An Introduction to Water Resource Protection in Massachusetts and New Hampshire

A Guide to Information Resources for Municipal Boards and Citizens
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# Table of Contents

**Figures and Photos** ........................................................................................................ II

**Preface** ........................................................................................................................... III

**Introduction** .................................................................................................................... 1

**Planning Tools for Water Resource Protection** ............................................................... 2

I. Wetland Protection ............................................................................................................ 2

II. River and Shoreland Protection ..................................................................................... 7

III. Stormwater Management ............................................................................................. 12

IV. Low-Impact Development ............................................................................................. 19

V. Aquifer and Wellhead Protection ................................................................................... 23

VI. Erosion Control and Steep Slopes ................................................................................. 29

**Summary and Conclusions** ............................................................................................ 35
Figures

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Riverfront Areas in the Massachusetts Rivers Protection Act</td>
<td>8</td>
</tr>
<tr>
<td>2</td>
<td>Riverfront Areas in the Massachusetts Rivers Protection Act</td>
<td>8</td>
</tr>
<tr>
<td>3</td>
<td>Jurisdictional Areas in the New Hampshire Shoreland Water Quality Protection Act</td>
<td>9</td>
</tr>
<tr>
<td>4</td>
<td>Relationship Between Impervious Cover and Stream Quality</td>
<td>13</td>
</tr>
<tr>
<td>5</td>
<td>Aquatic Organisms and Impervious Cover</td>
<td>14</td>
</tr>
<tr>
<td>6</td>
<td>Rain Garden / Bio-retention system plan and elevation views</td>
<td>21</td>
</tr>
<tr>
<td>7</td>
<td>Driveway Drainage Strip</td>
<td>21</td>
</tr>
<tr>
<td>8</td>
<td>Zone I and II in Lunenburg, Massachusetts</td>
<td>25</td>
</tr>
<tr>
<td>9</td>
<td>Groundwater Reclassification Areas in New Hampshire</td>
<td>26</td>
</tr>
<tr>
<td>10</td>
<td>Factors Involved in Erosion</td>
<td>30</td>
</tr>
</tbody>
</table>

Photos

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Forested Wetland in the Fall</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>Spotted Salamanders in Vernal Pool</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Monoosnoc Brook</td>
<td>7</td>
</tr>
<tr>
<td>4</td>
<td>UNH Stormwater Center Director Dr. Robert Roseen and Tour Group</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>Rain Garden on Church Property in Leominster, Massachusetts</td>
<td>20</td>
</tr>
<tr>
<td>6</td>
<td>Residential Rain Garden in Leominster, Massachusetts</td>
<td>20</td>
</tr>
<tr>
<td>7</td>
<td>Soil Erosion at Massachusetts Construction Site</td>
<td>29</td>
</tr>
<tr>
<td>8</td>
<td>Siltation of stream bed due to improper road construction</td>
<td>32</td>
</tr>
<tr>
<td>9</td>
<td>Siltation in wetland due to improper placement of silt fencing</td>
<td>32</td>
</tr>
</tbody>
</table>
Preface

The Nashua River Watershed Association (NRWA) was awarded a grant by the ENVIRON Foundation in 2009 for the Association’s “Crossing Boundaries and Barriers: A New Way of Working Together” project. The scope of work under the grant was varied and included forming a regional committee of citizens from towns in the combined Squannacook and Nissitissit sub-basin of the Nashua River watershed to work “together in a new way” to better protect the water resources of the region. This sub-basin is the northernmost and most pristine of the sub-basins that make up the larger Nashua River watershed. This sub-basin is about equally divided geographically between Massachusetts and New Hampshire.

One of the work products of the “Crossing Boundaries and Barriers” project is this manual on water resource protection tools that can be implemented in both Massachusetts and New Hampshire. This document would not have been possible without the advice and feedback of Michelle Collette, Town Planner of Groton, Massachusetts; Pierce Rigod, Environmentalist IV of the Source Protection Program of the New Hampshire Department of Environmental Services; and Liz Fletcher of the Mason Conservation Commission -- all three served as the Steering Committee for the duration of the project.

The author, Mark Archambault, NRWA Smart Growth Circuit Rider, also wishes to thank Elizabeth Ainsley Campbell, NRWA Executive Director, for her valuable advice and feedback; Wynne Treanor-Kvenvold, NRWA Communications Manager for her assistance with the document; and other fellow staff members of the NRWA who reviewed sections of the draft and contributed graphics and information. The author also thanks Kristopher Kvenvold for his assistance with the layout and graphics.

This document is a product of the Nashua River Watershed Association, and does not necessarily reflect the views of the ENVIRON Foundation.
Introduction

Massachusetts and New Hampshire are fortunate to have abundant surface and groundwater resources that support our diverse ecosystems and the human enterprises that form the basis for our regional economy. As a study of history shows, however, the value of these water resources has often been taken for granted, sometimes resulting in serious harm. After the environmental awakening of the 1960’s, both the Commonwealth of Massachusetts and the State of New Hampshire passed numerous laws and a multitude of programs to help safeguard these water resources for both human use and their ecosystem functions.

Both states have environmental agencies that aim to protect water resources from human activities such as poorly planned land development or forest harvesting operations, direct sewer discharges, oil and chemical spills and stormwater runoff. This document will introduce members of Land Use Boards and the public they serve to the various state laws, regulations and programs aimed at protecting surface and groundwater resources in both Massachusetts and New Hampshire. New board members should find this information especially useful as they begin to undertake their duties. These laws and programs, which are often distributed amongst several state agencies, will be listed and linked to here in one short document to make them more accessible.

State agencies in both Massachusetts and New Hampshire have developed guidance documents and model ordinances, bylaws, regulations and best practices addressing a wide array of water resource protection topics. Most of these guidance documents are excellent, and properly applied can be of great assistance to local water resource protection efforts.

However, the sheer number, variety and distribution of this information can be intimidating, resulting in the need for a simple, straightforward ‘guide to the guidance’.

This document aims to provide such a resource to town officials and citizens in both Massachusetts and New Hampshire who are concerned with better protecting their water resources. It will list and summarize, in plain English, the most important water resource protection measures that towns can enact. The compact disc (CD) version of this document will provide direct links to the state agencies and models concerned with each subject area. It is intended as an ‘Executive Summary’ level document, not an exhaustive study of each of the topics addressed. This guide will provide one or two pages of explanatory text on each subject area (stormwater management, aquifer protection, etc.), followed by a list of, and links to, key information resources that provide more detailed background information, scientific studies, model bylaws, ordinances, regulations and other planning tools.

The primary audiences for this document are the Land Use Boards (Planning Boards, Conservation Commissions and Zoning Boards of Adjustment / Appeals) and Boards of Health of the communities within the Nashua River watershed in Massachusetts and New Hampshire, as well as those members of the general public who interface with these boards who would like to learn more about the subject areas administered by the boards. By using this guide, members of the general public will be able to learn about the rationale for the environmental laws being administered by their fellow citizens serving on Land Use Boards.
Planning Tools for Water Resource Protection

I. Wetland Protection

WHAT ARE WETLANDS?

Wetlands are an ‘in between’ zone between dry land and open water in streams, rivers, ponds, lakes and the ocean. Wetlands often have a high water table, saturated soils and special vegetation adapted to these circumstances. Indeed, the federal government and many states define wetlands using the three characteristics of the presence of water (hydrology), water logged (hydric) soils, and specialized (hydrophytic) vegetation. The environmental agencies of both Massachusetts and New Hampshire define wetlands according to this three-fold definition.

Photo 1: Forested wetland in Nashua, New Hampshire
Source: Mark Archambault, NRWA Smart Growth Circuit Rider

WHY ARE WETLANDS IMPORTANT?

Wetlands provide many ecological functions that are vital to the health of ecosystems and the human environment. First of all, they help to protect the water quality of our lakes, streams, and groundwater. They do this by filtering out excess nutrients, pollutants, and sediments before they reach open waters and the groundwater table. Nutrients such as nitrogen and phosphorus can contribute to algal blooms and the growth of harmful bacteria. Wetlands help to regulate the amount of these nutrients reaching water bodies and sources of drinking water.

Wetlands also help to regulate the quantity of water that impacts downstream areas during floods. Wetlands help to reduce peak flows during floods, and reduce flood damage in downstream areas. They also help to recharge the groundwater that is discharged to streams, lakes, and ponds, thereby helping them to maintain water levels necessary to support many species of aquatic wildlife.

Wetlands also help to prevent erosion by diminishing the impact of waves on shoreland areas. In some cases these waves are generated by storms and high winds, in other cases by large motorboats. Wetlands also capture sediment and silt, providing a growth medium for aquatic plants that further protects against wave action.

And, of course, wetlands are valuable as habitat for many important species of wildlife, including birds, reptiles and amphibians, fish
and invertebrates. Many fish species of commercial importance spawn in coastal and inland wetlands. Many species of birds such as herons, egrets, ospreys, gulls, terns and shorebirds depend on wetlands for much of their life cycle. In addition, wetlands often serve as travel ways or ‘wildlife highways’ for many species of birds and mammals that live in New England.

![Photo 2: Spotted Salamanders in vernal pool](source: Gail Hansche, NRWA Photo Archives)

Since wetlands are often afforded much greater protection than upland areas, they are apt to remain intact even when much of the surrounding dry upland has been developed or converted to agriculture or other human uses. In many towns that are built out or nearly so, wetlands are among the only wild lands left standing. In these circumstances, their importance as wildlife habitat is perhaps even greater.

**HOW CAN WETLANDS BE PROTECTED?**

Because wetlands are valuable as wildlife habitat, and because they serve a vital purpose in controlling flooding and protecting drinking water supplies, most states strictly regulate any activities that would degrade, alter or destroy wetlands. Despite these laws, development and human activity nibble away at the edges of wetlands at a steady pace. According to the United States Environmental Protection Agency (USEPA), approximately 58,500 acres of wetland area is lost, on average, in the United States each year. Most states allow a certain small area or percentage of wetlands to be lost during the course of development, though some require that an area equal to that lost either be protected or replicated / constructed off-site. The ability of humans to successfully construct artificial wetlands that replicate most or all of the functions of natural wetlands is a matter of controversy. Nonetheless, the practice of replicating wetlands is fairly widespread in the United States.

Numerous studies show that the most effective way to protect wetlands is to protect the area around them by designating a 'buffer zone' in which human activity is either prohibited or strictly controlled.

The Commonwealth of Massachusetts, through its Wetlands Protection Act, Massachusetts General Law Chapter 131 Section 40, regulates all activities within a 100-foot wide buffer zone to all wetlands as defined in the Act. These include “…bank, riverfront area, fresh water
wetland, coastal wetland, beach, dune, flat, marsh, meadow, or swamp bordering on the ocean or on any estuary, creek, river, stream, pond or lake, or any land under said waters of any land subject to tidal action, coastal storm flowage, or flooding.” The Rivers Protection Act protects all land within 200 feet of the high water mark of rivers and perennial streams. Isolated lands subject to flooding greater than ¼ acre with a water depth of six inches are also protected. The Massachusetts Wetlands Protection Act identifies eight (8) interests, which projects proposed within wetland resource areas must meet:

1. Protection of public and private water supplies
2. Protection of groundwater
3. Flood control
4. Prevention of storm damage
5. Prevention of pollution
6. Protection of land containing shellfish
7. Protection of wildlife habitat
8. Protection of fisheries

Home Rule powers under Article 89 of the Massachusetts constitution have allowed more than half of Massachusetts’s 351 cities and towns to adopt general (non-zoning) local wetland bylaws or ordinances. These bylaws and ordinances give Conservation Commissions further power to protect wetlands through enhanced buffer zones and other means.

The State of New Hampshire, on the other hand, has no statewide official buffer zone, though its Department of Environmental Services has a Wetlands Bureau that regulates activities in wetlands themselves. The New Hampshire legislature, through Revised Statutes Annotated RSA 482-A, allows municipalities to adopt local wetland protection ordinances which can include provisions for buffer zones of various widths to provide additional protection above and beyond that afforded by the State. About 84 New Hampshire cities and towns have local wetland protection ordinances.

If cities and towns in both states can adopt local wetland protection bylaws and ordinances, the question then arises as to what width a buffer zone should be. Several studies have been conducted through the years to determine just how wide a buffer zone needs to be to protect certain values and functions of wetlands. These studies have shown that different wetland values and functions require buffer zones of varying widths. For instance, in order to filter out sediments and pollutants that would reach water bodies, wetlands may require a modest buffer zone of only 50 to 100 feet. In order to protect the widest possible diversity of wildlife species that breed and live in wetlands, including amphibians that breed in wetlands but spend part of their life cycle in adjacent uplands, a wider buffer zone up to 700 feet wide is recommended. However, as such extremely wide buffers are unlikely to be politically palatable for most towns, the general practice is that a buffer of 100 feet provides a good deal of protection to wetlands and their associated wildlife habitat functions while being a reasonable width to regulate.
In both Massachusetts and New Hampshire, it is the local Conservation Commissions that are on the front lines of wetlands protection. In New Hampshire, their function is more advisory, whereas in Massachusetts they have the ability to issue permits for activities in and adjacent to wetlands. In both states, it is the Conservation Commissions who are likely to draft local wetland protection bylaws and ordinances, and therefore determine the width of buffer zones.

In each city or town, the Conservation Commission must weigh the environmental threats to wetlands against the political will to protect them. Some towns have public support for a fairly wide buffer zone, whereas in others that is currently politically impractical. In the latter case, the Conservation Commission can set out to educate citizens on the important functions of wetlands and how they contribute to our quality of life. Once people fully understand how valuable wetlands are, they are more likely to vote to approve a local wetlands bylaw / ordinance that provides greater protection than that provided by state law.

WHAT CAN TOWNS AND THEIR CITIZENS DO TO BETTER PROTECT WETLANDS?

Residents of cities and towns can support their Conservation Commissions and Planning Boards in efforts to provide better protection to local wetlands. When local wetland bylaws / ordinances and regulations are proposed, it is often only the opponents that show up to testify at public hearings. This can lead the Conservation Commission or Planning Board to falsely conclude that the citizens of their town do not support innovative and proactive environmental protection measures. So, if you become aware of efforts to better protect wetlands and water resources in general, you can speak in favor of such measures at public meetings and hearings, and write letters to the editor of the local newspaper. In most towns, amendments to zoning ordinances and bylaws require a vote of the legislative body, in this case the voters at Town Meeting, so getting out the (positive) vote is a vital step in the process.

Perhaps the most important provision of local wetland bylaws and ordinances is the width of the buffer zone. Conservation Commissions may want to consider if their current buffer zone is adequate to protect the functions and values of wetlands that are most important to their town. If a wider buffer zone is desired, Conservation Commissions can embark on a public education campaign to educate their fellow citizens on why a wider buffer zone is desirable or necessary. Such public education can increase the likelihood that proposed changes to regulations, bylaw, and ordinances are supported by the citizenry and town officials.

Concerned citizens can go one step further and volunteer to serve on the local Conservation Commission or Planning Board. Many cities and towns operate with Commissions and Boards that are not fully staffed, and many have trouble obtaining the necessary quorum to conduct business at official meetings.
The following books, reference materials, and websites provide valuable information on wetlands and methods to better protect these valuable natural resources:

**Publications:**

**Massachusetts**

**New Hampshire**
To address the need for guidance and technical assistance on Innovative Land Use Controls authorized by RSA 674:21, DES and its partners, the NH Association of Regional Planning Commissions, the NH Office of Energy and Planning, and the NH Local Government Center, produced the *Innovative Land Use Planning Techniques: A Handbook for Sustainable Development.*

This Innovative Land Use handbook includes sections dealing with development density, environmental characteristics, and site level design. Each of the 23 chapters includes model ordinances and regulations for use by municipalities interested in implementing the innovative land use techniques.

Scroll down at the link below to section 2.4 for the chapter on wetland protection.
II. River and Shoreland Protection

WHAT IS RIVER AND SHORELAND PROTECTION?

Rivers and streams are, of course, a type of wetland. Yet, they have unique characteristics that separate them from other types of wetlands such as forested swamps, marshes, bogs, and lakes and ponds. First, rivers and streams typically traverse the landscape across both natural and political boundaries. Second, events that occur in their upper reaches often affect conditions downstream. This is most evident when pollution or sediment is introduced in the upper reaches of a river or stream. Eventually, the effects will be felt in areas far removed from the original source of contamination. Rivers and streams also play a major role in the life cycles of key fish and wildlife species, including trout, salmon, eels, and small fish like alewifes. Some of these species spawn in freshwater and then swim downstream to spend much of their lifespan in the ocean.

In addition to their value as wildlife and fish habitat, rivers and streams have an important role in the human economy as well, both for transportation of people and goods (which peaked in the 19th century), and more recently for hydropower and recreation.

Given that rivers and streams are especially valuable water resources, many states, including Massachusetts and New Hampshire, afford them special protections and regulatory mechanisms to ensure that their multiple uses are safeguarded.

Photo 3: Monoosnoc Brook, Leominster, Massachusetts
Source: Ed Himlan, Mass Watershed Coalition

HOW IS RIVER AND SHORELAND PROTECTION ACHIEVED?

Perhaps the best way to gain an understanding of river and shoreland protection is to review the pertinent laws of both Massachusetts and New Hampshire. In Massachusetts, the law is called the “Rivers Protection Act,” in New Hampshire it is called the “Shoreland Water Quality Protection Act.”

Common to both are measures to protect buffers along rivers and streams, which have been termed “riparian buffers.” Well-vegetated riparian buffers help to maintain the integrity of stream banks, which is of vital importance along rivers and streams that experience fluctuations...
in water level. They also help to shade the water, reducing water temperatures, which helps to maintain adequate oxygen levels for fish and aquatic species. Riparian buffers also help to reduce the transport of sediments, nutrients, bacteria and other pollutants by filtering them out before they reach rivers and streams.

Massachusetts: The Rivers Protection Act (RPA), Chapter 258 of the laws of 1996, is Massachusetts legislation to protect the shoreland areas along rivers and streams. The RPA creates a 200-foot wide riverfront area that extends along both banks of rivers and streams. In certain urban areas where it is recognized that a natural buffer is no longer possible, a riverfront area of 25 feet has been designated.

The RPA does not set up a new permitting process or reviewing authority, but is administered by local Conservation Commissions and the Massachusetts Department of Environmental Protection (MADEP) under the same procedures as the Wetlands Protection Act. Projects proposed within the riverfront area must meet the eight (8) purposes of the Massachusetts Wetlands Protection Act, which are listed in the preceding discussion of wetlands.

The following figures illustrate the jurisdictional areas under the Massachusetts Rivers Protection Act.

Figure 1: Riverfront areas (RFA) in the Massachusetts River Protection Act
Source: Philip Nadeau, Massachusetts Department of Environmental Protection (MADEP)

Figure 2: Riverfront areas (RFA) in the Massachusetts River Protection Act
Source: Philip Nadeau, MADEP
**New Hampshire:** The Shoreland Water Quality Protection Act of 2011 (SWQPA), RSA 483-B, is New Hampshire’s regulatory program for shoreland protection. It applies to fourth order and greater streams, designated rivers, tidal waters and lakes, ponds and impoundments over 10 acres.

The SWQPA applies to certain development and land disturbing activities within 250 feet of the water’s edge or the high water mark, which is called the ‘reference line’. This 250 foot wide area is called the ‘protected shoreland’. Within this protected shoreland, there are varying levels of protection depending on the distance between the reference line and the proposed activity. The SWQPA applies to new construction and any alteration of existing buildings that increase its impervious footprint, as well as excavation and filling activities within the protected shoreland.

The most restrictive area is called the ‘waterfront buffer’, which extends from the reference line 50 feet landward. Within this zone a buffer of natural ground cover is to be maintained, and tree coverage is managed through a 50 x 50 foot grid and point system, which awards points to the existing trees based on their diameter. Trees and saplings can be removed from the waterfront buffer provided each affected grid segment has at least 50 points in trees, saplings, shrubs and natural ground cover.

The NHDES maintains a fact sheet on the vegetation standards for each zone within the protected shoreland, which can be found here. *Vegetation Maintenance within the Protected Shoreland*

![Figure 3: Jurisdictional Areas in the New Hampshire Shoreland Water Quality Protection Act](image)

Source: *Vegetation Maintenance within the Protected Shoreland Fact Sheet (WD-SP-5 2012)*

All primary structures must be set back at least 50 feet from the reference line. Only low phosphorous, slow release nitrogen fertilizer can be applied between 25 and 50 feet of the reference line, and only limestone may be used within the first 25 feet. The next zone outward is called the ‘natural woodland buffer’, which extends from 150 – 250 feet of the reference line. At least 25% of this area must be maintained in an unaltered state. Forestry and agricultural operations can take place in this area and outward to 250 feet, provided they meet applicable state and federal requirements governing forestry and agriculture operations.
The SWQPA also places some restrictions on the amount and type of impervious surfaces within the protected shoreland. If a landowner or developer wishes to exceed the nominal limit of 20% impervious surface area, a stormwater management plan that infiltrates the increased stormwater must be implemented. In some cases, landowners and developers can exceed the maximum 30% impervious limit if their stormwater management systems do not concentrate runoff or contribute to erosion.

In addition to the SWQPA, New Hampshire also has a Rivers Management and Protection Program, which was established in 1988 with the passage of RSA 483 to protect certain rivers, called designated rivers, for their outstanding natural and cultural resources. The New Hampshire Department of Environmental Services (DES) administers the program.

More information on this program can be found at Rivers Management and Protection Program.

A similar program, called the Lakes Management and Protection Program, is applicable to the lakes of New Hampshire.

WHAT CAN TOWNS AND THEIR CITIZENS DO TO BETTER PROTECT THEIR RIVERS AND STREAMS?

The most important thing a concerned citizen or member of a local Land Use Board can do is to become familiar with the provisions of the Massachusetts Rivers Protection Act and/or the New Hampshire Shoreland Water Quality Protection Act. The public and Land Use Board members are typically not as familiar with these laws as they are with the general state laws protecting and regulating work in and near wetlands.

Staff from the Massachusetts Department of Environmental Protection and the New Hampshire Department of Environmental Services can meet with local boards and townspeople to explain how these river protection laws work and are administered. The Nashua River Watershed Association and the regional planning commissions can also offer or coordinate workshops on this subject.

Board members who have attended such trainings can then share their new knowledge with the any fellow board members who could not attend, thereby bringing the entire board up to speed on these important laws.
The following books, reference materials, and websites provide valuable information on rivers and shorelands:

**Publications:**

**Massachusetts**

**New Hampshire**

*Innovative Land Use Planning Techniques: A Handbook for Sustainable Development*

*Vegetation Maintenance within the Protected Shoreland*

**Organizations and their websites:**

*Massachusetts Department of Environmental Protection: Water Resources and Wetlands Home Page*

*The Massachusetts Rivers Protection Act* and [here](#).

*The Shoreland Program of the New Hampshire Department of Environmental Services*

*New Hampshire Department of Environmental Services Water Resource Primer*
III. Stormwater Management

WHAT IS STORMWATER?

Back in the 1960’s, the Nashua River, along with many other rivers and streams in the United States, was overwhelmed by industrial pollutants that often turned the river orange, red and other colors. Decades of such heavy pollution, often directly discharged to the rivers via pipes, left many rivers biologically dead and totally unfit for most human uses. The public outcry from this situation resulted in the eventual passage of the Clean Water Act and other federal environmental laws that prohibited direct discharges of untreated sewerage and industrial waste into rivers, streams and other waters of the United States.

Funds were made available for the construction of wastewater / sewage treatment plants and other large treatment facilities. Gradually, over the years, the rivers and streams came back to life and many formerly toxic waters are now swimmable, fishable, and functioning as valuable wildlife habitat. However, it was later noticed that the rivers, streams and waterways would only recover to a certain extent, beyond which water quality improvements were difficult to achieve.

Research indicates that precipitation running off of hard surfaces such as roads and parking lots, and from cleared lands with exposed soils, offers a pathway for pollutants such as road salt, oil, greases and lubricants, bacteria and soil particles to enter rivers, streams, and waterways. This type of pollution, which cannot be traced back to a single source such as a pipe exiting a factory, came to be called non-point source pollution or stormwater runoff. It is one of the major sources of water pollution today.

Some stormwater pollution enters waterways directly by flowing over land, such as through land clearing activities that expose soils, enabling erosion to occur. Another major pathway is stormwater entering a municipal storm drainage system that is then discharged into water bodies without proper treatment. No matter how it enters waterways, untreated stormwater runoff is a major cause of water pollution.

Stormwater is worsened by hardened or impervious surfaces, which prevent runoff from soaking into the ground (infiltration) or being taken up by plants. In fact, several studies, such as that conducted by the Center for Watershed Protection, show that the health of a stream or water body is directly proportional to the amount of impervious surfaces in its contributing watershed. When the percentage of impervious cover is less than or equal to 10% of the watershed, stream quality is generally safeguarded. When the percentage of impervious surfaces increases to 10 – 25%, the ecosystem functions of streams are increasingly impaired. Stream banks often show more erosion due to the more widely fluctuating water levels after storm events, and biological diversity begins to decrease. When the percentage of impervious surfaces increases to more than 25%,
the stream is severely impaired and may become non-supportive of native plant and animal species. Such streams are often classified as urban streams, and are in essence drainage channels more than natural streams.

Figure 4 below, produced by the Center for Watershed Protection, depicts the relationship between impervious cover and stream quality in a generalized watershed. The health of a watershed and its waterways can be safeguarded by limiting future creation of impervious surfaces and adequately treating stormwater where impervious surfaces cannot be avoided.

Figure 5 on the following page shows how the percentage of impervious surface in a Maryland watershed affects fish species and biological diversity. Though the specific features may vary, this relationship holds true for Massachusetts and New Hampshire as well. Cold-water streams are especially vulnerable to the effects of increasing imperviousness that comes with development.

![Graph showing relationship between impervious cover and stream quality](image)

**Figure 4: Relationship between impervious cover and stream quality**

*Source: The Center for Watershed Protection*
HOW CAN STORMWATER BE ADDRESSED?

The United States Environmental Protection Agency (USEPA) developed an approach to addressing non-point source pollution called the National Pollutant Discharge Elimination System. Under Phase I of this program, which was enacted in 1990, stormwater discharges into medium to large municipal storm sewer systems were addressed. These were defined as communities serving a population of at least 100,000 people, as well as stormwater discharges from eleven categories of industrial activities. Construction activities disturbing five or more acres of land are one category of such industrial activity.
In 2003, the USEPA published the standards for Phase II of their stormwater program. This program is aimed at municipal separate storm sewer systems or ‘MS4’s’ for short. It covers all urbanized areas as identified in the 2000 US Census. The US Census Bureau defines an urbanized area as “a land area comprising one or more places -- central place(s) -- and the adjacent densely settled surrounding area -- urban fringe -- that together have a residential population of at least 50,000 and an overall population density of at least 1,000 people per square mile.” The USEPA website provides maps of all areas subject to the Phase II stormwater program at [Urbanized Area Maps](https://www.epa.gov).

The Phase II program requires subject municipalities to address stormwater through a multi-faceted approach including public education and outreach, public participation and involvement, illicit discharge detection and elimination, construction site runoff control, post-construction runoff control and pollution prevention and good housekeeping. Phase II addresses construction activities disturbing between one and five acres of land.

Even when a small town is not subject to the USEPA’s Phase II stormwater program, choosing to address stormwater in a comprehensive manner is one of the best steps a town can take to safeguard its water resources. Small towns can adopt bylaws / ordinances and accompanying regulations addressing stormwater runoff from construction sites and from illicit discharges. As previously mentioned, most new construction activities require removal of vegetation and moving dirt around a site. Doing so exposes soil that was previously held in place by vegetation to the erosive effects of rainwater and dispersal by wind. In order to minimize such effects, practices can be adopted that minimize the amount of soil exposed at any one time and that prevent soil particles and other pollutants from leaving the site in runoff. Such practices can be spelled out in bylaws, ordinances, and regulations.

Typically, such regulatory provisions apply to construction activities above a certain threshold, such as a half-acre or acre of land disturbance. Some of these regulatory approaches also place limits on the amount of impervious surfaces that can be created, as either a percentage of total lot area or a maximum amount of square footage. The environmental agencies of both Massachusetts and New Hampshire have developed model stormwater bylaws, ordinances, and regulations that address the impacts of construction activities. Links to these models are found below.

Illicit discharges refer to unpermitted or illegal discharges of stormwater or wastes into a sewer, drainage system or water bodies such as streams, rivers, lakes, and ponds. The sources of illicit discharges are many and include but are not limited to industrial discharges and untreated sewage. Illicit discharge bylaws / ordinances and regulations usually require an agent of the town to be on the lookout for such discharges.
Most illicit discharge bylaws / ordinances exempt residential land uses from regulation, including the washing of individual cars, waterline flushing, discharges from lawn irrigation and water from foundation drains and sump pumps. Though residential uses such as those listed above are often exempt from formal regulation, homeowners and renters can still follow common sense best management practices in undertaking such activities.

The art and science of managing stormwater runoff has made great strides in the last several years. Many state universities as well as private foundations and corporations have been conducting research on the effectiveness of various stormwater management techniques, which has resulted in many new and improved best management practices being undertaken across the United States. The University of New Hampshire, for example, has a stormwater research center that tests both manufactured and ‘natural’ (see LID discussion, below) stormwater devices and techniques for their effectiveness in removing sediments, nutrients, bacteria and other pollutants from stormwater.

The University of New Hampshire (UNH) Stormwater Center prepares an annual report of their research results, which can help towns to make more informed decisions regarding stormwater management for both private development and municipal lands. The UNH Stormwater Center is also open for group tours.

WHAT CAN TOWNS AND THEIR CITIZENS DO TO BETTER ADDRESS STORMWATER MANAGEMENT?

First, citizens can make sure that they are not contributing stormwater pollution to their local waterways. Any water, clean or otherwise, flowing from a residential yard or driveway to a catch basin, culvert, or drainage ditch can potentially pollute surface waters and groundwater. Second, citizens can support their Conservation Commissions, Planning Boards, Departments of Public Works and other officials in better addressing stormwater pollution. This could include writing letters of support or attending public hearings on improvements to stormwater ordinances, bylaws, and regulations. If local officials are reluctant to adequately address stormwater management, citizens can encourage their elected officials in this direction.
Towns that are subject to the USEPA’s Phase II stormwater program should have adopted stormwater bylaws or ordinances by May of 2008, but they may not have yet adopted regulations, which help to clarify or administer these bylaws / ordinances. Such regulations can include guidance on administration, jurisdictional areas, and other detailed information. In Massachusetts and New Hampshire, such regulations are usually adopted by Planning Boards after a public hearing, and do not require a vote of Town Meeting.
The following books, reference materials, and websites provide valuable information on stormwater management:

**Publications:**
*Massachusetts Stormwater Handbook*

*New Hampshire Stormwater Manual* (available online and in hard copy)

*Innovative Land Use Planning Techniques: A Handbook for Sustainable Development*

*Stormwater Magazine*, Forester Media, Inc., 2946 De La Vina Street, Santa Barbara, CA 93105

**Organizations and their websites:**
*New Hampshire Department of Environmental Services, Stormwater Unit*

*Region 1, United States Environmental Protection Agency (USEPA) Stormwater, National Pollutant Discharge Elimination System, (NPDES), and Stormwater Frequently Asked Questions*

*The Center for Watershed Protection and Stormwater Management section*

*University of New Hampshire Stormwater Center*, Durham, NH
IV. Low-Impact Development

WHAT IS LOW IMPACT DEVELOPMENT (LID)?

Low Impact Development (LID) is a term that has been applied to several development practices that minimize human impacts to the environment at the site and local level. LID can refer to everything from open space (cluster) style development to small-scale ‘green’ stormwater systems. The term LID most often refers to practices that reduce both the amount and impacts of stormwater runoff. LID often first seeks to minimize the amount of impervious surfaces being created, because, as was seen in the stormwater discussion, the amount of impervious surfaces is directly correlated with water quality. LID also seeks to treat stormwater as close to its source as possible, in contrast to standard stormwater practices that often discharge stormwater far from where it originates.

The Massachusetts Coastal Smart Growth program of the Executive Office of Energy and Environmental Affairs (EOEEA) describes the benefits of LID as follows: “In conventional sprawl development, destruction of natural features and introduction of large impervious surfaces reduces infiltration of water into the ground and necessitates large structural stormwater controls such as catch basins, pipes, and detention ponds. LID, in contrast, seeks to preserve natural features and relies on thoughtful site planning and the use of a broad range of design techniques, such as clustering, permeable paving, and bioretention to reduce the level of impervious cover and address the quantity and quality of stormwater drainage. Natural drainage pathways and open space are preserved, and the overall impact from development is significantly reduced.”

At the site development level, LID typically consists of a series of small-scale stormwater best management practices that preserve and work with the natural features of the land as opposed to large-scale conventional methods of collecting, conveying, and piping away runoff to large detention basins. LID attempts to mimic the natural flow of water (hydrology) on a site, and as such seeks to allow rainwater falling on a site to recharge the groundwater in the same location. Prior to widespread adoption of LID, best management practices often consisted of collecting the stormwater from a wide area and recharging it either far from where it was collected or in a different drainage basin altogether. This practice altered the natural drainage patterns and water balance of many locations, and often resulted in the depletion of local aquifers. Therefore, LID can be thought of as smaller scale, decentralized and predominantly vegetation-based stormwater management techniques that seek to mimic the natural flow of water on and underneath a site or area.

Typical LID stormwater practices include rain gardens (otherwise called ‘bioretention’), which
use specific plant materials and soils to handle and treat stormwater, shallow road side swales, green infiltration strips within commercial parking lots, and porous pavement.

LID has been demonstrated to be economical, effective, flexible, and attractive. Like well-designed stormwater management systems, LID can reduce peak flows during flooding, remove sediments and pollutants from stormwater, provide health protection by removing bacteria, and improve property values due to the attractiveness of techniques such as rain gardens.

WHAT ARE SOME OF THE APPLICATIONS OF LID AND HOW CAN LID BE APPLIED IN SMALL TOWNS?

LID stormwater techniques are well suited to the smaller scale of development typical of small towns. Rain gardens / bio-retention cells, pervious pavement and vegetated infiltration strips are some of the techniques that can be used in commercial parking lots being developed in small towns. Along rural country roads, grassed drainage swales can replace the more expensive and difficult to maintain piped catch basin stormwater systems. LID also provides the opportunity for residents of towns and subdivisions to participate in the maintenance of their own infrastructure, in this case green infrastructure.
Since LID is usually considered a sub-set of stormwater management, towns often incorporate LID into their local regulatory structure by amending their subdivision and site plan regulations by giving applicants and/or developers the option of using LID in stormwater management. Some towns provide incentives, through a point system, to encourage the use of LID as much as possible. Others have even gone so far as to require the use of LID in certain situations. How towns choose to implement LID will depend on many factors, including their regulatory capacity, staffing levels and degree of staff expertise.

Figure 6: Rain Garden / Bio-retention system plan and elevation views

Whereas large, centralized, and engineered stormwater systems usually require maintenance from the town or a consulting engineer, LID systems can be maintained by lay people with minimal training. This is another attractive feature of LID.

WHAT CAN TOWNS AND THEIR CITIZENS DO TO PROMOTE LID?

First, even though LID has now been promoted for over a decade and is being increasingly applied at development sites, it is still not widely applied in the course of most development in New England. By educating yourself on LID, you can in turn help to educate your Planning Board, Conservation Commission, Health Agent, Selectmen, DPW, and other town officials on the applications and benefits of LID.

Figure 7: Driveway Drainage Strip
The following books, reference materials, and websites provide valuable information on low impact development:

**Publications:**

*Innovative Land Use Planning Techniques: A Handbook for Sustainable Development*

*Comprehensive Environmental, Inc.: Model Bylaws and Regulations to Achieve Phase II Stormwater Compliance and Promote Low Impact Development, Milford, MA*

Town of Franklin, MA; *Best Development Practices Guidebook, November 2001*

**Organizations and their websites:**
*Friends of the Rappahannock*

*Low Impact Development Center, Inc.*

*The Massachusetts Smart Growth / Smart Energy Toolkit – Low Impact Development section*

*University of New Hampshire Stormwater Center, Durham, NH*
V. Aquifer and Wellhead Protection

WHAT IS AQUIFER AND WELLHEAD PROTECTION?

Nearly 40% of Massachusetts residents and 60% of New Hampshire residents rely on groundwater as their source of drinking water. Some of this groundwater is found in deposits known as stratified drift, which consists of fine sands and gravels left behind by the glaciers several thousand years ago. These deposits are often found adjacent to river valleys and in wide flat areas that were the location of glacial lakes in the last ice age. These deposits can hold enormous amounts of water and for that reason are the preferred location for municipal and large community wells, which serve the populations of the larger towns and cities in our watershed. The other major source of groundwater is from cracks and fissures in the bedrock itself. This groundwater, while widely available, is not as readily pumped out of the ground and is often best suited for use by individual single-family homes or businesses.

Groundwater, whether in stratified drift or bedrock aquifers, is subject to contamination from various land uses and human activities. Just because we cannot readily see what’s taking place underground does not mean it’s not important to be aware of what is going on beneath the surface. Because soils tend to filter out many (but not all) microorganisms by the time the water carrying such organisms reaches the water table, the major threat facing groundwater is contamination from chemicals dissolved in water. These chemicals range from simple road salt to volatile organic hydrocarbons (VOCs) and industrial solvents. Some chemicals are so destructive to human use of water that the only thing that can be done to safeguard groundwater supplies is to prohibit their use in the most sensitive areas, which include the aboveground areas which supply water to the well or aquifer, sometimes called the wellhead protection area or “zone of contribution”. Chemicals such as industrial solvents and petroleum products fall into this category. For that reason, gas stations, dry cleaners, salt storage sheds and heavy industrial manufacturing are often prohibited from locating within the areas that contribute water to a public or community water supply. Those that remain within zones of contribution often pre-date the zoning that would prohibit them and thus enjoy “grandfathered” status. However, even in this circumstance water supply officials can seek to educate these business and landowners on best management practices (BMPs) that can minimize the risk of spills and contamination.

Other human activities involving some risk, but which can be undertaken in a way that greatly reduces the chances of groundwater contamination, are allowed but only after careful review by the Conservation Commission, Planning Board and, in cases
involving septic systems, the local Board of Health. These include but are not limited to light manufacturing, warehousing, and other commercial uses that involve small quantities of hazardous materials. Good bylaws and regulations will require such businesses to properly store, use, and dispose of such substances.

Because the area / zone of contribution to a well or aquifer can be easily defined through hydrogeological studies, this area is commonly mapped out and is administered as an overlay district in local zoning or regulations. Though the exact terms used to define such regulated areas may vary from state to state, the principles are very much the same across the country.

HOW DO MASSACHUSETTS AND NEW HAMPSHIRE ADDRESS AQUIFER AND WELLHEAD PROTECTION?

There are several steps that are commonly found in most groundwater and wellhead protection programs across the United States. The first step is to delineate the geographic area that contributes water to the well. There may be several sub-zones to this wider area. The first is the area closest to the well that definitely contributes a large percentage of water to the well and within which contaminants may quickly and easily find their way into the well. The second is a larger area that contributes water to the well or aquifer under drought or extreme conditions. This is sometimes called the ‘zone of contribution’ or wellhead protection area. Communities are encouraged to protect as much land as possible in this zone.

The third area is the wider watershed that contributes water to the zone of contribution, which is the aquifer’s or wellhead’s watershed.

The third step is to inventory the land use activities that could potentially pollute the surface or groundwater contributing to the well if they are improperly handled or an accident occurs. These activities or land uses can include junk yards, underground storage tanks for petroleum products, and dry cleaning establishments. After the inventory of potential contamination sources is compiled, the last step is to develop a management strategy that may include public education on the proper handling and storage of hazardous materials, which may include a regulatory mechanism that could include periodic site visits to assist property owners and to assess containment efforts. With some slight variation, this describes the majority of aquifer and wellhead protection programs in the United States. How does this scheme get applied in Massachusetts and New Hampshire?

Typically, all new buildings or impervious surfaces are prohibited in the zone closest to the proposed wellhead when a new well is sited. This zone is usually no more than several hundred feet in diameter and is sometimes referred to as the ‘sanitary radius’. The only uses commonly permitted within this protective area are service buildings associated with operation and maintenance of the well itself. In Massachusetts, this area is called the Zone I and is between 100 and 400 feet in diameter, depending on the pumping rate of the well. The Zone I must be owned or controlled by the water supplier. If the Zone I land is not owned

An Introduction to Water Resource Protection in Massachusetts and New Hampshire
by the water supplier or the town, the water supplier must control the land uses within this zone through a conservation restriction.

In Massachusetts, this area is called the Zone II and in New Hampshire it is called the GA1 area, which is the defined zone of high value for present or future drinking water supply. GA1 areas are only established when a local entity applies to NHDES to do so.

Though the areas defined in New Hampshire’s groundwater reclassification program do not exactly correspond to the Zones I, II and II as defined in Massachusetts, they are close enough analogues for general planning purposes. Most zoning bylaws/ordinances allow all but a few high risk land uses from locating within these areas (NH has no land use prohibitions for their GA1 areas), and typically mandate that land clearing stay below a certain threshold and that certain best management practices be undertaken to minimize the threat of groundwater contamination. It is recommended that water suppliers and/or towns protect as much of this zone of contribution area as possible, either through ownership, conservation restrictions or zoning.
allowed by special permit / exception in this more outlying zone.

In most cases, wellhead and aquifer protection bylaws and ordinances are overlay districts, in which most underlying uses are allowed, though high risk land uses such as salt sheds, hazardous waste facilities, commercial underground storage tanks, and junk yards are not. Single-family homes and their accessory uses are usually exempted from the provisions of such overlay districts.

However, Planning Boards, Conservation Commissions, Boards of Health and water suppliers should consider a public education campaign aimed at homeowners and even renters within aquifer and wellhead protection areas that can educate them on the proper use, storage and handling of petroleum products, paints, lawn chemicals and other materials that could otherwise contaminate groundwater.

WHAT CAN TOWNS AND THEIR CITIZENS DO TO BETTER PROTECT THEIR GROUNDWATER RESOURCES?

The first thing citizens can do is take responsibility for activities taking place on their own property. Realize that any substance or liquid released into a yard or driveway can eventually make its way to the water table or aquifer. If you have a private well for your water supply, this is an especially crucial matter to understand. The proper disposal of wastes, especially household hazardous wastes, is critical. Many towns now either hold their own
regular household hazardous waste collection
days or take part in regional efforts to do so.

The majority of land use decisions are made at
the local level. As a citizen, you may want to
review your town’s zoning bylaw / ordinance
and regulations to see if there is a section on
groundwater, aquifer, or wellhead protection. If
there is, you may want to determine if its
provisions reflect the latest technical studies,
approaches or management techniques
concerning groundwater protection.

If there is no local ordinance or bylaw, you can
discuss this with the Conservation Commission,
Planning Board, and Board of Selectmen and
form a committee to make recommendations to
improve your local ordinance or bylaw.
Citizens can also assist with volunteer efforts
such as storm drain stenciling, which lets people
know that storm drains discharge to lakes,
streams, rivers and the ocean, which many
people seemingly are not aware of. Watershed
associations and the regional planning
commissions often coordinate such efforts, and
hold workshops on a variety of topics that can
help homeowners and citizens to better protect
their water supplies.
The following books, reference materials, and websites provide valuable information on aquifer and wellhead protection:

**Publications:**

*Innovative Land Use Planning Techniques: A Handbook for Sustainable Development*

*Wellhead Protection Tips for Small Public Water Systems (New Hampshire)*

**Organizations and their websites:**
*Mass DEP Water Supply Protection Area Definitions* and [here](#).

*Massachusetts Financial Assistance for the Protection of Water Supplies*

*New Hampshire Department of Environmental Services Water Resource Primer*
VI. Erosion Control and Steep Slopes

WHAT IS EROSION CONTROL?

As we saw in the discussion on stormwater, rain falling on surfaces bare of vegetation or without adequate vegetation can cause soil particles to dislodge and be carried into nearby water bodies. In some locations, wind is also a significant cause of soil erosion. Erosion can be defined as the wearing away of the ground surface as a result of the movement of wind, water, ice and/or land disturbing activities. As most development entails at least some clearing of vegetation, development is one of the primary causes of soil erosion, at least in the United States. Fortunately, there are best management practices that can limit erosion in the face of development or other land disturbance.

WHY IS IT IMPORTANT TO PROTECT STEEP SLOPES AND PREVENT EROSION?

As anyone who has seen a mountain stream or waterfall can attest, water flows at a higher velocity the steeper the grade down which it flows. In flat areas, the flow of water in streams and rivers is much slower, and in such situations, waterways may gradually meander over the land’s surface over time. And just as slow moving streams in flat areas tend to collect sediments, fast moving streams in steep areas tend to dislodge soil particles, rocks and other debris that is then deposited downstream. What is true for streams is also true for all water flowing over steep or flat terrain. Therefore, clearing of vegetation in steep areas has a greater potential of causing serious erosion than clearing of land in flat areas.

Some towns are mainly concerned with the effects of erosion and sedimentation on water bodies and wetlands, and regulate potential erosion causing activities accordingly. Other towns address such activities in all circumstances, whether or not erosion may impact water bodies or upland areas and town roads. Towns should decide on which approach to take based on a variety of factors including the amount of steep areas, the distribution of water bodies and natural resources, the administrative capacity of the Planning Board and Conservation Commission and the political will of town voters to take a more proactive approach to environmental protection.
Several towns administer steep slope and erosion control provisions through an overlay district that is made to apply to areas that meet a certain slope threshold. In developing such a regulatory mechanism, there are several steps that should be followed:

1. **Set a threshold for steep slope applicability**

The first step in developing a regulatory mechanism to address erosion from development on steep slopes is to determine the threshold of slope to be regulated. This will depend in part on the topographic characteristics of the town and the degree of development pressure on steep slopes. A common threshold in many towns is slopes greater than 15%. The slope is determined by dividing the vertical distance (rise) by the horizontal distance (run). Some very hilly towns begin to regulate development on slopes of 20% or 25%, though once it begins to get that steep, it may be wiser to prohibit land development altogether.

Because slope can be measured for any size area, it is important to also set a threshold for area of disturbance. A common area threshold is half an acre, or 20,000 square feet.

An ordinance or bylaw might then read, “This ordinance shall apply to all areas with a slope greater than 15%, as shown on a topographic map or determined by survey, and where the proposed site disturbance is greater than 20,000 square feet.”

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**Figure 10: Factors involved in erosion**

Source: [www.urbanworkbench.com](http://www.urbanworkbench.com)

**HOW CAN EROSION AND THE PROTECTION OF STEEP SLOPES BE ADDRESSED?**

In many communities in Massachusetts and New Hampshire, the easy to develop flat to gradually sloping land has already been developed for town centers, residential, commercial, and industrial land uses. What remains is the steeper land that is harder and more expensive to develop. This is especially the case in the hillier parts of Massachusetts and New Hampshire. Many Planning Boards, Conservation Commissions, and town officials are trying to regulate development in steep areas with provisions that only work well in the flatter parts of town. Over the past two decades, model ordinances, bylaws and regulations have been prepared that can assist towns in better regulating development on steep slopes, thereby reducing the incidence of serious erosion and other environmental problems.
2. **Determine the development density in steep slope areas**

Many towns go further than merely setting a slope and area of disturbance subject to such regulation. These towns regulate the density of development in steep areas, either by requiring a larger lot size in areas with a preponderance of steep slopes, or by discounting a certain percentage of steep slope area from counting towards the underlying (if an overlay zone) minimum lot size. The rationale for either approach is that a lesser density of development minimizes the risk of erosion and environmental damage. A common approach is to increase the minimum lot size by a certain percentage, for example, 50%. So if the minimum lot size in the underlying zone is 2 acres, the minimum lot size in a steep slope area would be 2 acres plus 50% or 3 acres. 

Alternately, the zoning bylaw / ordinance could just specify the lot size for the steep slope overlay district.

3. **Designate allowed and prohibited land uses in the steep slope area**

Because most commercial, industrial, or institutional land uses typically require a greater land area than residences to accommodate the building and parking, many steep slope bylaws / ordinances prohibit such non-residential land uses outright. However, there are numerous examples of where such non-residential land uses have been successfully and safely sited in steeper areas, though doing so entails a much greater degree of engineering proficiency and environmental safeguards than developing on less steep sites.

Land uses such as forestry, tree farms, and recreational uses such as skiing have their own set of issues that differ from those involving construction of buildings and parking lots. These uses are usually allowed provided they meet certain performance standards and best management practices, though some uses, such as downhill skiing facilities, have enormous potential impacts that must be carefully planned for.

4. **Develop a list of erosion and sedimentation control best management practices (BMPs) that can be required of development in areas prone to erosion and/or with steep slopes**

A good steep slope and erosion control bylaw / ordinance will either include a list of best management practices (BMPs) that be applied in the course of development, or provide a link or appendix to where such BMPs can be found.
BMPs to minimize the impacts of erosion on steep slopes address several general areas of concern. Rather than provide a thorough list of BMPs here, the general areas they address are listed. Please see the ‘Where can I get more information?’ section below for a link to lists of BMPs themselves. In general, steep slope and erosion control BMPs address the following:

- Minimize the amount of vegetation that can be cleared
- Minimize the amount of cuts and fills
- Require development to occur in phases, with prior phases of work completed and cleared areas stabilized (usually with ground cover vegetation) before work can proceed to the next phase
- Require physical barriers such as silt fencing, hay bales, or other structures to be installed at the limit (especially the down slope limit) of disturbance. These are only to be removed once the cleared areas are revegetated or the soils otherwise stabilized
- All site work must be in compliance with an approved site plan and/or erosion control plan prepared by a professional engineer
- All stockpiles of soil or other earth materials must be covered or stabilized for the duration of work on the site
- Erosion control measures must be inspected on a regular basis
- Agents of the town’s Conservation Commission, Planning Board, Town Engineer or other professionals may enter the site at any time or after short notice to conduct inspections, especially after rain storms

Photo 8: Siltation of streambed due to improper road construction
Source: Conservation Commission, Townsend, Massachusetts

Photo 9: Siltation in wetland due to improper placement of silt fencing
Source: Conservation Commission, Townsend, Massachusetts
WHAT CAN TOWNS AND THEIR CITIZENS DO TO PREVENT EROSION AND PROTECT STEEP SLOPES?

If your town does not have a steep slope or erosion control bylaw / ordinance and/or regulations, you can request that the Conservation Commission and Planning Board take this up as a topic to study. As can be seen below, there are several models available to assist towns with drafting such documents.

Provisions for erosion and sedimentation control can also be placed in a town’s site plan, subdivision, and/or wetland regulations. Some towns may wish to take this approach rather than have a separate bylaw, ordinance, or regulations on the topic.

As with any bylaw / ordinance or regulation, it is important that supporters of such enhanced environmental protection measures attend work sessions and especially the public hearings on proposed zoning articles. And when such zoning articles appear on the Town Meeting warrant or ballot, it is vital that supporters of such measures get the vote out to increase the likelihood of passage.
The following reference materials and websites provide valuable information on erosion control and the protection of steep slopes:

**Massachusetts**

**New Hampshire**

To address the need for guidance and technical assistance on Innovative Land Use Controls authorized by *RSA 674:21*, DES and its partners, the NH Association of Regional Planning Commissions, the NH Office of Energy and Planning, and the NH Local Government Center, produced **Innovative Land Use Planning Techniques: A Handbook for Sustainable Development**.

This Innovative Land Use handbook includes sections dealing with development density, environmental characteristics, and site level design. Each of the 23 chapters includes model ordinances and regulations for use by municipalities interested in implementing the innovative land use techniques.

**Innovative Land Use Planning Techniques: A Handbook for Sustainable Development**;
Scroll down at the link below to section 2.2 for the chapter on steep slope protection.

Summary and Conclusions

This document is intended as an introduction to the most common water resource protection measures practiced in both Massachusetts and New Hampshire. It is hoped reading it will instill a desire to learn more about how these measures can better protect water resources. The links and information resources provided in this document provide a great deal of additional information, which may prove useful in undertaking these water resource protection efforts. By addressing wetland protection, river and shoreland protection, stormwater management, low-impact development, aquifer and wellhead protection, erosion control and the protection of steep slopes, town boards, committees, and citizens can play an important role in protecting their water in perpetuity.

Citizens can work with their Planning Boards and Conservation Commissions to explore which of these protection measures are suitable or need updating in their towns. Many towns adopted environmental and water resource protection measures in the 1970s and 1980s. In many cases, these bylaws, ordinances and regulations are out of date and do not afford as much protection to the resource(s) as originally intended. The links provided in this document can help citizens and town boards and commissions to access the latest regulatory models and research available in Massachusetts and New Hampshire.

The Nashua River Watershed Association is available to assist towns and help coordinate regional efforts to better protect the water resources of its watershed towns. Please contact the Nashua River Watershed Association at 592 Main Street, Groton, MA or by calling 978-448-0299 to request assistance or learn more about the techniques described in this document. You can also visit our website at www.nashuariverwatershed.org.