

2.5 Protection of Groundwater and Surface Water Resources

BACKGROUND AND PURPOSE

Drinking water for public and private wells and municipal drinking water systems is derived from both groundwater and surface water. This chapter addresses groundwater and surface water separately by providing model ordinances for each. Both ordinances focus on the regulation of land use and the implementation of performance standards as the primary mechanisms to protect the quality of these resources. These model ordinances apply to designated geographic areas that comprise overlay districts superimposed over existing zoning districts. The purpose of these model ordinances is to preserve, maintain, and protect from contamination existing and potential groundwater and surface water drinking water supplies used by public water suppliers.

The *Model Drinking Water Ordinance for Protection of Surface Water Supply Areas and Sources* and its appendices follow the background section of this chapter.

The *Model Groundwater Protection Ordinance* can be downloaded from the N.H. Department of Environmental Services Drinking Water and Groundwater Bureau website at www.des.nh.gov.

TYPES OF WATER RESOURCES

In New Hampshire, public drinking water is supplied by both groundwater and surface water sources. These sources include bedrock aquifers (commonly known as deep or artesian aquifers), stratified drift aquifers (commonly known as sand and gravel aquifers), rivers, lakes and reservoirs. Groundwater is a critical natural and economic resource for communities, and it is the most frequently used source of drinking water in the State. Approximately 62 percent of New Hampshire residents rely on groundwater for their drinking water.

Bedrock Aquifers

Many communities utilize bedrock aquifers as a water supply source. These wells serve both public water suppliers and domestic or private users. In fact, most of the wells drilled in the state since the 1970s have been bedrock wells. In comparison to stratified-drift wells, bedrock wells are typically deeper, tend to have lower yield, and can have a variety of water quality concerns such as iron, manganese and arsenic.

RELATED TOOLS:

- Stormwater Management
- Erosion and Sediment Control During Construction

Stratified Drift Aquifers

Stratified drift aquifers are composed of coarse to fine unconsolidated sediment deposited by glacial meltwater and are found across the state. These aquifers have historically been and are in some communities, the principal high-yielding aquifers for community wells. Stratified drift deposits also are a valuable commodity, providing coarse aggregate material used for construction. Many communities have limited distribution of stratified drift aquifers with varying yields. For many areas, a large percentage of lands overlying these aquifers have already been developed, making these aquifers of limited use to accommodate future water needs.

Surface Water Sources

New Hampshire has approximately 60 surface waters (rivers, lakes, ponds, reservoirs) currently used as a public water supply source. These surface water sources – or water supply watersheds – serve approximately 38 percent of the state’s population or 494,000 people, and the watersheds that provide these sources comprise 80 percent of the state. As a result, nearly all water supply watersheds extend beyond the communities that they serve.

ENSURING THE QUALITY OF PUBLIC AND PRIVATE DRINKING WATER SUPPLIES

Public water systems, whether they derive their water from groundwater or surface water sources, have specific federal and state regulatory monitoring, treatment, and operating requirements to ensure the quality of drinking water. In contrast, private wells that serve homes (or those wells not considered a public water supply source) typically have no monitoring requirements except when first drilled and put into use.

Public Water Systems

The N.H. Department of the Environmental Services Drinking Water and Groundwater Bureau (DWGB) administers New Hampshire’s Drinking Water Source Protection Program, which provides regulatory oversight and non-regulatory assistance to protect groundwater and sources of public and private drinking water. The DWGB also works to ensure the protection, responsible development and use of the ground water and surface waters of the state. The program is responsible for permitting new sources of drinking water, improving protection of existing sources, and ensuring adequate quantity and quality of drinking water. In New Hampshire, “very small” water systems (serving fewer than 500 persons) comprise 95 percent of the public water systems. A public water system is defined by DES as “a piped water system having its own source of supply, serving 15 or more service connections or designed to serve an average of at least 25 or more people for 60 or more days each year.” Public water systems are divided into three categories:

- **Community Systems** include municipal, apartment/condominium complexes, and mobile home parks (resident population).
- **Non-Community/Non-Transient Systems** includes schools, daycare facilities, year-round office buildings, commercial and industrial, and businesses with permanent employees (serving the same non-resident population each day).

- **Non-Community Transient Systems** include restaurants, motels, hotels, ski areas, beaches, and campgrounds (serving different people each day).

The state has approximately 2,416 public water systems that serve about 65 percent of the total state population, or approximately 850,000 people. Of these public water systems, 30 percent are community systems, 19 percent are non-transient, non-community water systems, and 51 percent are transient systems. (NH DES 2008)

Private Drinking Water Wells

Private wells supply drinking water to about 35 percent of the population of New Hampshire, but are not regulated or monitored for water quality by state and federal agencies. Although both public water systems and private drinking water wells derive water from groundwater sources (bedrock, stratified drift, and shallow surface aquifers), routine monitoring of water quality is not regulated by DES for private drinking water wells. New private drinking water wells must be registered with DES and a few communities require water quality and quantity testing as a condition of a local well permit or building/occupancy permit. However, in most instances, if not all, there are no local requirements for subsequent monitoring of water quality or water quantity of private drinking water wells. For all private wells, DES recommends regular water testing of certain contaminants. Visit DES's website www.des.nh.gov for more details.

APPROPRIATE CIRCUMSTANCES AND CONTEXT FOR USE

Sustainability of existing development and accommodation of future growth will largely depend upon development of water resource protection plans at the local level, using the best available technical data and analytical tools to support these plans.

WATER RESOURCES TECHNICAL DATA AND TOOLS

Information valuable for comprehensive water resource protection includes: inventory and map of existing groundwater (bedrock aquifers and stratified drift aquifers) and surface water resources; capacity analysis of existing water supply use and future water demands; and water quality data for existing public and private drinking water wells. The following data sources serve as a fundamental and objective scientific foundation on which land-use, water-use, and resource-use decisions and planning can be based.

USGS Stratified Drift Aquifer (SDA) Maps

The UNH GRANIT GIS system has statewide coverage of stratified drift aquifer deposits, including technical and spatial information about where these aquifers are, how much capacity they have, and the general water quality conditions in a given area. The GRANIT SDA maps are based on a statewide study conducted by the USGS in cooperation with the state in the late 1980-1990s. The detailed reports and maps produced are available from the USGS website http://nh.water.usgs.gov/Publications/biblio_subj.htm.

Surficial Geologic Maps (U.S. Geological Survey and N.H. Geological Survey)

New Hampshire's surficial geologic maps depict the surface distribution, orientation, and structural features of earth materials. The information in these maps can be used to refine the SDA map information. Maps can be viewed and ordered from www.des.nh.gov.

Bedrock Well-Yield Probability Assessment (U.S. Geological Survey)

The U.S. Geological Survey assessed the bedrock aquifer throughout the state in the mid-late 1990s. The purpose of the study was to identify potential high-yielding areas of ground water and determine the quality of water from this source. Products from the study include a statewide bedrock yield model for high yielding wells, lineament and fracture trace maps for all areas of the state, and a summary of bedrock water quality by major groupings of bedrock geologic units. The probability model is designed to show yield areas based on a random placement of wells. High yield wells can be found in every rock type in New Hampshire if specialized exploration methods are employed. Additionally, one of the data sets used to derive the model is the published bedrock geologic map of New Hampshire, which represents the geology at the 1:250,000 scale. Thus, the probability map is limited in its use by this generalized representation of the state's geology. However, the results of the study can provide information useful to communities, as well as to regional and state planners, as a planning tool suitable for community level analysis or resource inventory. The bedrock aquifer yield potential mapping tool and more information are available at <http://nh.water.usgs.gov/projects/nhwellyieldprob>.

One Stop Data Retrieval

The DES maintains an inventory and database of all public (permitted through DES) and private drinking water wells in each New Hampshire community. DES maintains several databases, one of which includes the following information about public water supplies: well type, category, status, population served, service connections, laboratory sample analysis results and reports, licenses and applications, operator contact information, and sampling schedule with results. The database is located at www2.des.nh.gov/OneStop/Public_Water_Systems_Query.aspx.

Web-based Geographic Information System

This GIS database includes various regulated uses and potential point source contamination sites, conservation lands, hazardous waste generators, local resource protection priorities, non-point sources, National Pollutant Discharge Elimination System (NPDES) outfalls, remediation sites, and watershed information. The database is located at www2.des.nh.gov/gis/onestop/.

LOCAL PLANNING INITIATIVES RELATED TO WATER SUPPLY

The following steps are recommended to accomplish comprehensive protection of public drinking water supplies on the local level. Technical and financial assistance is available from DES's Drinking Water Source Protection Program to accomplish these steps.

Step 1. Collect and evaluate information related to existing sources of drinking water supplies (private and/or public) in your community or region; identify issues related to the total quantity and quality of existing water supplies (e.g. growing water consumption); locate local studies concerning future water supplies; evaluate gaps in protections (e.g. existing ordinances, regulations, and plans); identify potential natural and manmade contaminants in local surface and ground waters; evaluate whether they influence the viability of a particular source, and identify long-term public health risks.

Source Water Assessments have been completed by DES to evaluate the existing threats to public water systems in New Hampshire. Visit www.des.nh.gov or a list of water systems and assessment in your community.

Step 2. Develop a Water Resources Chapter in the local master plan that addresses the topic in a comprehensive manner, including an inventory of groundwater and surface water resources, with emphasis on the connection between drinking water supply, and wetlands, lakes, ponds and streams.

Step 3. Develop a Drinking Water Source Protection Plan that identifies long-term water supply protection and management issues and options. A source protection plan consists of the following basic elements: 1) an inventory of potential contamination sources (PCSs); 2) an assessment of risks posed by these PCSs; 3) a management plan to minimize risks to the water source(s); and 4) a contingency plan for responding to emergency loss of the water supply. A source protection plan is an important tool in source water protection because it sets priorities for actions to take in protecting a water source. Actions taken by water system management, surrounding landowners, and the larger community are key to achieving comprehensive protection.

Step 4. Adopt a Groundwater and/or Surface Water Protection Ordinance that balances land development with water supply protection needs; limits high-risk uses; establishes a district boundary based upon technical studies delineating watersheds, stratified drift aquifers, or wellhead protection areas; and requires buffers and setbacks, measurable performance standards related to stormwater management and control of regulated substances.

LEGAL BASIS AND CONSIDERATIONS FOR NEW HAMPSHIRE

FEDERAL SAFE DRINKING WATER ACT

DES has primacy authority to regulate public drinking water systems in the state under both the federal and state Safe Drinking Water Acts. The federal Safe Drinking Water Act applies to every public water system in the United States but does not regulate private wells. The 1996 amendments to the Act greatly enhanced the existing law by recognizing source water protection, operator training, funding for water system improvements, and public information as important components of safe drinking water protection.

A “primacy state” refers to a state that has the responsibility and authority to administer federal drinking water regulations within its borders, and must have rules for drinking water protection at least as stringent as EPA’s.

NEW HAMPSHIRE SAFE DRINKING WATER ACT

The New Hampshire Safe Drinking Water Act (RSA 485:3) establishes authority for DES to adopt drinking water rules and primary drinking water standards, which

apply to all public drinking water systems for the protection of public health. Through its Drinking Water Source Protection Program, DES provides guidance and assistance to water suppliers and municipalities to protect groundwater and surface water sources for public water systems. The program emphasizes prevention of contamination of drinking water through better management of potential contamination sources, land conservation, local land use controls, and public education.

Under RSA 485:23, water suppliers, local boards of health, local health officers, and citizens may petition DES to adopt rules to protect a particular water supply source. Under this section of the Act, DES has adopted rules to protect half of the state's 60 surface water supply sources. As noted above, the watersheds of most surface water sources extend beyond the municipalities they supply; hence, protecting the watersheds through state rules is sometimes more appropriate and effective than relying on local ordinances. DES's goal for these rules is to balance the desire to protect water supplies with the desire to accommodate other existing uses and address threats specific to the water supply source. To that end, DES published *Model Rule for the Protection of Water Supply Watersheds* in 2000 to help water suppliers and local officials craft proposed rules for DES's consideration. Once the rules are adopted by DES, local officials have a role in their enforcement. (NH DES 2006a).

NEW HAMPSHIRE GROUNDWATER PROTECTION ACT

The New Hampshire Groundwater Protection Act (RSA 485-C) was adopted to protect the natural quality of the groundwater resource of the state for drinking water supply. This is accomplished by assisting local groundwater protection efforts and by establishing procedures and standards for the classification and remediation of groundwater, and provides for consistent, protective management and remediation of groundwater affected by regulated contaminants. DES developed and adopted N.H. Code of Administrative Rules Part Env-Wq 401 Best Management Practices for Groundwater Protection, which apply to all potential contamination sources in the state. The BMPs in the rules are essentially common-sense structural and operating practices that should be adopted by all entities that use regulated substances (e.g. oil, regulated contaminants) as defined in Env-Wq 401. The purpose of the BMPs is to help prevent a release of regulated substances, particularly into a high value water resource.

New Hampshire's Groundwater Protection Act, passed by the state legislature in 1991, is enabling legislation for local entities (e.g., water suppliers, town boards) that choose to play a role in actively managing threats (potential contamination sources) in order to protect valuable groundwater. Under the Act, all groundwater may be classified into one of four classes: GAA classification, the most protected class, includes groundwater contributing to public water supply wells (wellhead protection areas). Within GAA areas, six high risk land uses are prohibited and local entities must develop a management program that includes regular on-site inspections and distribution of educational materials to potential contamination sources (PCSs); GA1 classification allows local entities to identify valuable groundwater resources they want to protect via management of potential contamination sources; GA2 classification includes high-yield stratified drift aquifers mapped by the USGS that are potentially valuable sources of drinking water; and GB classification includes all groundwater not in a higher classification. Within areas reclassified to GAA or GA1, local health officers may enforce best management practices within state administrative rule Env-Wq 401 that apply to regulated substances (e.g. oil, regulated contaminants). Reclassification allows protection to be applied across multiple communities according to the resource's boundaries. (Refer to www.des.nh.gov/reclass.htm.)

MODEL DRINKING WATER ORDINANCE FOR PROTECTION OF SURFACE WATER SUPPLY AREAS AND SOURCES

The purpose and the approach of the model ordinance presented in this section are similar to those of DES's *Model Rule* described above under New Hampshire Safe Drinking Water Act. Both DES's model rule and the model ordinance focus on prohibiting certain activities on the water supply source and on restricting land uses within buffer zones around the source and its tributaries. The model ordinance would be useful in situations where the ordinance, in combination with other local controls and protections, would provide adequate protection. In situations where local controls and other existing protections would not be sufficient to adequately protect the source, the model rule should be considered.

Model Groundwater Protection Ordinance

DES and the OEP published in 1998 (and revised in 2006) a *Model Groundwater Protection Ordinance* as a tool for communities to protect groundwater resources. The model ordinance was designed for the protection of aquifers as well as other locally important groundwater, such as wellhead protection areas. The model recommends that before adopting a groundwater protection ordinance, communities should address water resources (groundwater and surface water) in their master plan and where applicable in their community facilities/capital improvements program. The model provides an alternative to a strictly regulatory approach based solely on local use restrictions by including provisions for inspections, measurable performance standards for best management practices and stormwater treatment, and protection of selected groundwater resources that serve as drinking water supplies to ensure the necessary resources can be focused in these areas.

EXAMPLES AND OUTCOMES

CASE STUDY: HOLLIS, NEW HAMPSHIRE

In 2006, the town of Hollis received the DES Source Water Protection Award for its exemplary zoning ordinance overlay districts that protect local groundwater and surface water, as well as protection of conservation lands, a private water well testing program, and protection of the regional drinking water supply. Hollis's Aquifer Protection Overlay Zone provides protection for all of the town's mapped stratified drift aquifer areas. The overlay identifies 13 high-risk land uses that are prohibited, and all permitted uses must implement best management practices and meet specific performance standards for groundwater protection. The Hollis Water Supply Protection Zone further limits land use over the aquifer serving both public and private drinking water wells. The Wetland Conservation Zone protects a 100-foot buffer around wetlands and surface waters, and includes a significant portion of the streams and wetlands in the watershed for Pennichuck Brook, the main water source for Nashua and portions of the surrounding towns. The town also conducted a ground water study (with the N.H. Geological Survey) to locate well records and collect samples, which were compiled to create a comprehensive groundwater water quality database to provide information about arsenic, road salt and the geology of the local aquifers. (NH DES 2006)

Communities should modify DES or other "model" guidance and apply needed protections to both public and/or private water supplies based upon existing or future threats. Information concerning natural (arsenic, radon) or anthropogenic threats (source threat assessments for public water supplies) is available from DES at www.des.nh.gov/dwspp/

CASE STUDY: NEWMARKET, NEW HAMPSHIRE

Newmarket adopted an Aquifer Protection District and Wellhead Protection District ordinance to protect groundwater resources. The Aquifer Protection District for Groundwater Protection includes all stratified-drift aquifer areas and contains the following innovative groundwater zoning protections: compliance with Env-Wq 401 Best Management Practices rules for preventing groundwater pollution; incentives for open space and low-impact development; prohibiting high-risk land uses; requiring environmental performance standards; increased minimum lot size and reduced density where septic systems are used; limits on impervious surface coverage; and limiting on-site hazardous materials. The ordinance includes: a ban on new commercial excavation and underground storage tanks containing petroleum products within the wellhead protection area; and requirement for a build-out analysis and a hydrogeologic study for large developments. (NH DES 2007)

CASE STUDY: PEMBROKE, NEW HAMPSHIRE

Pembroke established an Aquifer Conservation District (ACD) and associated zoning by-laws to “protect, preserve, and maintain existing and potential groundwater supply and ground water recharge areas within known aquifers from adverse development, land use practices, or depletion.” Pembroke Water Works utilizes high capacity gravel packed wells located in shallow aquifers along the Suncook and Soucook Rivers. Among other requirements, the by-laws expressly prohibit subsurface storage of petroleum and refined petroleum products as well as limiting the area of impervious surfaces within the ACD. The ACD boundaries are coincident with the aquifer mapping completed by USGS in cooperation with the DES. As mapping quality improves, the town of Pembroke adjusts its ACD to accurately delineate aquifer boundaries. The entire aquifer is covered by the ordinance so that future supplies as well as current water supplies are protected. In addition, Pembroke applied to the DES to reclassify its wellhead protection areas as GAA, the highest level of protection afforded under state groundwater reclassification. The DES approved the reclassification in January of 1997. GAA classification requires an active inventory, inspection, and management of potential contamination sources (PCSs are defined in RSA 485), limits six high-risk land uses within areas contributing water to the town’s wells and provides Pembroke with local authority to enforce Env-Wq 401 rules at PCSs.

Refer to the margin note under “New Hampshire Groundwater Protection Act” for an explanation of groundwater classification.

Model Language and Guidance for Implementation

MODEL DRINKING WATER ORDINANCE FOR PROTECTION OF SURFACE WATER SUPPLY AREAS AND SOURCES

I. AUTHORITY

The Town or City of Name hereby adopts this Ordinance pursuant to the authority granted under RSA 674:16, II and RSA 674:21, relative to innovative land use controls and RSA 147:1, relative to local health regulation.

II. PURPOSE

The purpose of this ordinance is, in the interest of public health, safety, and general welfare, to preserve, maintain, and protect from contamination existing and potential drinking water supply areas and sources, and surface water bodies that are hydrologically connected to them. The purpose is to be accomplished by regulating land uses, which have potential to contribute pollutants to designated surface water supply areas and sources identified as being needed for present and/or future public water supply, and to maintain the Water Quality Goals as identified in Env-Ws 310.

III. APPLICABILITY

This Ordinance applies to all uses in the Drinking Water Protection District, except for those uses exempt under Article XI Exemptions of this Ordinance.

IV. DEFINITIONS

Best Management Practices (BMPs): A practice or combination of practices determined to be the most practicable means of preventing or reducing, to a level compatible with water quality goals, the amount of pollution generated by nonpoint sources. BMPs are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility.

Disturbance: Any alteration to or reconfiguration of the land surface such as, but not limited to, excavating, clearing, grading, cut and fill.

Drinking Water Supply: Water extracted from a stream, river, lake, pond, or reservoir used as a public drinking water supply, as defined under RSA 485:1-a.

Grandfathered Parcel or Lot: A parcel or lot of record shown on a plan recorded at the ___ Register of Deeds at the time of adoption of this Ordinance.

Hazardous Waste: (As defined under RSA 147-A) A solid, semi-solid, liquid or contained gaseous waste, or any combination of these wastes:

1. Which, because of either quantity, concentration, or physical, chemical, or infectious characteristics may:

The Model Groundwater Protection Ordinance is available online at www.des.nh.gov/dwspp.

The ordinance's restrictions on activities on surface waters are adopted pursuant to the local authority to adopt health regulations. In order for these restrictions to take effect, the ordinance must be approved by the selectmen, etc. as prescribed in RSA 147:1, I., in addition to being adopted by the local legislative body as with other land use ordinances.

- a. Cause or contribute to an increase in mortality or an increase in irreversible or incapacitating reversible illness; or
 - b. Pose a present or potential threat to human health or the environment when improperly treated, stored, transported, disposed of or otherwise mismanaged.
2. Or which has been identified as a hazardous waste by the department using the criteria established under RSA 147-A:3, I or as listed under RSA 147-A:3, II. Such wastes include, but are not limited to, those which are reactive, toxic, corrosive, ignitable, irritants, strong sensitizers or which generate pressure through decomposition, heat or other means. Such wastes do not include radioactive substances that are regulated by the Atomic Energy Act of 1954, as amended.

Impervious Surface: A hard surface area that either prevents or retards the entry of water into the soil profile as under natural conditions prior to development and/or a hard surface area that causes water to run off the surface in greater quantities or at an increased rate of flow from the flow present under natural conditions prior to development.

Personal Watercraft: A gasoline powered sailboat, powerboat, jet-ski, barge, raft, inflatable craft, or other floatable device.

Primary Buffer Protection Zone: The area within 300 feet of the seasonal high water mark of a waterbody actively used as a surface water supply and the area within 100 feet of the reference line of all contributing perennial surface waterbodies (see Figure 2.5.1).

Qualified Professional: A person knowledgeable in the principles and practices of erosion and sediment control, and stormwater management, such as but not limited to a licensed professional engineer, soil scientist, Certified Professional in Erosion and Sediment Control (CPESC), Certified Professional in Storm Water Quality (CPSWQ), or another professional with experience in the principles and practices of erosion and sedimentation control and stormwater management working under the direction and supervision of a qualified professional.

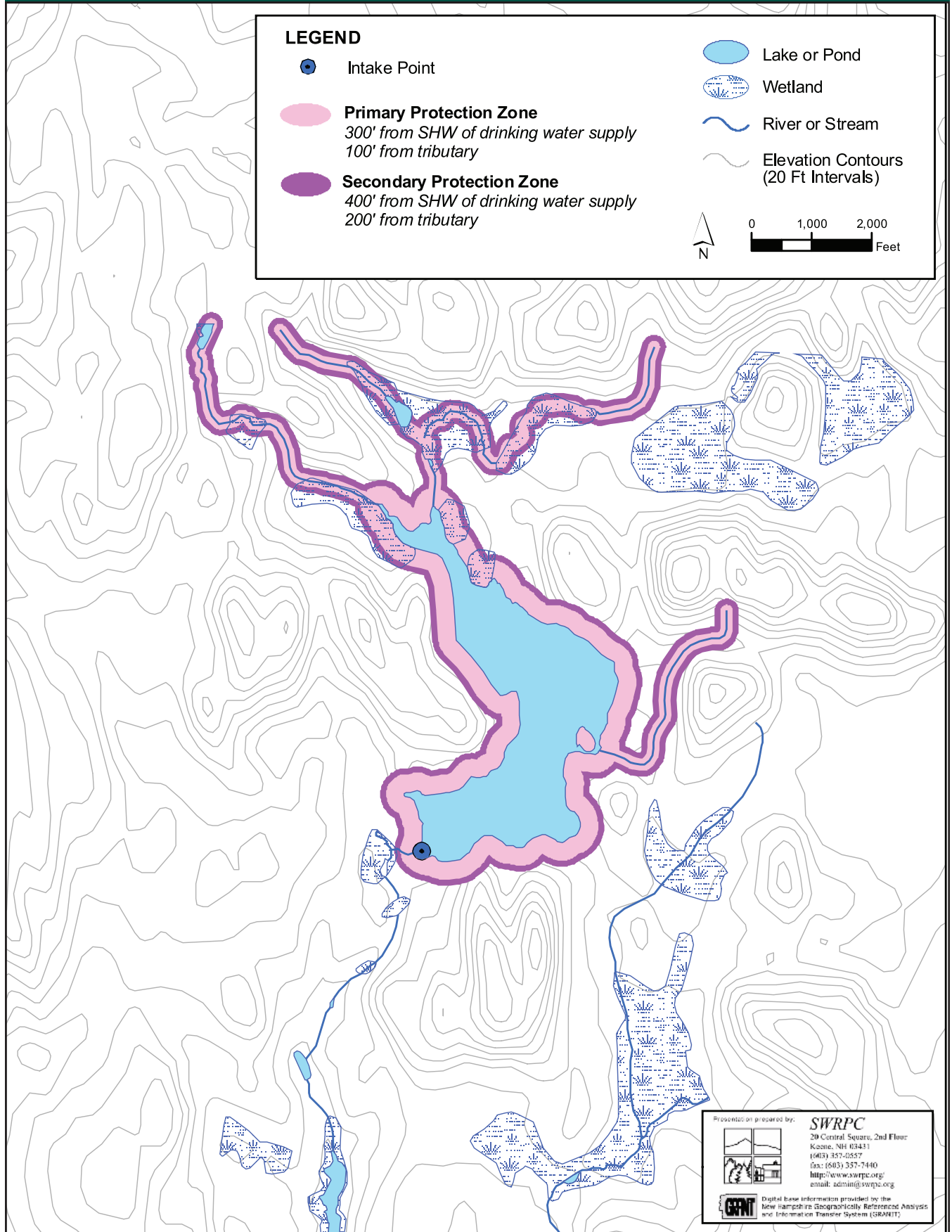
Regulated Substance: (defined in New Hampshire Administrative Rule Env-Wq 401) Any of the following, with the exclusion of ammonia, sodium hypochlorite, sodium hydroxide, acetic acid, sulfuric acid, potassium hydroxide, and potassium permanganate:

1. Oil as defined in RSA 146-A:2, III.
2. Any substance that contains a regulated contaminant for which an ambient groundwater quality standard has been established pursuant to RSA 485-C:6.
3. Any substance listed in 40 CFR 302, 7-1-05 edition.

Reference Line: (defined in RSA 483-B:4, XVII):

1. For natural fresh water bodies without artificial impoundments, the natural mean high water level as determined by the Department of Environmental Services.

FIGURE 2.5.1 Drinking Water Supply Primary and Secondary Protection Zones



2. For artificially impounded fresh water bodies with established flowage rights, the limit of the flowage rights, and for water bodies without established flowage rights, the waterline at full pond as determined by the elevation of the spillway crest.
3. For coastal waters, the highest observable tide line, which means a line defining the furthest landward limit of tidal flow, not including storm events, which can be recognized by indicators such as the presence of a strand line of flotsam and debris, the landward margin of salt tolerant vegetation, or a physical barrier that blocks further flow of the tide.
4. For rivers, the ordinary high water mark.

Secondary Buffer Protection Zone: The area between 300-400 feet of the seasonal high water mark of a water body actively used as a surface water supply, and the area within 100-200 feet of the reference line of all contributing perennial surface waterbodies.

Surface Water Supply: Water that is extracted and treated from sources open to the atmosphere, such as rivers, lakes, and reservoirs.

Water Body: Any flowing water confined in a channel or concentrated overland flow and any standing body of water in a topographic depression that persists annually and for at least several months during the year.

Wetland: An area that is inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal conditions does support, a prevalence of vegetation typically adapted for life in saturated soil conditions (RSA 482-A:2).

V. DRINKING WATER PROTECTION DISTRICT

- A. The provisions of this Ordinance shall apply to land uses and activities and expansion or alteration of existing nonconforming uses and activities identified as possible sources of contamination within areas designated as the Drinking Water Protection District (District). The regulation of land use and activities within the District is essential to protect existing or potential surface water supply areas and sources from the effects of point source and non-point source pollution and sedimentation.
- B. **Drinking Water Protection District Boundary.** Within Town/City [Name], the Drinking Water Protection District is an overlay district, which is superimposed over the underlying zoning district and includes within its boundaries. The District is shown on the map entitled, Town/City of [Name] Drinking Water Protection District, dated [date adopted] and includes the following:
 1. The contributing perennial surface waters to the drinking water supply source.
 2. The Primary and Secondary Buffer Protection Zones as defined under Article IV Definitions of this Ordinance.
 3. The surface water body [insert name of stream, river, lake, pond, or

reservoir] used as a public drinking water supply source, as defined under RSA 485:1-a.

- C. All surface water bodies within the District shall be accurately delineated on each parcel or lot using the best available data or site evaluation methods for all activities regulated under this Ordinance.

The scientific literature suggests that common non-point source pollutants (i.e. nutrients, metals, pathogens) require a natural vegetated buffer of between 100-300 ft to attenuate those pollutants associated with land use development. Application of buffers to first and second order streams, as well as larger tributaries, has been shown to be essential to overall watershed water quality; thus buffer protection is extended to all perennial tributaries. Given varying natural buffer conditions, such as slope, soil type or land cover as well as the nature of the proposed land use, the buffer distances necessary to protect drinking water supplies may vary. Three hundred feet is suggested as a buffer distance along the shoreline of a surface water drinking water supply as that distance would attenuate most common non-point source pollutants. A secondary buffer extending from 300 to 400 from the water supply's shoreline limits certain higher risk land uses.

VI. PRIMARY AND SECONDARY BUFFER PROTECTION ZONE REQUIREMENTS

The Primary and Secondary Buffer Protection Zones are established to protect the water quality of the drinking water supply source and all of its perennial tributaries, while permitting limited uses within the designated Primary and Secondary Buffer Protection Zones. The Primary and Secondary Buffer Protection Zones are intended to protect water quality by maintaining an undisturbed vegetated area and otherwise limiting land use in the area surrounding surface waters used for drinking water supply and perennial surface waters that contribute to the drinking water supply. All permitted uses and activities within the Primary and Secondary Buffer Protection Zones must comply with Article VIII Performance Standards unless specifically exempt under Article XI.

- A. The following uses and activities are prohibited on surface waters or on the ice of water used for drinking water supply that are protected under this Ordinance:
1. Gasoline powered boats, snowmobiles, ATVs or any other gasoline powered personal watercraft.
 2. Fishing, ice fishing, wading, swimming, bathing, water skiing or any similar water contact activity.
 3. Placement of any hazardous waste or regulated substances of any sort left in water or otherwise able to enter the water supply.
 4. Placement of waste, trash or refuse of any sort left in water or otherwise able to enter the water supply.
- B. The following uses and activities are permitted within the Primary Buffer Protection Zone of the Drinking Water Protection District. All Permitted Uses and Activities must comply with Article VIII Performance Standards unless specifically exempt under Article XI. All other uses and activities are prohibited in the Primary Buffer Protection Zone.

1. Uses and activities that provide for conservation of soil, water, plants, and wildlife.
 2. Outdoor recreation, nature study, non-motorized boating, shoreline fishing, and hunting where otherwise legally permitted.
 3. Foot and/or bicycle paths, and bridges designed for such uses; horse paths providing these are no closer than 50 feet to surface waters.
 4. Normal operation and maintenance of existing water bodies and dams, and other water control, supply and conservation devices.
 5. Maintenance and repair of any existing structures.
 6. Agriculture, forestry, and grazing, provided that a 50-foot non-disturbance zone is maintained along all waterbodies, and is conducted in compliance with best management practices in Manual for Best Management Practices (BMPs) for Agriculture in New Hampshire (reprinted April 2002).
 7. Construction, maintenance, repair and enlargement of drinking water supply related facilities such as, but not limited to, wells, pipelines, aqueducts and tunnels.
- C. The following uses and activities are prohibited within the Secondary Buffer Protection Zone of the Drinking Water Protection District:
1. Activities or uses that cannot prevent, through the design or use of best management practices, the untreated release of any regulated substance.
 2. Storage, use, treatment or disposal of hazardous waste as defined under RSA 147-A.
 3. Storage, use, treatment or disposal of a solid waste or sludge facility.
 4. Outdoor storage of road salt or other deicing chemicals in bulk.
 5. Salvage or reclamation yards, including but not limited to automobiles, appliances, home electronics and construction waste.
 6. Snow dumps or long-term storage or stockpiling of snow.
 7. Wastewater or septage lagoons.
 8. Animal feedlots and manure storage, unless in compliance with Agricultural Best Management Practices Manual as referenced above in B.6.
 9. Petroleum, fuel oil and heating oil bulk plant, stations or terminals.
 10. Gasoline stations.
 11. Sewage disposal systems and treatment systems.
 12. Housing, grazing, or other maintenance of livestock.
 13. Commercial (non-agricultural) application of pesticides, herbicides, and fertilizers.

- D. Enlargement or intensification of an existing non-conforming use shall not be permitted in the Primary Buffer Protection Zone. Existing uses, which are nonconforming under this ordinance, may continue until the use ceases to exist or the use is discontinued for a period of two years. Existing nonconforming uses shall operate in conformance with Article VIII Performance Standards. Within the Drinking Water Protection District, an existing nonconforming use shall not be changed to another nonconforming use.
- E. All lands within the Primary Buffer Protection Zone that are part of a subdivision or development project or activity requiring approval under this ordinance shall be identified on an approved subdivision plat or site plan and shall be preserved in a natural state (undisturbed and undeveloped) through a declaration of protective covenant as a “Water Supply Protection Zone.” Such covenant shall be submitted to the Planning Board for review and approval, shall be recorded with the approved subdivision plat or site plan at the Country Registry of Deeds, and shall run with the land and continue in perpetuity.

VII. CONDITIONAL USE PERMIT

A. Grant of a Conditional Use Permit

A Conditional Use Permit from the planning board shall be required for certain permitted uses and activities within the Primary and Secondary Buffer Protection Zones.

1. The following uses occurring wholly or partially within the Drinking Water Protection District shall, where permitted under Section VI, require the grant of a Conditional Use Permit by the planning board:
 - a. Land disturbances greater than 10,000 square feet of land.
 - b. Enlargement, alteration or intensification of an existing non-conforming use or structure.
 - c. Storage, handling, and use of regulated substances in quantities greater than household quantities (greater than five gallons).
2. In granting a Conditional Use Permit, the planning board must determine that the applicant has met all requirements of Article VIII Performance Standards, as well as all applicable local, state and federal permitting requirements.
3. In granting a Conditional Use Permit, the planning board may impose conditions to the extent the Board concludes such conditions are necessary to minimize any adverse effect of the proposed use or activity upon surface waters, consistent with the intent of this ordinance, and to ensure compliance with state and federal drinking water quality standards.
4. In granting a Conditional Use Permit, the planning board may reduce the required buffer zone to reflect site-specific features such as topography, highly permeable soils or areas that provide significant water quality protection for the drinking water supply source and its tributaries.

5. **Primary Buffer Protection Zone Reduction:** A reduction in the required Primary Buffer Protection Zone width down to an absolute minimum of 75 feet may be granted by the planning board upon presentation of technical and water quality information that provides sufficient justification that even with the reduction, the protection afforded would be the same as that provided by the full-width buffer.
6. **Performance Guarantee:** The planning board may, at its discretion, require a performance guarantee or bond, in an amount and with surety conditions satisfactory to the board, to be posted to ensure completion of construction of any facilities required for compliance with the Performance Standards.
7. **Conditional Use Standards.** A Conditional Use Permit application shall be evaluated by the planning board and/or their consultant, in terms of meeting the following standards to ensure that:
 - a. The use or activity, at any point in the development process, shall not result in degradation of the drinking water supply.
 - b. The use or activity will not result in a violation of state drinking water quality standards as defined under Env-Ws 310.
 - c. Non-point source pollution is minimized through implementation of Low Impact Development (LID) techniques.
 - d. Best available technology and stormwater treatment systems address expected non-point source pollutants.
 - e. Structural or operational best management practices are designed to remove or neutralize pollutants that present a potential impact to surface waters within the Drinking Water Protection District.
 - f. Grading and removal of vegetation is minimized, and erosion and sediment control measures (temporary during development and permanent post-development) are properly designed and appropriately placed to minimize erosion and maximize sediment control.
 - g. Subsurface disposal systems (tanks, leachfields) are in compliance with state rules and will only receive residential domestic wastewater. (Note: The planning board may require inspection of existing subsurface disposal systems to ensure proper function in compliance with state rules.
 - h. All businesses using regulated substances are in compliance with Env-Wq 401 and will not expose regulated substances to precipitation.

B. Application and Review Requirements for Issuance of a Conditional Use Permit

1. **Applicability.** A Conditional Use Permit application shall be submitted to the planning board for review for uses and activities described in Article VI.

Such application shall include a copy of any application for a building permit, a site plan review, or a subdivision of land, occurring wholly or partially in the Drinking Water Protection District.

2. **Application Requirements.** A Conditional Use Permit application shall be accompanied by the following information.
 - a. A site plan and description of the size and density of the proposed project, use or activity including the location and extent of impervious surfaces and all land disturbance; existing site conditions including topographic, hydrologic, historic, and vegetative features; and all plans shall identify and label the Primary and Secondary Buffer Protection Zones.
3. **Additional Information.** For uses or activities that disturb greater than 20,000 square feet or pose a high risk to water quality within the district, the planning board may request the following additional information:
 - a. Characteristics of natural and/or man-made drainage on the site and projected runoff from the proposed project area or activity, including rate and chemical characteristics of runoff deemed necessary to make an adequate assessment of both pre-development and post-development water quality.
 - b. Measures proposed to be employed to reduce the rate of runoff and pollutant loading of runoff from the project area, both during and after construction.
 - c. Proposed runoff control and surface water protection measures for the project area or activity. These measures shall be designed with the goal of ensuring the rate and volume of surface water runoff from the site does not exceed pre-development conditions.
 - d. Where existing or planned off-site stormwater quality management facilities are proposed to be utilized, the applicant shall provide a written certification that the owner of the off-site facilities will accept runoff and be responsible for its adequate treatment to a level acceptable to the planning board and/or their consultant.
4. **Bonds.** For projects requiring a Stormwater Management Plan and Erosion and Sedimentation Control Plan, the planning board may request a bond as a condition of approval in an amount determined by the Planning Board, which may be held for up to 12 months after final certificate of occupancy is issued. Such bond will ensure:
 - a. Proposed stormwater management controls are installed as approved.
 - b. Stormwater management controls function properly.
 - c. Performance of routine inspections during and after construction and any necessary maintenance of structures and facilities included in the approved site plans or subdivision plans.

Expansions or redevelopment of areas with preexisting soil contamination problems (referred to as “brownfields”) should be evaluated to determine whether changes to the surface or underlying soils will release existing contamination to groundwater or surface water. Environmental assessment standards and guidance for evaluating brownfield conditions can be obtained from the American Society of Testing and Materials (ASTM) or the US EPA. See EPA’s Brownfields website at www.epa.gov/swerosps/bf/regneg.htm.

VIII. PERFORMANCE STANDARDS

The following performance standards apply to all uses and activities permitted or allowed through a Conditional Use Permit in the Drinking Water Protection District unless exempt under Article XI.

1. **Stormwater Management.** For all activities and uses regulated under this Ordinance, a stormwater management plan shall be submitted to the planning board and/or their consultant for determination of consistency with the intent and purpose of this Ordinance and with Best Management Practices for Urban Stormwater Runoff, NH Department of Environmental Services (January 1996 as updated and amended).

Communities may consider adopting a Stormwater Management Ordinance requiring treatment and management of stormwater for development throughout the community. Alternatively, as a condition of approval for development projects in the Drinking Water Protection District requiring a Conditional Use permit, these projects may be required to meet specific performance criteria for protection of surface waters.

2. **Stormwater Discharge.** Stormwater generated within the Drinking Water Protection District or entering the district shall be treated based upon expected non-point source pollutants prior to discharge, and shall be infiltrated to the maximum extent possible.

Refer to the Stormwater Management chapter for a model ordinance with performance standards and criteria for: impervious surfaces, best management practices, implementation of low impact development techniques, preserving natural hydrologic functions and drainage patterns, and post-development peak flow rates and total runoff volumes, water quality treatment criteria and measurement, groundwater recharge. These performance standards and criteria can also be adopted as part of the subdivision and site plan regulations.

3. **Erosion and Sedimentation Control.** For all activities and uses regulated under this ordinance, an Erosion and Sedimentation Control Plan shall be submitted to the planning board and/or their consultant for determination of consistency with the intent and purpose of this Ordinance.

Communities may consider adopting an Erosion and Sedimentation Control Ordinance requiring implementation of best management practices during construction and for a period following construction for all development projects in the community. Alternatively, as a condition of approval for development projects in the Drinking Water Protection District requiring a Conditional Use permit, these projects may be required to meet specific performance criteria for protection of surface waters.

Refer to the chapter in this volume, Erosion and Sedimentation Control During Construction, which includes a model ordinance with performance standards and criteria for the protection of water quality. These performance standards and criteria can also be adopted as part of the subdivision and site plan regulations.

4. Regulated Substances. For all uses or activities involving the storage, handling, and use of regulated substances the property owner shall develop a stormwater management and pollution control plan. Such plan shall include information consistent with “Stormwater Management For Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices” (US EPA, 1992). The plan shall demonstrate that:

- a. The use or activity will minimize, through source controls and other pollution prevention measures, the release of regulated substances into stormwater.
- b. Recharge to groundwater will not result in violation of Ambient Groundwater Quality Standards (Env-Ws 410.05) on the property.
- c. The use or activity will not infiltrate stormwater passing through areas containing contaminated soils without completing a Phase I Assessment in conformance with ASTM E 527-05 (All Appropriate Inquiry or AAI).
- d. The use or activity will comply with Env-Wq 401.

Source control BMPs are structures or operations that are intended to prevent pollutants from coming into contact with stormwater through physical separation of areas or careful management of activities that are sources of pollutants. See www.ecy.wa.gov/pubs/0510032.pdf.

5. Roads, Bridges, Driveways, Paths and Utilities. Documentation that the following standards are met shall be provided for review for all projects including roads, bridges, driveways, paths and utilities within the Secondary Buffer Protection Zone.

- a. A feasibility analysis shall be conducted to ensure no alternatives are practicable to locate roads, bridges, driveways, paths and utilities outside the Drinking Water Protection District.
- b. All utility rights-of-way shall be the minimum width necessary to allow for maintenance access and installation.
- c. The angle of a road crossing shall be perpendicular to the tributary, wetland or other surface waters, or otherwise configured to minimize disturbance to the land surface and steep slopes, and to reduce clearing.
- d. The minimum number of crossings shall be used within each project and will result in the least overall impact to water quality (i.e. shared driveways).
- e. All roads, bridges, driveways and paths shall be configured and composed of materials to minimize impervious surface coverage to the maximum extent possible.

6. Structures, Buildings, and Residential Dwellings and Accessory

Structures. Documentation that the following standards are met shall be provided for review for all projects including structures, buildings, and residential dwellings and accessory structures within the Secondary Buffer Protection Zone.

- a. An evaluation to demonstrate that no feasible alternatives are practicable to locate structures, buildings and dwellings outside the Secondary Buffer Protection Zone.
- b. All structures, buildings and dwellings shall be located and otherwise configured to minimize disturbance to the land surface and steep slopes, to reduce clearing, and to minimize impervious surfaces.

7. Impervious Surface. Impervious surface coverage shall not exceed 10 percent of the total land area of a parcel or lot wholly within or partially within the Drinking Water Protection District. For developed parcels and lots within the Drinking Water Protection District, existing impervious surface coverage in excess of 10 percent shall not be increased.

Communities may consider restricting impervious surface limits to less than 10 percent to achieve the higher standards for water quality required for drinking water supplies as compared with other uses such as the standards for “fishable and swimmable waters.” It is simply cost effective to maintain the highest water quality standards by limiting land use than paying for additional costly treatment of the drinking water supply.

Watershed research has established that water quality and habitat degradation accelerate rapidly in watersheds when impervious surface areas are greater than 10 percent of the total area, and that stream degradation increases proportionately with increases in imperviousness (see Schueler 1994 and Deacon 2005).

IX. SPILL PREVENTION, CONTROL AND COUNTERMEASURE (SPCC) PLAN

- A. Any use or activity having regulated substances in amounts greater than five gallons, shall submit to the local official such as Fire Chief, Emergency Response Official a SPCC plan for review and approval. It will include the following elements:
 1. Disclosure statements describing the types, quantities, and storage locations of all regulated substances that will be part of the proposed use or activity.
 2. Owner and spill response manager’s contact information.
 3. Location of all surface waters and drainage patterns.
 4. A narrative describing the spill prevention practices to be employed when normally using regulated substances.
 5. Containment controls, both structural and non-structural.
 6. Spill reporting procedures, including a list of municipal personnel or agencies that will be contacted to assist in containing the spill, and the amount of a spill requiring outside assistance and response.

7. Name of a contractor available to assist in spill response, contaminant, and cleanup.
8. The list of available clean-up equipment with instructions available for use on-site and the names of employees with adequate training to implement containment and clean up response.

X. EXISTING NON-CONFORMING USES

Existing nonconforming uses may continue without expanding or changing to another nonconforming use, but must be in compliance with all applicable state and federal requirements, including Env-Wq 401, Best Management Practices for Groundwater Protection Rules.

XI. EXEMPTIONS

The following uses are exempt from this ordinance as long as they are in compliance with all applicable local, state and federal requirements:

1. Storage of heating fuels for on-site use or fuels for emergency electric generation, provided that storage tanks are indoors on a concrete floor or have corrosion control, leak detection, and secondary containment in place.
2. Storage of motor fuel in tanks attached to vehicles and fitted with permanent fuel lines to enable the fuel to be used by that vehicle.
3. Storage and use of office supplies.

XII. RELATIONSHIP BETWEEN STATE AND LOCAL REGULATIONS

Where both the state and the municipality have existing requirements the more stringent shall apply.

XIII. MAINTENANCE AND INSPECTION

Pursuant to the requirements of Article VIII Performance Standards, Inspections shall be performed by the planning board's designee, to ensure compliance with the requirements of this ordinance and any conditions of a Conditional Use Permit. Any necessary maintenance of structures or facilities in the approved Plans shall be paid for with the performance bond.

XIV. ENFORCEMENT PROCEDURES AND PENALTIES

Any violation of the requirements of this ordinance shall be subject to the enforcement procedures and penalties detailed in RSA 676. When the responsible party fails to implement the requirements of this ordinance or any conditions of a Conditional Use Permit, as determined by the Code Enforcement Officer or Board of Selectmen, the [name of the municipality] is authorized to assume responsibility for their implementation and to secure reimbursement for associated expenses from the responsible party, including, if necessary, placing a lien on the subject property.

XV. SAVING CLAUSE

If any provision of this ordinance is found to be unenforceable, such provision shall be considered separable and shall not be construed to invalidate the remainder of the ordinance.

XVI. EFFECTIVE DATE

This ordinance shall be effective upon adoption by the municipal governing body.
[Insert statement of date of adoption and by whom.]

REFERENCES

- Buffer Protection and Management Ordinance, Baltimore County, Maryland, Environmental Protection and Resource Management, Sec. 14-341. *Design standards for forest buffers and building setbacks*. www.stormwatercenter.net/Model%20Ordinances/baltimore_buffer_ordinance.htm.
- Center for Watershed Protection, *Buffer Model Ordinance and Model Surface Water Ordinance*. www.stormwatercenter.net.
- Deacon, Jeffrey R., Sally A. Soule and Thor E. Smith. 2005. *Effects of Urbanization on Stream Quality at Selected Sites in the Seacoast Region in New Hampshire, 2001-03*, USGS and NHDES.
- Lowrance, Richard. 1997. "Water Quality Functions of Riparian Forest Buffers in Chesapeake Bay Watersheds," *Environmental Management*, 21(5), pp. 687-712.
- Manchester Water Works, City of Manchester, New Hampshire, *Watershed Rules for Lake Massabesic*. www.manchesternh.gov/CityGov/WTR/wtrshed/Rules.html.
- New Hampshire Department of Agriculture. April 2002. *Manual for Best Management Practices for Agriculture in New Hampshire: Best Management Practices for the Handling of Agricultural Compost, Fertilizer, and Manure*. www.agriculture.nh.gov/divisions/markets/documents/BMPs_NH_Agriculture.pdf.
- New Hampshire Department of Environmental Services. January 1996. *Best Management Practices for Urban Stormwater Runoff*.
- New Hampshire Department of Environmental Services. May 18, 2006. "Hollis Wins State Award for Water Protection Efforts," press release.
- New Hampshire Department of Environmental Services. 2008. *Annual Compliance Report on Public Water System Violation*. www.des.nh.gov.
- New Hampshire Department of Environmental Services. Winter 2007. "Spotlight on... Newmarket: Protecting the Newmarket Plains Aquifer," *The Source*, newsletter of the NH DES Drinking Water Source Program.
- New Hampshire Department of Environmental Services. April 2000. *Model Rule for the Protection of Water Supply Watersheds*. WD-00-3.

- New Hampshire Department of Environmental Services. October 2006. *Enforcement of NHDES Water Supply Watershed Rules Part Env-Ws 386 Guidance for Local Officials*. WD-06-40.
- New Hampshire Department of Environmental Services and New Hampshire Office of Energy & Planning. February 1999 (Revised June 2006). *Model Groundwater Protection Ordinance*. WD-06-41.
- Schueler, Thomas. 1994. *Watershed Protection Techniques Volume I: The Importance of Imperviousness*.
- State of Massachusetts, Department of Conservation and Recreation. October 2001. *Wachusett Reservoir Watershed Land Management Plan: 2001-2010*. www.mass.gov/dcr/waterSupply/watershed/documents/WachusettLMPES.pdf.
- State of Massachusetts, Department of Conservation and Recreation. *Watershed Protection*, 350 CMR 11. www.mass.gov/dcr/waterSupply/watershed/350CMR11.htm.
- Town of Canaan, New Hampshire. August 2006. *Canaan Street Lake Watershed Protection Plan*.
- Town of Peterborough, New Hampshire. January 2004. *Water Resources Protection Regulatory Strategy Guide*.
- University of New Hampshire Cooperative Extension. *Best Management Practices for Forestry: Protecting New Hampshire's Water Quality*. www.extension.unh.edu/Forestry/Pubs/BMPBook.pdf.
- U.S. Environmental Protection Agency. 1992. *Stormwater Management For Industrial Activities: Developing Pollution Prevention Plans and Best Management Practices*. www.stormwaterauthority.org.
- Wenger, Seth. 1999. *A Review of the Scientific Literature on Riparian Buffer Width, Extent, and Vegetation*. Office of Public Service & Outreach, Institute of Ecology, University of Georgia, Athens, Georgia, www.outreach.ecology.uga.edu/tools/buffers/lit_review.pdf.

