwn.org/cwn/* The Clean Water Network teams up with Clean Water Action and the Campaign for Safe and Affordable Drinking Water to link watershed and drinking water source protection in the hearts and minds of activists around the country.

Getting In Step: A Guide for Conducting Watershed Outreach Campaigns EPA 841-B-03-002 – *http://www.epa.gov/owow/watershed/outreach/documents/*

The Getting In Step watershed outreach guidebook provides some of the tools you will need to develop and implement an effective watershed outreach plan. If you're a watershed practitioner trained in the sciences, this manual will help you address public perceptions, promote management activities, and inform or motivate stakeholders.

Getting In Step: Engaging and Involving Stakeholders in Your Watershed -

http://www.epa.gov/owow/watershed/outreach/documents/

This document is a companion to Getting In Step: A Guide for Conducting Watershed Outreach Campaigns. This stakeholder guide provides the tools needed to effectively identify, engage, and involve stakeholders throughout a watershed to restore and maintain healthy environmental conditions.

The Rhode Island Source Water Assessment Program: A Model for Public Education and Participation, The Land Use Inventory – http://www.uri.edu/ce/wq/program/html/SWAP_LUInv.htm

The Cooperative Extension at URI prepared this packet of information on conducting a source water protection land use inventory.

Source Water Assessments for Rhode Island's Major Community Drinking Water Supplies -

http://www.uri.edu/ce/wq/program/html/SWAP.html

The Cooperative Extension at URI information on community-based drinking water protection at the source approach using Geographic Information Systems.

Community Rules: A New England Guide to Smart Growth Strategies -

http://www.clf.org/general/index.asp?id=347

Written by the Conservation Law Foundation and the Vermont Forum on Sprawl, the guidebook is for volunteer board members, planners, concerned citizens, and others who want to achieve smart growth in their communities through better planning, zoning, and permitting. Community Rules is accessible and authoritative, and is chock-full of examples of communities in New England and elsewhere that have laid the groundwork for smart growth through sensible planning, zoning and other strategies.

Electronic environmental ordinance files currently available for New England states.

Ordinances for the State of Massachusetts -

http://www.epa.gov/safewater/protect/gwpos/ordma.htm

Ordinances for the State of Maine - http://www.epa.gov/safewater/protect/gwpos/ordme.htm

Ordinances for the State of New Hampshire -

http://www.epa.gov/safewater/protect/gwpos/ordnh.htm

Ordinances for the State of Vermont - http://www.epa.gov/safewater/protect/gwpos/ordvt.htm

Fuel Storage Tanks

Federal and State Underground Storage Tank Programs

U.S. EPA Region 1	http://www.epa.gov/ne/topics/cleanup/ustorage.html		
U.S. EPA National	http://www.epa.gov/oust		
Connecticut	(860) 424-3374	http://www.dep.state.ct.us/wst/ust/indexust.htm	
Maine	(207) 287-7800	http://www.maine.gov/dep/rwm/usts/index.htm	
Massachusetts			
UST	(978) 567-3100	http://www.mass.gov/dfs/osfm/fireprevention/ust/index.htm	
LUST	(617) 292-5851	http://www.mass.gov/dep/bwsc/bwschome.htm	
New Hampshire	(603) 271-3644	UST: http://www.des.state.nh.us/orcb/ustprog.htm	
		LUST: http://www.des.state.nh.us/orcb/irs_intro.htm	
Rhode Island	(401) 222-2797	http://www.state.ri.us/dem/programs/benviron/ waste/index.htm	
Vermont			
UST	(802) 241-3882	http://www.anr.state.vt.us/dec/wastediv/ust/home.htm	
LUST	(802) 241-3876		

Decentralized Wastewater

Federal and State Decentralized Wastewater Management Programs

U.S. EPA Region 1	http://cfpub.epa.g	gov/owm/septic/contacts.cfm?type=region
U.S. EPA National	http://cfpub.epa.g	gov/owm/septic/home.cfm
Connecticut	(860) 509-7296	http://www.dph.state.ct.us/BRS/sewage/sewage_ programtext.htm
Maine	(207) 287-5689	http://www.state.me.us/dhs/eng/plumb/index.html
Massachusetts		http://www.mass.gov/dep/brp/wwm/t5pubs.htm
Northeast Region	(617) 654-6500	
Southeast	(508) 946-2700	
Central	(508) 792-7650	
Western	(413) 784-1100	
New Hampshire	(603) 271-3501	http://www.des.state.nh.us/ssb/
Rhode Island	(401) 222-3961	http://www.state.ri.us/dem/programs/ benviron/ water/index.htm
Vermont	(802) 241-3822	http://www.anr.state.vt.us/dec/ww/wwmd.cfm

U.S. EPA

- Handbook for Management of On-site and Clustered (Decentralized) Wastewater Treatment Systems (EPA 832-D-03-001)
- Voluntary National Guidelines for Management of On-site and Clustered (Decentralized) Wastewater Treatment Systems (EPA 832-B-03-001)
- A Homeowner's Guide to Septic Systems (long version EPA 832-B-02-005) http://www.epa.gov/owm/septic/pubs/homeowner_guide_long.pdf; (short version – EPA 832-B-02-006) http://www.epa.gov/owm/septic/pubs/homeowner_guide_short.pdf
- Homeowner Septic System Checklist (EPA 832-F-03-006)
 http://www.epa.gov/owm/septic/pubs/septic_sticker.pdf
- Wastewater Treatment Programs Serving Small Communities (EPA 832-R-02-004)
- It's Your Choice: A Guidebook for Local Officials on Small Community Wastewater Management Options (EPA 430987006)

Hazardous Materials

Federal and State RCRA Programs

U.S. EPA Region 1	http://www.epa.gov/region01/topics/cleanup/rcra.html		
U.S. EPA National	http://www.epa.gov/rcraonline/		
Connecticut	(888) 424-4193	http://www.dep.state.ct.us/wst/index.htm	
Maine	(207) 287-2651	http://www.maine.gov/dep/rwm/index.htm	
Massachusetts	(617) 292-5753	http://www.mass.gov/dep/bwp/bwpprogs.htm	
New Hampshire	(603) 271-2942	http://www.des.state.nh.us/HWCS/	
Rhode Island	(401) 222-6800	http://www.state.ri.us/dem/programs/benviron/ waste/index.htm	
Vermont	(802) 241-3888	http://www.anr.state.vt.us/dec/wastediv/rcra/ rcrahome.htm	

FY

Managing Household Hazardous Waste

Household hazardous waste (HHW) is generated in every community and is likely to end up in solid waste facilities (e.g., sanitary landfills, incinerators), municipal sewers, septic tanks, or be released directly into the environment unless provisions are made to manage it separately from other wastes. Households generate wastes such as unused paints and stains, old pesticides, cleaning products, drain cleaners, swimming pool chemicals, and mothballs. Such wastes are exempt from RCRA because of the household hazardous waste exemption.

Small amounts of some wastes can do a lot of harm to a water supply. For example, one mercury thermometer can contaminate up to 25,000 gallons of water. U.S. EPA encourages communities to take steps to prevent contamination of drinking water supplies by properly disposing of household hazardous wastes. These steps include:

- sponsoring a community HHW collection day
- constructing a permanent collection facility that would enable communities to regularly collect household hazardous waste
- building a paint and stain collection facility (paint products comprise 30-50 percent of the total HHWs collected in New England communities).

In New England, the average amount of hazardous waste diverted through a community program is 10-20 gallons per household per

collection. For a community of 10,000 residents with a participation rate of 200 households, 2,000 to 4,000 pounds of HHW are collected during each event.

For More Information

Each New England state has a different infrastructure in place for managing household hazardous waste collection. For more information, call the following number at your state environmental protection agency:

- Connecticut Department of Environmental Protection (860) 424-3242
- Maine Department of Environmental Protection (207) 287-7703
- Massachusetts Department of Environmental Protection (617) 292-5704
- New Hampshire Department of Environmental Services (603) 271-2047
- Rhode Island Department of Environmental Management (401) 222-3872, ext. 7143
- Vermont Department of Environmental Conservation (802) 241-3472

Guide to Using Municipal Hazardous Waste Collection Programs for New Hampshire Small Quantity Generators – http://www.nerc.org/documents/gdhzdwstnh02-04.html

Published by the Northeast Recycling Council (NERC), this guide is a starting point for understanding municipal household hazardous waste collection programs.

Stormwater

Federal and State Stormwater Programs

U.S. EPA Region 1	http://www.epa.g	ov/region01/npdes/stormwater/administration.html
U.S. EPA National	http://cfpub.epa.g	gov/npdes/stormwater/swphases.cfm#phase2
Connecticut	(860) 424-3020	http://dep.state.ct.us/wtr/stormwater/stormwtrindex.htm
Maine	(207) 287-5404	http://www.state.me.us/dep/blwq/docstand/stormwater/
Massachusetts	(508) 849-4005	http://www.mass.gov/dep/brp/stormwtr/stormhom.htm
New Hampshire	(603) 271-2984	http://www.des.state.nh.us/StormWater/
Rhode Island	(401) 222-6800	http://www.state.ri.us/dem/programs/benviron/water/ permits/ripdes/stwater/index.htm
Vermont	(802) 241-3770 or	: http://www.anr.state.vt.us/dec/waterq/stormwater.htm
	(802) 241-37777	

Resources for Source Water Protection

U.S. EPA Stormwater Phase II Final Rule Fact Sheet Series –

http://cfpub2.epa.gov/npdes/stormwater/swfinal.cfm A series of 14 fact sheets covering the small MS4 program, minimum control measures, and permitting.

Model Ordinances to Protect Local Resources: Stormwater Control Operation & Maintenance –

http://www.epa.gov/owow/nps/ordinance/stormwater.htm Includes model ordinance language that focuses primarily on the maintenance of stormwater BMPs, and includes the elements of design, routine maintenance, and inspections.

Low Impact Development (LID) Center -

http://www.lowimpactdevelopment.org/publications.htm A non-profit organization established to develop and provide information to individuals and organizations dedicated to protecting the environment and our water resources through proper site design techniques that replicate pre-existing hydrologic site conditions. The site includes the following:

- Low Impact Development (LID) Urban Design Tools http://www.lid-stormwater.net/

Provides watershed managers with a new set of tools and techniques that can be used to meet regulatory and receiving water protection program goals for urban retrofits, redevelopment projects, and new development sites.

 Introduction to Low Impact Development (LID) – http://www.lid-stormwater.net/intro/background.htm

Federal and State UIC Programs

U.S.EPA	http://www.epa.gov/safewater/uic/pdfs/fact_class5_stormwater.pdf
	http://www.epa.gov/safewater/uic/classv.html
	http://www.epa.gov/safewater/uic.html
Connecticut	http://dep.state.ct.us/wtr/index.htm
Massachusetts	http://www.mass.gov/dep/brp/dws/uic.htm
Maine	http://www.state.me.us/dep/blwq/docstand/uic/uichome.htm
New Hampshire	http://www.des.state.nh.us/dwspp/gwdisch.htm
Rhode Island	http://www.state.ri.us/dem/programs/ benviron/water/permits/uic/index.htm
Vermont	http://www.anr.state.vt.us/dec/ww/uic.htm



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