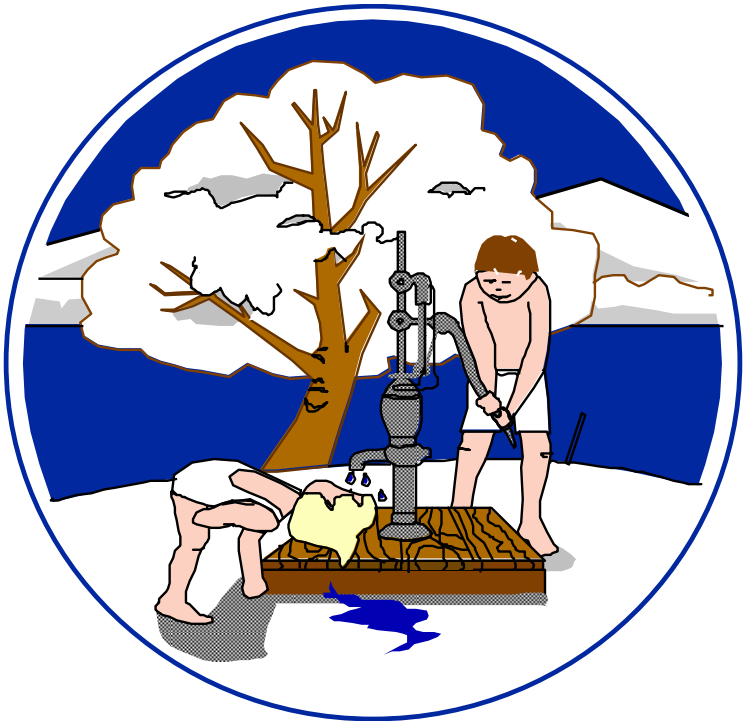
The DES Guide to Groundwater Protection

Answers to questions about groundwater protection in New Hampshire



NEW HAMPSHIRE DEPARTMENT OF Environmental Services

N.H. Department of Environmental Services
29 Hazen Drive
Concord, N.H. 03301

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New Hampshire Department of Environmental Services
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CONTENTS

What Is In This Guide?

Since the publication of sand-and-gravel aquifer maps in the mid 1970s, local planning and conservation officials have taken a keen interest in identifying, understanding, and protecting their groundwater resources for present and future use. When this guide was originally published in 1996, the goal was to help communities prevent contamination of groundwater, since there had been a number of high-profile contamination incidents involving leaking underground storage tanks and industrial sources. Since that time, the concern over groundwater protection has broadened to include ensuring groundwater availability, as well as preventing contamination. While DES has addressed and continues to address groundwater availability concerns on the state level, there is an important local role in maintaining groundwater availability. This revised guide therefore contains some new material on maintaining groundwater recharge and managing groundwater demand, while retaining the emphasis on local efforts to prevent contamination.

The importance of local actions to prevent groundwater contamination follows from two facts: there are too many potential sources of contamination for DES to oversee directly, and New Hampshire has a long tradition of local control over land use. For municipal officials, public water suppliers, and concerned citizens interested in understanding and addressing local groundwater protection needs, this guide is a good starting point. It contains basic information about groundwater and its importance in New Hampshire, potential threats to the resource, the local role in protecting it, and the options that are available for local protection programs.

This guide is not comprehensive; it refers the reader to additional sources of information – fact sheets, guidance documents, internet resources, and state programs. It is designed to serve as an introduction, not a blueprint. The specifics of local programs need to be based on local needs and goals, a good understanding of the resources to be protected, the potential threats, the variety of protection tools available, and competing community interests.

Staff of the DES Drinking Water Source Protection Program are available to provide additional assistance in the development and implementation of local groundwater protection programs. For contact information, please see the last section of this guide.

Why Does New Hampshire's Groundwater Need Protection?

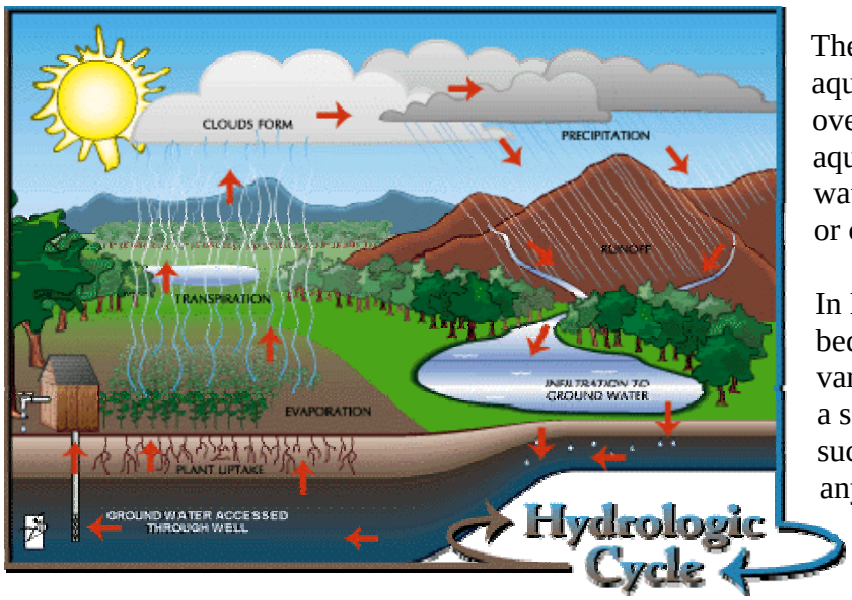
Groundwater is an important natural resource, vital to human health, the natural environment, and the economy. To keep groundwater clean and available, it needs to be protected.

What Is Groundwater?

Groundwater is water that saturates materials such as topsoil, gravel, sand, silt, clay, glacial till, and bedrock below the water table. It comes from precipitation and surface water (water in lakes, ponds, rivers, streams, wetlands, etc.) seeping into the ground.

Like water in rivers and lakes, groundwater moves, although it moves more slowly than surface water. As with surface water, the movement of groundwater is driven by gravity, which creates hydraulic head or water pressure. Groundwater moves from areas of high head to areas of low head. Pumping wells create areas of low head, causing groundwater to move from the surrounding area toward the well. The greater the amount of water being pumped from a well, the greater the area of land that contributes water to the well.

An **aquifer** is a layer of porous material (sand or gravel) or fractured bedrock that can be used as a water supply source. The ability of the aquifer to supply water depends on its porosity (the amount of water it contains) and its transmissivity (its ability to allow water to flow to a well).



Source: U.S. Environmental Protection Agency

The two broad categories of aquifers are bedrock aquifers and overburden (soil material) aquifers. Bedrock aquifers supply water to wells through fractures, or cracks, in the rock.

In New Hampshire, the ability of bedrock wells to supply water varies greatly. A bedrock well for a single-family home can be successfully drilled almost anywhere in the state.

However, siting a bedrock well for a large public water system may take a great deal of geologic investigation beforehand to find a location with major water-bearing fractures.

Overburden is the soil, subsoil, sand, gravel, and other unconsolidated material that lies on top of the bedrock. Most of the highly productive wells in New Hampshire are overburden wells, drawing water from thick deposits of sand and gravel that cover large areas. These glacial deposits of sand and gravel are called stratified-drift aquifers.

In order to be productive as a water supply source, the rock in an aquifer must allow water to flow easily to a well site. The same properties that allow this movement and make aquifers valuable as water supply sources also make it easy for pollution released into the aquifer to spread within the aquifer.

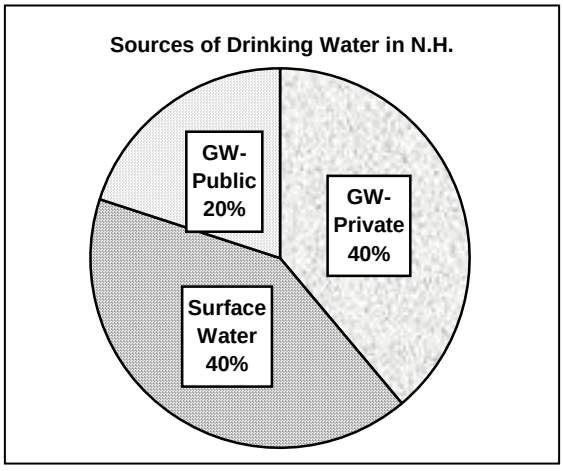
The Importance of Stratified-Drift Aquifers in New Hampshire

While 85 percent of private water supply wells tap bedrock aquifers, most high-yielding public water supply wells tap stratified-drift aquifers. Of the state's registered groundwater withdrawals (20,000 gal/day or more) 33 million gallons per day (MGD) come from stratified-drift wells, compared to 4 MGD from bedrock wells. About 14 percent of the state is underlain by stratified-drift aquifers with saturated thicknesses ranging up to 500 feet. In general, the highest-yielding aquifers are found in major stream valleys in central and southern New Hampshire.

Why Is Groundwater Important in New Hampshire?

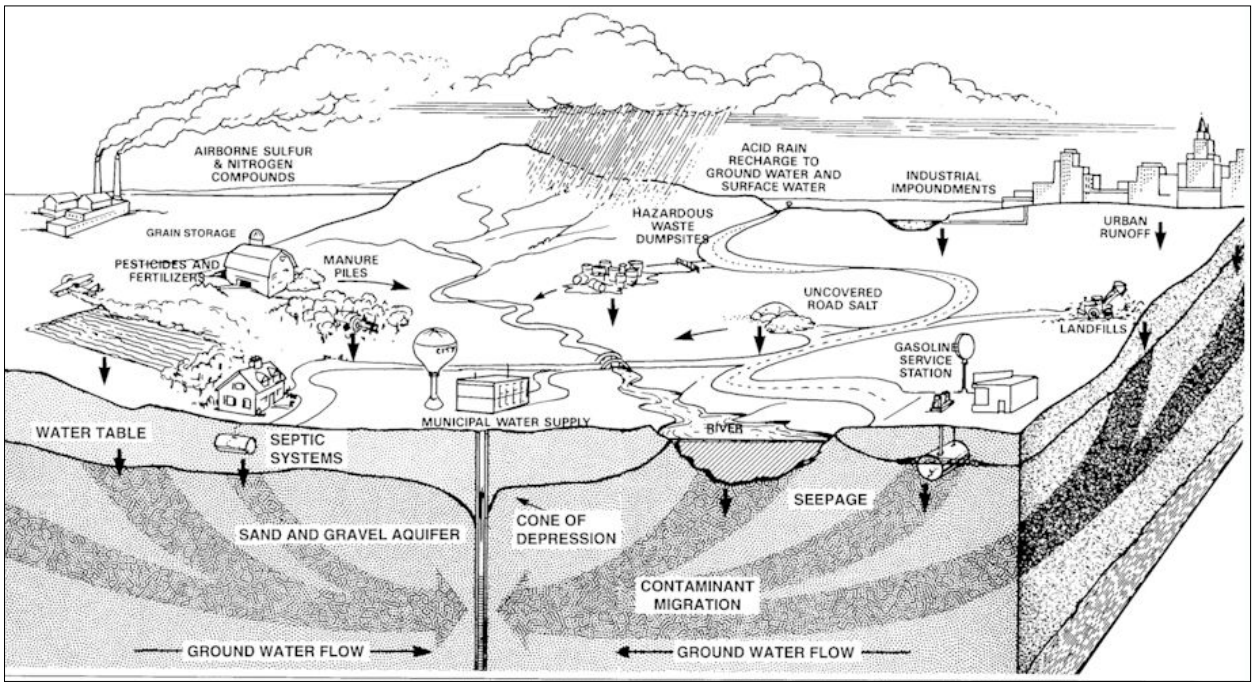
Groundwater is a critical natural and economic resource for New Hampshire. It is our most important source of drinking water in addition to being an integral part of the hydrologic cycle (see p. 1), and therefore vitally important for fish, wildlife, and recreation.

Approximately 60 percent of New Hampshire residents rely on groundwater for their drinking water. The U.S. Geological Survey estimates that of the 82 MGD of groundwater withdrawn in New Hampshire in 1995, 31 MGD were used for public supply, another 31 MGD for private domestic use, and 20 MGD for commercial, industrial, and agricultural activities. Of the state's 2,177 public water supply systems (serving homes, schools, places of work, restaurants, etc.), 98 percent rely on groundwater. Groundwater also provides an estimated 40 percent of the total flow in New Hampshire's rivers, which in turn feed the state's lakes, reservoirs, and estuaries.



How Does Groundwater Become Contaminated?

Groundwater contains a variety of naturally occurring minerals, such as calcium, fluoride, iron, manganese, radon, and sometimes arsenic, usually in low concentrations. Some of these minerals, such as calcium, iron, and manganese, can naturally occur in concentrations that make water unappealing because of taste, odor, or appearance. In many instances, radon or arsenic may pose a health risk if left untreated. In this guide, the presence of chemicals in groundwater *as the result of human activities* is referred to as "contamination."



Source: University of Nevada Cooperative Extension (used with permission)

Groundwater can be contaminated when chemicals are spilled or discharged onto or into the ground. Liquids can flow through the ground into groundwater, and both solids and liquids can be carried into the soil and bedrock by rain and snowmelt.

Once contaminants reach the groundwater, they often move along with the groundwater flow. However, many contaminants have special properties that affect the way in which they contaminate groundwater. Some contaminants may be naturally removed when groundwater passes through the soil under the right conditions. Phosphorus, nitrogen compounds, bacteria, viruses, and some petroleum compounds may be at least partially removed either by adhering to soil particles or by biological degradation in the soil.

Potential Contamination Sources (PCSs)*

- Vehicle service and repair shops
- General service and repair shops
- Metalworking shops
- Manufacturing facilities
- Underground and above-ground storage tanks
- Waste and scrap processing and storage
- Transportation corridors
- Septic systems
- Laboratories and certain professional offices (medical, dental, veterinary)
- Use of agricultural chemicals
- Salt storage and use
- Snow dumps
- Stormwater infiltration ponds or leaching catch basins
- Cleaning services
- Food processing plants
- Fueling and maintenance of earth moving and logging equipment
- Concrete, asphalt, and tar manufacture
- Cemeteries
- Hazardous waste facilities

*as identified in New Hampshire's Groundwater Protection Act (RSA 485-C)

Some chemicals, such as gasoline and fuel oil, tend to float on top of the water table. While some portion of petroleum products may not move far in groundwater, other constituents, such as benzene, toluene, xylene, and methyl *tertiary*-butyl ether (MtBE), are very readily dissolved in water and therefore tend to spread with the groundwater flow to contaminate a large volume of water over a wide area. Still other contaminants, such as degreasing solvents, including trichloroethylene (TCE), tend to sink beneath the water table. These contaminants may form small pools, which are hard to locate in the aquifer and which may continue to contaminate groundwater for decades.

The most common causes of groundwater contamination in New Hampshire are leaking underground storage tanks, mishandling of industrial solvents, and storage and use of road salt. The gasoline additive MtBE is an especially potent contaminant; only one gallon of gasoline containing 11 percent MtBE can contaminate six million gallons of drinking water to a level of 13 parts per billion (ppb), New Hampshire's drinking water standard.

New Hampshire's Groundwater Protection Act identifies nineteen activities that have the potential to release contaminants to groundwater. Most of these potential contamination sources (see above) are businesses that use potential contaminants in quantities greater than the typical household would use or store.

While PCS businesses are usually the main focus of groundwater

Hazardous Materials In The Home

- Gasoline
- Motor oil
- Other auto-motive fluids
- Auto batteries
- Paint
- Paint thinner
- Other solvents
- Pesticides
- Cleaning products
- Herbicides

protection efforts, *anyone has the potential to contaminate groundwater if they improperly use or dispose of hazardous materials*. Improper disposal could mean pouring household chemicals (such as those listed on page 4) on the ground or down the drain.

Has New Hampshire's Groundwater Been Contaminated?

Groundwater quality is a concern in New Hampshire. Our natural water quality is generally good. In New Hampshire, the most common natural contaminants are iron, manganese, arsenic, and radon. An estimated 15-20 percent of our bedrock wells may exceed the new arsenic standard (the limit that applies to public water systems) of 10 ppb. Iron and manganese present aesthetic problems in an estimated 15 percent of all wells but do not constitute a health threat. A similar number of wells have taste and odor problems. Approximately 95 percent of bedrock wells and 70 percent of overburden wells are likely to exceed a radon concentration of 300 pCi/L (the standard currently being proposed by the EPA for public water systems in states without qualifying radon mitigation programs).

Contaminants caused by human activity, including volatile organic chemicals (VOCs) such as solvents and petroleum constituents, are

Contaminated Public Water Supply Wells in New Hampshire – Examples

Milford: In 1983 and 1984 the Town of Milford lost two wells to chemical contamination from several industrial sites. The town spent $475,000 to replace the wells, and extensive investigation and remediation activities have been and are still being carried out by DES and U.S. EPA. These include demolition of buildings, removal of over a thousand drums of hazardous waste, removal of PCB-contaminated soil from nearby residential properties, and treatment of contaminated soil. In 1999, under EPA supervision, the state constructed a 1500-foot underground slurry wall to contain one area of contaminated groundwater, as well as a facility to pump and treat the groundwater. Cleanup work at one site is expected to be completed by 2009, and work is still underway by one of the responsible parties to design a strategy to clean up another site. The cleanup cost is expected to exceed $30 million.

Merrimack Village District: Contamination by volatile organic compounds (VOCs) attributable to a metal reclamation operation caused the district to shut down a well serving 10,000 people.

Jaffrey: A town well was threatened by the disposal of cyanide-containing industrial wastes. Monitoring wells near the town well exceeded U.S. EPA limits for cyanide, but the town well did not. The groundwater contamination resulted in loss of the town well for five years and substantial engineering expenses to the town.

Seabrook: Backyard disposal of degreasers used by a business located over 1/4 mile away affected a town well serving 8,500 year-round (12,000 summer) residents. The town well remained on line (U.S. EPA maximum levels were not exceeded), but town water was extended to replace contaminated private wells. The contamination also caused a delay in bringing another well on line. All of the cleanup costs have been borne by the Town of Seabrook.

Peterborough: The town's South Well was taken off line after it was found to be contaminated by activities associated with a nearby industrial facility in 1982. After 20 years of investigation and remediation activity involving DES and U.S. EPA, the town is conducting a two-year withdrawal test to determine whether the well can be put back on line. So far the town has spent between $50,000 and $75,000. The town has been unable to find a cost-effective replacement source.

detected in approximately 5 percent of groundwater samples. VOCs have been detected in wells at 352 community water systems and 279 non-community public water systems. Approximately 1 percent of stratified-drift wells have nitrate above the health-based standard of 10 milligrams per liter (mg/L). Fewer than 1 percent of bedrock wells exceed that level.

Some localities in New Hampshire have experienced significant groundwater contamination due to improper storage and use of regulated substances such as gasoline and industrial chemicals. New Hampshire's contamination incidents have affected both public and private water supply wells, as illustrated by the examples on page 5 and the following statistics:

- 874 public water supply wells have been affected by industrial chemicals in New Hampshire; 47 of them have had to be permanently closed.
- MtBE, a gasoline additive, has been found in 182 public water supply wells in New Hampshire, although in many cases it is present at low concentrations, which do not make closing the wells necessary at present.
- The three largest incidents of leaking underground storage tanks in New Hampshire contaminated 56 private wells serving 130 residences, businesses, several churches, and an elementary school.
- From 1983 to 2003, the N.H. Department of Transportation replaced more than 424 private wells contaminated by the use or storage of road salt, at a cost of $3.2 million. Several public water supply wells have also been abandoned due to contamination by road salt.

Groundwater contamination can be costly for water suppliers and communities, as well as for the responsible parties. Direct costs may include those for temporary water supplies, investigation, cleanup, and replacement of water supplies. The estimated cost of cleaning up the 18 Superfund sites in New Hampshire is $350-400 million. Since 1990, DES has provided $86 million in financial aid to owners of leaking petroleum storage tanks (above ground and underground) to clean up contamination at 2,501 sites. Typical site cleanup costs are in the range of $20,000-$80,000, but may exceed $1 million for complex sites. At New Hampshire's three largest leaking underground storage tank sites, the cost of cleanup and replacement water supplies averaged $2 million per site. DES estimates that the private sector has spent an additional $5-10 million for the remediation of petroleum contaminated groundwater, while $20-40 million has been spent by the private sector at 750 sites contaminated by chemical wastes. These numbers do not reflect indirect costs such as possible health effects, reduced consumer confidence in the water system, reduced property values, and potentially lost opportunities for economic growth.

How Can Groundwater Become Depleted?

In recent years, prompted in part by the drought of 2001-2002, the continued availability of plentiful groundwater has become a concern in a number of New Hampshire communities, particularly in rapidly growing areas. The availability of groundwater can be affected by climatic factors, by changes in land cover, by alteration of topography, and by the withdrawal of groundwater, either directly from wells or indirectly through surface water withdrawals.

When land conversion results in paving, compacting, or stripping soils, the hydrologic balance of the site changes, typically resulting in reduced infiltration of rain and snowmelt into the ground. *Managing Stormwater as a Valuable Resource* (see **Additional Resources**) provides more information about the importance of proper stormwater management in preserving – rather than disrupting – the natural process of groundwater recharge by infiltration of stormwater. The latter is an issue of growing importance in highly urbanized areas that overlie aquifers or sensitive watersheds, and DES urges communities to consider land use planning and stormwater management as part of a comprehensive groundwater protection program.

Large groundwater withdrawals (47,600 gallons per day or more) are regulated by the N.H. Department of Environmental Services with a view to quantifying and minimizing impacts. The cumulative impact of a large number of unregulated withdrawals, however, is not well understood without a great deal of site-specific information.

Has New Hampshire's Groundwater Been Depleted?

Almost anywhere in New Hampshire it is possible to site a well capable of providing enough water for a home. However, siting a high-yielding well, such as for an existing or future municipal water system is another matter. In some areas of the state, particularly the seacoast region, there are so many existing water withdrawals that it is becoming increasingly difficult to identify a new large-capacity withdrawal site that would not have an unacceptable impact on existing water uses. Even where existing water uses are not an issue, existing land uses often make it increasingly difficult to find a adequate-size undeveloped area in which to site a well.

What Can Be Done on the Local Level?

Although there are many state and federal programs that directly or indirectly serve to protect groundwater, it is generally acknowledged that the most effective protection requires local involvement. There are many tools that cities and towns can use to protect groundwater. Some of these tools involve passing new laws or changing existing laws, while others are entirely non-regulatory.

Avoiding Potential Threats – Managing Land Use

The most effective way to protect groundwater is to exclude potential threats from the contributing area by controlling land uses.

To control land use completely, municipalities can acquire the land or obtain restrictive easements. Since the 1800s, water suppliers in New Hampshire have purchased land to protect surface water supply reservoirs. The same approach works for groundwater. Unfortunately, cost is often a major obstacle. It is expensive to buy land and keep it undeveloped.

Fortunately, funding assistance is available from DES's Water Supply Land Grant Program. Under the program, grants are made available to municipal or non-profit water suppliers for the purchase of land or conservation easements critical to their water quality. These water supply lands must be within the source water protection areas for existing or planned public drinking water sources. The Society for the Protection of New Hampshire Forests and other similar organizations are actively involved in assisting communities with conservation purchases and easements. For more information about this program or for assistance call 271-7061.

What About Surface Water?

Surface water sources – reservoirs, lakes, ponds, rivers, and streams – are also an important part of the drinking water picture in New Hampshire, supplying approximately 40 percent of the population. All of the approaches described in this guide can be used to protect surface water sources of drinking water as well as groundwater. However, there are additional aspects to surface source protection that deserve special attention. For additional guidance documents and assistance with surface source protection, please contact DES's Drinking Water Source Protection Program at 271-7061.

Cities and towns can also place regulatory limits on what kinds of development are acceptable in specific areas of a community. Local zoning laws, written to implement goals and

recommendations in the municipal master plan, usually establish different districts for residential, retail/commercial, and industrial activities to avoid conflicts among various land uses. Cities and towns can also pass zoning laws to protect groundwater and public water supply wells. For example, 212 New Hampshire cities and towns have created zoning districts that prevent or restrict industries and businesses in important aquifer areas. For more information see DES's *Model Ordinance for Groundwater Protection.*

Some have argued that by limiting what people can do with their land, the government is "taking" the land. Court rulings have consistently shown that while there are limits to how far zoning can go, it is still a reasonable way to protect the public from inappropriate land uses in sensitive areas.

While zoning is a good tool to use in protecting groundwater, it does not take care of every situation. First, while zoning can prevent new threats, it cannot eliminate existing threats, because existing uses are "grandfathered" when zoning laws take effect. Second, some communities may want to allow development to take place in aquifer areas, but to review development on a site-specific basis. Fortunately, there are other tools, such as those described below, that cities and towns can use.

Reviewing New Development Projects

In addition to keeping high-risk activities out of sensitive areas through acquisition, easements, or zoning, a municipality may wish to exercise some level of control over new development. Site plan and subdivision review, typically performed by municipal planning boards for new developments, may include consideration of potential impacts to groundwater quality, particularly in sensitive areas.

Site Plan Review

Site plan reviews are performed to evaluate commercial, industrial, and multi-family development proposals prior to construction. These are also typically required when an existing use that does not conform to local zoning laws is to be expanded or changed to another use, other than single-family residences.

Local site plan review regulations are typically implemented by planning boards in communities where the local legislative body (e.g. town meeting) has granted that authority and the municipality has both a zoning ordinance and subdivision regulations.

Site plan review can cover a wide range of issues surrounding the relationship between the proposal and the surrounding area. Among those issues is the management of existing and potential threats to groundwater and surface water.

Site plan review regulations include standards for site design. Among those standards, the planning board will probably include compliance with applicable state laws as well as local zoning laws. Since state best management practice (BMP) rules for potential contamination sources apply throughout the state (even outside wellhead or groundwater protection areas), local planning boards can help ensure that those BMPs are being implemented through site plan review. Local site plan review regulations should also require compliance with local stormwater regulations and discourage landscaping that requires extensive watering and/or chemical inputs.

Site plan review occurs before a site is developed or expanded, or the use changed. If necessary, the planning board would typically place conditions on approval of a site plan to ensure that groundwater resources are adequately protected. If those conditions are violated, the municipality may take enforcement action as with any zoning violation.

Subdivision Regulations

Subdivision regulations describe local requirements and limitations on how land may be subdivided. Subdivision regulations cover a wide variety of issues, including water supply and wastewater disposal. For groundwater protection, the regulations should ensure that on-site wastewater disposal systems (septic systems) and the application of lawn chemicals do not contaminate groundwater or surface water. They should also discourage landscaping that requires extensive watering and/or chemical inputs. For more information on alternatives for subdivision and site plan review regulations, contact your regional planning commission or the N.H. Office of Energy and Planning at 271-2155.

Who Is Doing What?

The number of municipalities (M) or public water supply systems (S) in New Hampshire with the following groundwater protection controls (as of 2004):

Groundwater Reclassification.....9 M
Aquifer Protection Zoning.....58 M
Site Plan Review Regulations.....186 M
Inspection of Potential Threats.....64 S
Groundwater Education .....871 S

Stormwater Regulations

When reviewing subdivisions and site plans, a major water-related concern is stormwater management. While projects that alter 100,000 square feet or more (or 50,000 square feet or more of protected shoreland) require a permit from DES's Alteration of Terrain (site specific) program and projects disturbing one acre or more must file a Notice of Intent with the U.S. Environmental Protection Agency, municipalities may set more stringent standards, and should also regulate projects that fall below the site specific threshold. While local regulation of stormwater management has long been concerned with preventing erosion and sedimentation of

waterways, there has been growing interest in infiltrating clean stormwater into the ground in order to recharge groundwater. As the principal regulators of land use, municipalities have a responsibility to ensure that groundwater resources will continue to be recharged after a site has been developed. For more information, see DES's *Managing Stormwater as a Valuable Resource* or call 271-7061.

The Local Role in Protecting Groundwater Availability

Where education by itself is not enough to manage water demand, municipalities can establish landscaping standards and sprinkler system standards. The key provisions of landscaping standards designed to foster water use efficiency would be minimum topsoil depths for new lawns (because lawns with sufficient topsoil need little or no irrigation), selection of drought-tolerant grasses, limits on the size of sprinklered areas, and water-conserving irrigation system design. Site plan review design standards, historic district design standards, building codes, and property maintenance codes are likely places to include such provisions. DES can provide examples of specific design standards that have been adopted by municipalities in other states.

Even in the absence of local regulatory initiatives to manage water demand, there is a role for municipalities in DES's large groundwater withdrawal permitting process, which affects new withdrawals of 57,600 gallons or more per day. Potentially affected municipalities have an opportunity to request a public hearing on a permit application. Such a hearing, and the public comment period that follows, can help to ensure that DES has all of the available information about water users and other water resources that might be affected by the withdrawal. In addition to assisting DES, the hearing and comment period help the public because DES must respond in writing to all comments provided at the hearing that are contrary to any decision DES later makes on the permit application.

Managing Potential Threats to Groundwater

Several tools can be used to reduce the risk that existing businesses (and other activities) pose to groundwater. While zoning and buying land enable towns and water suppliers to *exclude* potential threats, the tools described here are designed to *manage* the potential threats that may already exist or are allowed to occur in the protected area. Public education is appropriate everywhere. The more active techniques, health ordinances and reclassification, are called for when threats already exist and the local entity has personnel (paid or volunteer) available to inspect potential threats.

Public Education

Every groundwater protection program should be designed to educate people about what they can do to help protect groundwater. After all, not only do certain types of businesses pose a risk to groundwater, everybody does! Almost everyone uses small quantities of materials that could contaminate groundwater—motor fuels, used motor oil, toxic household cleaners, pesticides, and fertilizers—to name a few.

What's the Message?

Public education materials designed for local groundwater protection programs should cover the following:

- What groundwater is.
- Why groundwater is important, and where the local drinking water comes from.
- How groundwater can be contaminated.
- What people should and should not do to prevent groundwater contamination.
- How to use water efficiently, with an emphasis on less lawn watering.
- Where to get more information.

Public education can be an effective way to manage potential threats to groundwater because most homeowners as well as business owners will handle hazardous substances more responsibly if they know the groundwater contamination risks. Business owners and residents may also choose to use less hazardous alternatives once they are informed about what alternatives are available.

In addition to convincing people to properly handle hazardous materials, public education about groundwater protection can also build support for other aspects of a groundwater protection plan. For example, if a program relies partly on zoning changes or a health ordinance, the support of voters at town meeting is more likely if a public education program has been implemented.

Public education can include a wide range of activities. Water suppliers or municipalities may send letters and fliers to businesses and residents in the protected area. Alternatively, public education might be designed to reach a wider audience by direct mail, hand delivery, through the schools, mass media, or posting signs that identify wellhead areas. Bringing the message directly to school-age children can be especially effective, because children in turn bring the message to the adults at home. Children can be particularly convincing since they have a long-term stake in protecting groundwater. Many resources are available in New Hampshire for working with schools and teachers. New Hampshire Project WET (see below) is a good place to start.

Since 1999, all new sources of drinking water for community water systems have been required by DES to have a local wellhead protection program, which includes the distribution of educational materials to residents and businesses located within the wellhead protection area. Many more public water systems distribute public education material as part of voluntary wellhead protection programs. Working with those systems is a good place to start a local groundwater protection program.

Sources of public information materials and training regarding groundwater protection include:

- American Ground Water Trust
  (603) 228-5444; www.agwt.org
- The Groundwater Foundation
  (800) 858-4844; www.groundwater.org/
- New England Interstate Water Pollution Control Commission
  (978) 323-7929; www.neiwpcc.org
- National Ground Water Research and Educational Foundation
  www.ngwa.org/ngwef/ngwef.html
- US Environmental Protection Agency
  www.epa.gov/ebtpages/wategroundwater.html
- US Geological Survey
  water.usgs.gov/education.html
- NH DES Drinking Water Source Protection Program
  (603) 271-7061; www.des.nh.gov/dwspp
- NH Project WET (Water Education for Teachers)
  (603) 271-4071; www.des.nh.gov/wet

Health Regulations and Ordinances

One regulatory tool for local management of potential threats is a health regulation or health ordinance. The state law that describes the powers of local health officers provides the authority to enact regulations.

Some New Hampshire towns and cities have adopted health regulations that require businesses handling significant quantities (more than typically found in a home) of hazardous substances to implement management practices that prevent the occurrence of groundwater contamination. Proper procedures are specified in Best Management Practices for Preventing Groundwater Contamination, Env-Wq 421, which can be applied locally through a health regulation. For more information about groundwater protection BMPs, see DES fact sheet WD-DWGB-22-4.

Local health regulations typically provide the health officer with authority to inspect handling practices for hazardous substances at certain types of businesses. In some communities, the regulations provide the authority to some other local official such as a water department employee, fire official, code enforcement officer, or building inspector.

The purpose of inspections is not to penalize business owners who are not following the rules. The purpose is to educate business owners about the right practices and to make sure they are following them. If business owners refuse to cooperate after repeated requests, the municipal official may take enforcement action to protect the public’s interest in clean drinking water and/or refer the matter to DES.

One of the drawbacks of health regulations is that local funds may be needed if enforcement actions become necessary. Health *ordinances*, which are similar to health regulations but require passage by the local legislative body, enable municipalities to raise money through permit fees.

New Hampshire's Drinking Water Source Protection Program, in conjunction with the N.H. Office of Energy and Planning, has prepared a guide for the development and use of health ordinances to protect groundwater (see **Additional Resources**).

Voluntary Inspection Programs

The most common local approach to ensuring compliance with DES's groundwater protection BMP rules is a voluntary inspection program. Such programs are very similar to mandatory inspection programs carried out under local health regulations or ordinances, or under groundwater reclassification (see below), except that businesses are not required to participate and there is no *local* enforcement authority. However, these programs can be just as effective as mandatory programs, because local officials (or water suppliers) can refer uncooperative businesses to DES for inspections and enforcement, if necessary. More than 60 public water systems carry out BMP inspection programs in New Hampshire.

Groundwater Reclassification

Another way to actively manage potential threats to groundwater is through groundwater reclassification. This is a process that involves both the local entity – a water supplier or municipality – and DES. Through this process, a local entity would inventory and manage potential contamination sources through education and inspections. Reclassification provides the local entity with the authority to enforce BMP rules in the protected area. DES can also help with enforcement in reclassified areas.

In wellhead protection areas designated with the highest classification, GAA, six high-risk land uses are prohibited by state law. In addition, groundwater monitoring is required for existing high-risk land uses in a GAA area. Municipalities can also enact local health ordinances or regulations in conjunction with reclassification. In this approach, a health ordinance can strengthen the level of protection provided by reclassification. This happens in two ways. First, the

Class	Description
GAA	Delineated wellhead protection areas Prohibits new and monitors existing high risk uses (e.g. landfills) Authorizes active management on local level
GA1	Groundwater of high value for present or future drinking water No prohibitions Authorizes active management on local level
GA2	Potentially valuable stratified drift aquifers No active management
GB	All groundwater not assigned to a higher class No active management

health ordinance can expand the list of potential threats covered by the program and prescribe BMPs that are not in the state's rules. Second, a health ordinance (as opposed to a health regulation) can enable the local health officer to collect fees to pay for the program.

For more information on groundwater reclassification, contact DES at 271-7061 or see DES fact sheets WD-DWGB-22-2 and WD-DWGB-22-3.

High Risk Land Uses Prohibited in Areas Where Groundwater is Reclassified GAA

Hazardous Waste Disposal Facilities
Wastewater or Septage Lagoons
Solid Waste Landfills
Outdoor Bulk Storage of Road Salt
Junkyards
Snow Dumps

Household Hazardous Waste Collection

To prevent the improper disposal of household hazardous materials, many communities sponsor household hazardous waste collection days. Residents of the community bring their materials to a central location for packaging and disposal at a permitted facility. Matching state funds are available on a limited basis for these programs. DES encourages water suppliers in the participating towns to notify residents and businesses of the event by distributing fliers provided by DES. Contact DES at 271-2047 for more information.

Gravel Excavation Regulations

Large deposits of sand and gravel can be valuable sources of construction materials. Because of their permeability (the ability to allow water to flow through) sand and gravel deposits also tend to be good sites for water supply wells. Permeability also makes sand and gravel deposits very vulnerable to contamination; once contaminants are spilled or dumped, they can quickly spread. The area contaminated could be quite large, depending on the extent of the aquifer. Therefore, special attention should be given to regulating land uses over sand and gravel deposits.

Municipalities issue permits for gravel excavation under RSA 155-E. The local regulator (usually the planning board) also has the authority to adopt regulations that apply to gravel excavation. These regulations, along with the process of reviewing permit applications for gravel removal areas, should be designed to ensure that fuels and lubricants used by earth moving equipment are handled properly and the areas are secured against illegal dumping. For groundwater protection BMPs specific to gravel pits, please see DES fact sheet WD-DWGB-22-6. Gravel pit owners should be reminded that future uses of the land could be limited if excavation extends too close to the water table. For example, if the land is to be used for residential development after the gravel is removed, enough material should be left behind to allow for the construction of properly designed septic systems.

Septic System Ordinances

While DES's regulations covering the design, construction, and maintenance of septic systems are protective of groundwater, there is a local role in ensuring compliance with the state regulations and responding to potential septic system failures. This responsibility resides with the local health officer. For more information, contact the Health Officer Liaison at the N.H. Department of Health and Human Services at 271-4781.

Underground Storage Tank Regulations

Since many existing underground storage tanks (USTs), such as 1,000-gallon residential heating oil tanks, are exempt from state environmental regulations, towns may regulate those tanks to reduce the chance of groundwater contamination. Although local regulation of USTs is rare in New Hampshire, towns should consider requiring testing of state-exempt USTs and removal of tanks that fail the test.

Regulations for the Management of Fertilizer and Wastewater Residuals

Municipalities may also regulate the application of fertilizer, manure, septage, and sludge in order to protect groundwater as well as surface water.

Testing of Private Wells

Approximately 35-40 percent of New Hampshire residents rely on private wells for their residential water supply. In many towns, private wells are the primary, if not sole, source of domestic water supply. But, while the state *does* regulate well drillers and pump installers, it *does not* regulate the quality of water obtained from private wells. If water quality standards for public water systems were applied to private wells, DES estimates that 95 percent would exceed the proposed federal maximum contaminant level (MCL) of 300 pCi/L for radon, and about 13 percent would exceed the federal MCL of 10 ug/L for arsenic. Both of these contaminants occur naturally, but that does not make them any less of a health risk.

Homeowners are responsible for testing their own private well water and obtaining appropriate treatment, if needed. Municipal officials can help ensure private well users have the knowledge they need to make informed decisions about their well water in two ways. The first and most important objective is public education. DES can provide educational materials and guest speakers to aid local educational efforts. Second, municipalities can provide homebuyers with additional opportunities to find out about well water quality by requiring testing of private wells when homes are built or sold. If a municipality is going to require testing, it should specify testing for the full range of parameters recommended by DES. At least one municipality already goes beyond this recommendation; the Town of Salem requires that water from private wells be treated to meet federal standards before issuing a certificate of occupancy.

How Can a Community Develop a Groundwater Protection Program?

Local communities have the opportunity to develop a groundwater protection program tailored to local needs. The Department of Environmental Services actively regulates some potential contamination sources (PCSs) and known contamination sources (KCSs) statewide, such as underground storage tanks, hazardous waste and solid waste sites, septic systems, and other underground discharges of wastewater. Many other facilities are required to follow state BMP rules for preventing groundwater contamination. Still other activities, such as household use of hazardous materials, are not regulated by state programs. Consequently, the development of local programs enhances the state-local partnership for groundwater protection. A six-step program to develop a groundwater protection program is described below.

Help is Available

In addition to providing technical assistance, DES makes small grants to water suppliers, municipalities, and other local organizations for the purpose of protecting drinking water sources. Protection projects funded through this program have included delineation of wellhead protection areas and critical watershed segments, inventorying potential contamination sources, formation of watershed protection alliances, development of local ordinances, performing land surveys as a precursor to land acquisitions, water quality monitoring, shoreline surveys, drinking water education and outreach activities, and controlling access to sources. For more information about this program, call 271-7017.

1. Identify and Contact "Key Players"

The first step in developing a groundwater protection program is to bring together the relevant decision makers and the people affected. In other words, who in the community has an interest in protecting groundwater or will be affected by local program changes?

The key is to include as many different points of view as possible, so that the final program will have broad support. For example, water suppliers, planning board members, the local health officer,

Key Players might include:

- Municipal governing body (e.g., Board of Selectmen) or town manager/ administrator
- Planning board
- Conservation commission
- Health officer
- Public water suppliers
- Business interests
- Local lake or river association(s) or environmental group(s)
- Zoning board
- Concerned citizens
- Consultants

and developers are likely to have different perspectives which need to be heard in order to develop a consensus on the content of a local groundwater protection program.

2. Gather Information About Potential Threats

Source Assessment Reports

DES prepared a Source Assessment Report for each public water system between October 2000 and January 2003. Each report, which was sent to the planning board of the community in which the system was based, as well as the system owner, includes a map of the wellhead protection area(s), an inventory of potential sources of contamination, and a rating of each well's vulnerability to contamination. These reports are an excellent source of information about public water systems, their sources, and potential contamination threats in the community. Each report also includes a description of suggested protection measures. The Source Assessment Report results, without the maps, can be viewed online at http://des.nh.gov/organization/divisions/water/dwgb/dwspp/reports/part1.htm. If your planning board has difficulty finding the Source Assessment Report(s) for your community, please contact DES at 271-0657.

Conduct a Local Inventory

Preparing a PCS inventory does not require any special training. Here are the steps to follow:

1. For a particular public water system, start with the Source Assessment Report(s) prepared by DES (see above). Or, for a town-wide or regional inventory, start with the Drinking Water Resource Map(s) prepared by DES and distributed to each planning board. Each map is accompanied by a list of sites in DES's databases.
2. Conduct a "windshield survey." This consists of driving or walking through the area to see if any businesses or activities can be taken off or added to the preliminary inventory of PCSs and to verify the locations of the PCSs. Businesses can be taken off the possible PCS list if they do not include any of the activities listed on page 4. Please note that some of the known contamination sources on the map may no longer be in business although they remain in DES's geographic information system.
3. Check local sources of information. Tax records may be of use in identifying PCS businesses. In some cases, these records will reveal the business name, but not the type of business. The local code enforcement officer, health officer, and fire officials are usually very knowledgeable about businesses in town. For some multi-tenant properties, you may wish to contact the owner by phone to see if there are any PCS businesses on the premises.

4. Based on the windshield survey and review of local information, finalize your PCS list and map. Please forward any updated information to the DES Drinking Water Source Protection Program.

These steps are the minimum needed to prepare a PCS inventory. For those water suppliers or municipalities wishing to develop a more exhaustive inventory or to locate PCSs more precisely, contact DES at 271-0657.

3. Decide What Should Be Protected

(This step runs concurrently with Step 2)

Local groundwater protection programs come in a variety of shapes and sizes. The choice of what to protect will depend on the local situation.

Wellhead Protection Areas

A community may seek simply to protect a specific well or set of wells, or all public water supply wells. Public water supply wells are more difficult and costly to replace than residential wells, and may be essential to the community's economy. For each community and non-transient water supply well, DES has delineated a wellhead protection area, which is the area that is likely to contribute water to the well. To protect the well, you need to protect the wellhead protection area.

Important Aquifer(s)

Important aquifers – particularly sand and gravel aquifers – have been identified in many New Hampshire municipalities. These aquifers are often valued as existing or potential future sources of large quantities of drinking water. Many communities want to provide more protection for these aquifers, particularly those that may play key roles as major future water supply sources.

Fortunately, a good deal of information is already available about the location and extent of sand and gravel aquifers in New Hampshire. Local aquifer protection ordinances often refer to maps prepared by the U.S. Geological Survey to define the area to be protected. DES has provided a Local Drinking Water Resources Map to each community, which includes stratified-drift aquifer information. DES can also provide a Favorable Gravel Well Analysis for any community upon request. Favorable Gravel Well Analysis is a planning tool that identifies known constraints to siting a large municipal well in the mapped aquifer area. Often, the analysis indicates that most areas of stratified-drift aquifers are unusable as high-yielding well sites because of existing land uses or insufficient yield.

Groundwater Contributing to Surface Water

If it can be shown that groundwater contributes significantly to a reservoir or other surface water source of drinking water, a municipality may wish to protect all groundwater in the watershed that drains to the surface water source.

All Groundwater in the Municipality

If a municipality contains a large number of private wells, the goal may be to protect all groundwater.

4. Decide Which Approach(es) to Take

Once the areas for protection have been established, the approach or combination of approaches that is most appropriate needs to be established. Different types of protection for different areas may be considered, based on:

- Existing and potential threats identified in DES's Source Assessment Reports, together with locally generated information about actual and potential groundwater threats.
- Current zoning, and other protection in place.
- The replacement cost for various wells.
- The municipality's (or water supplier's) ability to carry out the program.
- The likelihood of public support for the program.

For example, a municipality may decide to implement a voluntary or mandatory inspection program for a developed area that contributes water to irreplaceable high-yield municipal wells, while not adopting such a program for low-yield aquifers in a sparsely developed part of town.

For a town with no significant public water systems and numerous private wells, it may be desirable to provide some basic level of protection throughout the town. In this case, the town may want to implement any or all of the following: a town-wide public education program, incorporating BMPs into site plan review regulations, and a program of inspections for potential contamination sources.

5. Inform and Educate

Even before a well-defined proposal for a groundwater protection program tailored to specific local needs has been developed, it is time to inform and educate.

The best ways to reach people depend on the specific community. Depending on the size of the community, mass media outlets such as radio, cable TV, the town website and newspaper might be effective. In a smaller community, a poster at the general store and another at the post office

and a town-wide mailing might reach people better. Educating school children can also be effective, since they can be reached through the school, they are the future water users, and they usually bring the message home to their parents. Speaking to local boards, committees, and clubs will help.

Remember an important principle of advertising: once is never enough. There is a much better chance of getting the message through if people see or hear it multiple times through different channels of communication, whether it's newspaper, radio, or word of mouth.

One final note on the education process: Questions and comments from the public will tell you something about how the idea is being received. Any problems with the proposal will become evident through these comments. Changes to the proposal or the way the proposal is presented that are responsive to public concerns will increase the likelihood of approval and successful implementation.

6. Adopt a Local Program

Some programs or program components require no formal vote or official action, while others such as ordinances or regulations will need to be officially adopted. A brief description of the requirements associated with each approach is provided below.

- Public education requires no action by the local legislative body (e.g. town meeting or city council), although an extensive program may require funds that would have to be included in a budget requiring approval of the local legislative body.

- Buying land requires appropriation of the money by the local legislative body. If a municipality sees a need to buy land or easements, provisions to include money in the municipality's capital improvements plan might be considered.

- Zoning ordinances, including aquifer protection ordinances, require approval by the local legislative body. Before a zoning ordinance is developed or changed, the municipality should consider writing or revising its master plan to reflect the need for the ordinance.

- Health regulations, such as those required for a mandatory inspection program or for local regulation of septic systems, typically need to be recommended by the health officer and adopted by the board of selectmen or city council, but not by town meeting. However, any fees associated with the program typically require the local legislative body's approval of an ordinance.

- Underground storage tanks can be regulated by health regulations or general bylaws. General bylaws require approval of the local legislative body.

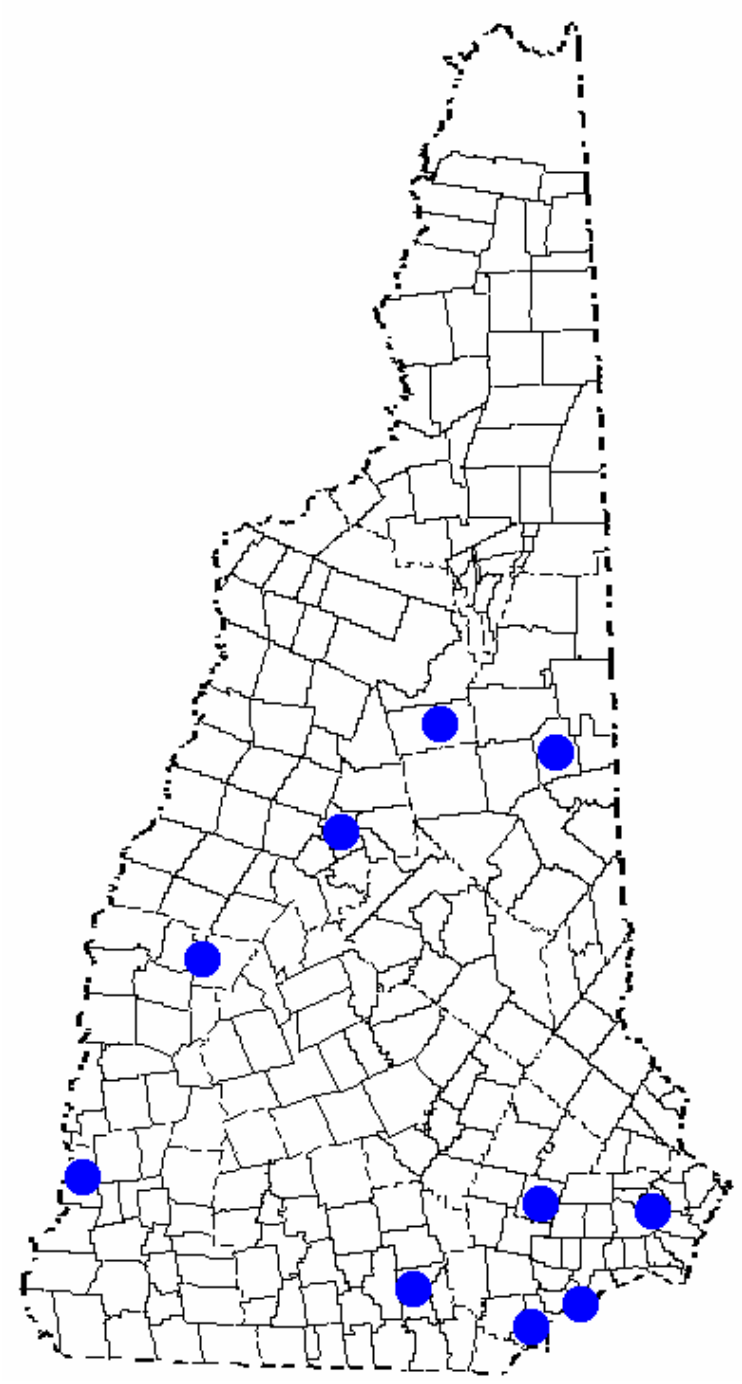
- Local regulations for gravel excavations can be adopted by the local regulator (typically the planning board) without approval of the local legislative body.

- Reclassification involves filing an application with the N.H. Department of Environmental Services. An application can be filed by the governing body (e.g., board of selectmen, city council) of a municipality, or by a water supplier.

- As noted previously, planning boards need the local legislative body's authorization to adopt site plan review regulations. However, revisions to existing site plan review regulations typically only require adoption by the planning board, following a public hearing.

Local Groundwater Protection Case Studies

Nearly **80 percent** of the community water systems in New Hampshire have implemented groundwater protection programs. Below are just a few case studies that demonstrate that groundwater protection programs are achievable and take many forms to reflect local needs.



1. Eastman

Eastman Village District was the first local entity in New Hampshire to pursue groundwater reclassification. Because of its status as a village district, zoning was not an option. Reclassifying its wellhead protection areas to GAA resulted in state prohibition against six high-risk land uses. Because the contributing areas to its wells were largely undeveloped, the only potential contamination source is Eastman's maintenance shed. Operations have been modified to employ good housekeeping and pollution prevention practices. Eastman's management program relies heavily on public education, especially regarding septic systems.

2. Merrimack

Merrimack was one of New Hampshire's first communities to adopt aquifer protection zoning. In 1984, the Town of Merrimack established a policy to reduce the application of road salt in areas that contribute groundwater to town wells and in areas that are served by on-site, private wells. The policy involves reducing salt use on some roads and eliminating its use on other roads, in all but the iciest conditions. Appropriate signs advise residents and motorist of the reduced salt usage. Merrimack Village District (MVD), which is the water supplier for much of the town, has a very active wellhead protection

committee that focuses efforts on education and land acquisition. In 2000, MVD received a DES Local Source Water Protection Grant for a landscaping project at MVD's own offices showcasing landscaping alternatives as a model for the residents of Merrimack. The landscaping project is aimed at educating residents about how they can achieve handsome yards without excess watering and fertilizers. The district offers tours of the grounds and uses them as a living classroom to conduct landscaping and lawn care workshops. Through public education, BMP inspections, and the landscaping project, Merrimack Village District qualified as a participant in the Groundwater Foundation's national Groundwater Guardian program.

3. Plaistow

Town-wide groundwater protection is the approach taken by Plaistow's Source Water Protection Committee following a study of sources, threats, and protection options by Northeast Rural Water Association in 2003. Plaistow has no municipal system and with 52 public water systems, including 19 community systems, wellhead protection areas cover much of the town. Furthermore, with half of the residents served by private wells, the entire town is dependent on local groundwater resources. Early in the process, the committee held a workshop that brought together water systems, business owners, town officials, and concerned citizens to guide the development of the final plan. The plan calls for an education and outreach campaign; a BMP inspection program; a used motor oil collection program; increased reliance on the town's aquifer protection ordinance to guide appropriate development; and an emergency response and water supply contingency plan. In 2003, Plaistow obtained a Local Source Water Protection Grant from DES to work with the Conservation Law Foundation on a comprehensive review of the town's land use regulations. The town also worked with the Nashua Regional Planning Commission to map storm drains in 2003-2004. Plaistow's groundwater protection plan is featured on U.S. EPA's website at www.epa.gov/safewater/protect/plaistow.html.

4. Plymouth

Plymouth's drinking water is supplied by four community water systems serving a total population of 6,700, including Plymouth State College's student population of 3,000. Approximately 2,500 residents use private wells. In 2001, Northeast Rural Water Association coordinated the formation of a diverse source water protection steering committee. Implementation of the resulting plan has included public education as well as the reclassification of the wellhead protection area for Plymouth Village Water and Sewer District.

5. Raymond

Since the fall of 2000, DES's Water Supply Land Grant program has awarded over $4 million to municipalities and non-profit water suppliers. The Town of Raymond received a grant in 2001 for the acquisition of an old gravel pit in its wellhead protection area. The land provides the town with passive recreation while protecting the sanitary radius of one of the town's wells. Previously, Raymond worked with Southern New Hampshire Planning Commission to develop a groundwater protection plan to successfully qualify its wellhead protection area and stratified-drift aquifer for groundwater reclassification.

6. Salem

In 1995, the Town of Salem worked with DES to reclassify the wellhead protection areas for two bedrock wells to GAA and reclassify the Canobie Lake watershed to GA1. The majority of Salem's water supply comes from the Lake, which is largely groundwater-fed. Both protection areas extend into the town of Windham. Windham's health officer inspects PCSs in the Windham portion of the reclassified area in cooperation with DES. Education, inspections, and outreach are major components of Salem's program.

The Town of Salem also instituted a local ordinance in February of 2000 that requires the testing of private well water. Before a Certificate of Occupancy is given to any Salem building serviced by a new or replacement well the water must be tested for a set of 12 water quality parameters. The ordinance requires that any exceedences of EPA's maximum contaminant level (MCL) standards for any of the parameters must be remediated before the Certificate of Occupancy is issued. The requirement for both the test and the remediation not only protects those residents moving in, but it could potentially protect neighbors as well because the town catalogs and maps the data submitted. Through this ordinance the Town of Salem hopes to ensure the health of residents and protection of the groundwater.

7. Stratham

As in many small New Hampshire towns, Stratham's nearly 7,000 residents are not served by a municipal water supply system. Instead, approximately 30 percent of the town's residents are served by 18 small community systems, each of which relies on groundwater sources to serve condominiums, subdivisions, or mobile home parks. The other 70 percent use on-site private wells. Recognizing the need to protect both public and private drinking water sources, the Town of Stratham worked with Rockingham Planning Commission to request reclassification of all of the town's groundwater as "locally important." Maintaining the reclassification requires the town to establish a groundwater protection program, and provides the town with the authority to enforce DES's best management practices rules for the safe handling and storage of regulated substances. Stratham's groundwater protection program involves a town-wide inventory of potential contamination sources, which is updated every three years followed by on-site surveys

at certain businesses for compliance with the BMP rules.

8. Eidelweiss

The Village District of Eidelweiss is a residential precinct in the town of Madison at the southern end of the Mount Washington Valley. Build-out is expected to be 700-800 homes. Long-term concerns for the district focused on the proximity of a commercial zone and the former town dump, which are located right on top of the aquifer. Working through the North Country Council, a DES Local Source Water Protection Grant was used to develop a wellhead protection plan in 1999. A key recommendation of that plan was to work with the town to develop a groundwater protection ordinance. District concerns over source water protection happened to coincide with the town's concerns over a proposed large-scale sludge spreading project within the aquifer zone itself. The sludge project was abandoned after a public outcry but the need to protect the aquifer was more broadly understood. District residents were very much aware of the importance of protecting the well, so there was a critical mass of people to spread the word to the town. A vigorous education campaign and a coalescing of opportunities resulted in the passage of a Groundwater Protection Ordinance by a large majority in March of 2000.

9. Walpole

Approximately half of Walpole's 3,700 residents are served by two community water systems. Following a source water protection workshop organized by Northeast Rural Water Association in 2002, the town formed a Wellhead Protection Committee including representatives of town land use boards, farmers, and businesses. Implementation of the resulting plan has included N.H. Project WET (Water Education for Teachers) training for teachers and the adoption of an aquifer protection overlay district in 2004.

10. Waterville Valley

Even though it is a small system with only two potential contamination sources within its wellhead protection area, Waterville Valley Water District has opted to perform BMP inspections in an effort to protect the pristine environment in which its public water supply wells are located. The Water District's wellhead protection program also includes educational mailings sent to all residents and businesses every three years.

Conclusion

Groundwater is an important resource, which once contaminated is expensive if not impossible to clean up. Given the expense, and in many areas the difficulty, of siting new municipal wells, it makes sense to prevent contamination rather than risk its consequences.

Local entities – municipalities and water suppliers – have a wide range of options from which to choose. Some approaches emphasize excluding potential threats from a wellhead area or other area of important groundwater. Other approaches emphasize managing potential threats to minimize the risk posed to groundwater. Municipalities can also rely on a wide range of legal authorities to implement groundwater protection, while non-municipal water suppliers can pursue a number of possible voluntary groundwater protection strategies. Both municipalities and water suppliers can pursue reclassification of groundwater, through application to the N.H. Department of Environmental Services.

Currently, 80 percent of the community and non-transient public water systems in New Hampshire are involved in some form of groundwater protection. Their experience clearly indicates that public education must be the cornerstone of any local groundwater protection program. Their experience also shows that groundwater protection is a reasonable and achievable approach to protecting water supplies that can be tailored to the needs of each water supplier and community.

Additional Resources

For further information about groundwater protection in New Hampshire, contact:

- N.H. Department of Environmental Services Drinking Water Source Protection Program at 271-7061 or visit our website at http://des.nh.gov/organization/divisions/water/dwgb/dwspp/index.htm

- Your regional planning commission:
  Central New Hampshire Regional Planning Commission – (603) 226-6020
  Lakes Region Planning Commission – (603) 279-8171
  Nashua Regional Planning Commission – (603) 883-0366
  North Country Council – (603) 444-6303
  Rockingham Planning Commission – (603) 778-0885
  Southern New Hampshire Planning Commission – (603) 669-4664
  Southwest Region Planning Commission – (603) 357-7440
  Strafford Regional Planning Commission – (603) 742-2523
  Upper Valley Lake Sunapee Regional Planning Commission – (603) 448-1680

The Department of Environmental Services Drinking Water Source Protection Program can provide individual advice and assistance, as well as the following publications covering various aspects of groundwater protection programs in New Hampshire. To obtain these publications, contact the DES Public Information and Permitting Office at 271-2975 or visit our website at http://des.nh.gov/organization/commissioner/pip/index.htm.

Guidance Documents

- *A Guide to Identifying Potentially Favorable Areas to Protect Future Municipal Wells in Stratified Drift Aquifers--Vol. 1,* January 1999, WD-99-2
- *Managing Groundwater Protection Areas: Guidance and Sample Letters,* 2006
- *Managing Stormwater as a Valuable Resource,* September 2001, R-WD-01-13
- *Model Groundwater Protection Ordinance,* June 2006, WD-06-41
- *Model Health Ordinances to Implement a Wellhead or Groundwater Protection Program,* July 1995, NHDES-WSPCD-92-13

Fact Sheets and Brochures

- *The N.H Groundwater Protection Act: An Overview,* WD-DWGB-22-1
- *Local Reclassification of Groundwater to Implement Protection Programs: A Ten Step Process,* WD-DWGB-22-2
- *Groundwater Reclassification and How It Affects the Property Owner,* WD-DWGB-22-3

- *Best Management Practices (BMPs) for Groundwater Protection,* WD-DWGB-22-4
- *Protecting Groundwater from Floor Drains and Other Discharges,* WD-DWGB-22-9
- *Delineating Wellhead Protection Areas,* WD-DWGB-12-2
- *Performing an Inventory for Groundwater Protection,* WD-DWGB-12-3
- *Phase II and V Source Protection Sampling Waivers,* WD-DWGB-12-4
- *Drinking Water Source Assessment Program,* WD-DWGB-12-7
- *Protecting Drinking Water Sources Based on Source Water Assessments,* WD-DWGB-12-8
- *Wellhead Protection Tips for Small Public Water Systems,* WD-DWGB-12-10
- *Household Hazardous Waste,* HW-3
- *Pollution Prevention for the Consumer,* WMD-SW-2

State Laws and Administrative Rules

RSA 485-C Groundwater Protection Act
Env-Dw 901 Groundwater Reclassification
Env-Wq 421 Best Management Practices for Preventing Groundwater Contamination