

# Land Use Recommendations for Protecting Water Quality in Canaan Street Lake, Canaan, NH

Report by Plymouth State University's Center for the Environment &  
Upper Valley Lake Sunapee Regional Planning Commission

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# Land Use Recommendations for Protecting Water Quality in Canaan Street Lake, Canaan, NH

## Introduction

The Center for the Environment at Plymouth State University and the Upper Valley Lake Sunapee Regional Planning Commission (UVLSRPC) were contracted to assist the Town of Canaan, NH with a review of land use regulations and procedures that relate to protecting the water quality in Canaan Street Lake, which is the Town's drinking water. The project involved studying Canaan's Master Plan and land use regulations to evaluate how the community currently addresses water resources in the land use planning process and make recommendations to the Canaan Planning Board about how they can apply land use planning to protect the community's drinking water supply. Work on this project was conducted in the fall of 2009 and was incorporated into a graduate level Land Use Planning Seminar providing several Plymouth State students with an opportunity for applied learning. Funding for this project was provided by a Local Source Water Protection Grant from the NH Department of Environmental Services to the Town of Canaan, NH.

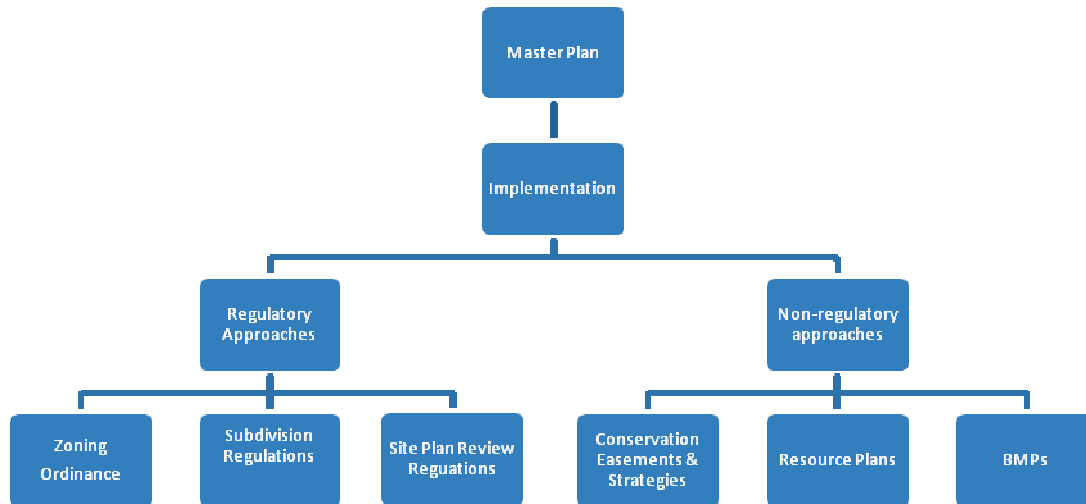
## Land Use Planning Overview

Land use planning is an effective method to give towns control of their future and ensure that their desires are realized and values maintained. Land use planning, like all planning, involves preparing for the future in a rational way. It typically includes gathering and analyzing data, examining possible future trends, considering alternatives, choosing preferred paths, and implementing and monitoring the plan. Planning typically results in the development of a Master Plan, which is a document that lays out the desired future or vision for a community and offers direction for development, location of infrastructure, protection of natural resources, and many other factors concerning the area's future.

The Master Plan is the basis for regulatory and non-regulatory approaches to land use in a community. Regulatory approaches include zoning ordinance and subdivision regulations. Non-regulatory approaches include conservation easements, best management practices (BMPs), and natural resource plans. Figure 1 illustrates the relationship between the master plan land use policies.

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Figure 1. The relationship between the master plan land use policies.



Regulations and ordinances are the most common and appropriate ways of controlling the use and development of land. Subdivision Regulations address the way in which land is divided into new lots along with the construction of roads and associated features such as drainage systems. Zoning regulates the ways in which land is used and the density of the use. Site Plan Review Regulations address commercial and multi-family developments by controlling site design and aesthetics. New Hampshire law authorizes towns and cities to use innovative land use controls to deal with complex planning and development issues (RSA 674:21) and gives municipalities a great deal of authority and freedom to adopt and administer their own specific land use plans and controls that will foster the type of growth and land use desired by that community.

### Summary of Relevant Parts of Land Use Documents and Studies

#### Canaan Master Plan

The New Hampshire Office of Energy and Planning publication *The Planning Board in New Hampshire: a handbook for local officials* (<http://www.nh.gov/oep/resourcelibrary/referencelibrary/p/planningboard/documents/pbhandbook.pdf>) describes a master plan as “a planning document that serves to guide the overall character, physical form, growth, and development of a community...It provides guidance to local officials when they are making decisions on budgets, ordinances, capital improvements, zoning and subdivision matters, and other growth related issues.” The Master Plan sets the future direction of a community through establishing goals and objectives. It serves as the basis for regulatory measures, such as Subdivision Regulations and Zoning Ordinances, which are used to achieve the goals of the master plan.

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Canaan's Master Plan contains a number of goals that address the quality and protection of Canaan Street Lake as well as the town's water supply. Specifically, these include:

- Section VIII. 10. Adopt and enforce regulations such as those proposed by the Source Water Protection Committee that are designed to protect water quality. Develop watershed and Aquifer Protection Zones to prohibit or control any use that would potentially introduce either point or non-point pollutants to Canaan's aquifers and water sources.
- Section VIII. 13. Pass a shorefront ordinance for Canaan Street Lake that will prevent new septic or other potential pollution sources within a shoreline buffer zone of this water body that serves as Canaan's reservoir. Establish a regular and standardized water-testing program for Canaan Street Lake.
- Section VIII. 23. Incorporate a minimum-runoff requirement in the subdivision regulations, requiring new development to design drainage systems that will not discharge additional runoff into existing surface waters in Town.
- Section VIII. 24. Encourage landowners to leave their shorefronts in a natural state...Canaan local government officials should enforce DES wetland, shoreland and reservoir regulations.
- Section X. 14. Establish a 150-foot minimum shore frontage requirement for new lots created fronting on Canaan's lakes and major ponds and the Mascoma and Indian Rivers west of Canaan Village.
- Section X. 15. Adopt and enforce site plan and zoning regulations dealing with water protection, septic systems, and signage.

In addition, Canaan has completed the *Canaan Street Lake Watershed Protection Plan* which has been incorporated as part of the town's Master Plan. This plan outlines the quality of the water in Canaan Street Lake and threats to the water quality, and gives additional objectives for the community to work toward. Of particular significance for this report, the recommendation is made to create a Canaan Street Lake watershed protection area and a shoreland protection district. Another objective is to ensure that subdivision regulations adequately protect water quality from erosion and sedimentation.

### Subdivision Regulations

Canaan defines a property subdivision as the division of a lot, tract or parcel of land into two or more lots, plats, sites, or other division of land. The purpose of the divisions can be for the immediate or future sale, rent, lease, condominium conveyance or building development. Any additional dwelling placed upon a lot shall also be deemed a subdivision.

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Canaan identifies three categories of subdivisions; Major, Minor and Technical. A Major Subdivision is a subdivision of four or more lots, or one which involves the creation of new streets and/or utilities. A Minor Subdivision is divides land into not more than three lots for building development purposes, with no potential for re-subdivision on an existing street and does not involve the creation of new streets and/or utilities. A Technical Subdivision is a subdivision of land into two lots or sites for the purpose of conveying one such lot directly to an abutting landowner.

There are many general requirements for a subdivision of land and these are established in Subdivision Regulations. Canaan's regulations state that in a subdivision the character of the land must not encourage exceptional danger to health or peril from fire, flood, poor drainage, excessive slope or other hazardous conditions. A subdivision will not be allowed if it endangers or injures the health, safety, or prosperity by reason of the lack of water supply, sewage disposal, drainage, transportation, schools, fire protection or other public services. In a subdivision suitable steps should be taken to preserve and protect significant existing features such as trees, scenic points, stone walls, rock outcroppings, water bodies and historic landmarks. Since these general requirements mention water supply and water bodies, it can be inferred that the Subdivision Regulations can be used to protect the water quality of Canaan Street Lake and the public drinking water supply whether it is from surface or ground water.

In Canaan, as in most towns, for a new subdivision it is the subdividers responsibility to provide a state approved individual sewage disposal system or a connection to a public sewer system. For subdivided parcels of land that have existing sewage systems it is the subdividers responsibility to demonstrate that to the planning board that the system is in good working order. If a new well is to be installed it must have a protective radius of 75 feet contained within the subject lot that does not overlap the existing or proposed onsite sewage disposal system, unless the owner demonstrates reasons for the state to waive these requirements. For lots served by public water, approval from the Town Water and Sewer Commission is required. The purpose of these requirements is to protect surface and groundwater water quality for the benefit of public health.

Subdivision regulations typically consist of the establishment of basic requirements of what must be submitted in order to subdivide land as well as minimum design and construction standards for shared facilities and infrastructure. The design and construction standards establish the quality of the proposed development and protection of community resources. These standards are important as they are what the Planning Board will use to base their decision for approval or disapproval of a subdivision. Certain design and construction standards, like erosion and sedimentation control standards and best management practices, can be developed with the intent to protect water quality.

### Historic District Regulations

Canaan adopted Historic District Regulations in 1968 and amended them in July 2005. The Historic District lies in the Canaan Street Lake Watershed. These regulations are designed to protect the

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cultural, social, economic, community, and architectural history of the town while also preserving property values, fostering civic beauty, and strengthening the local economy. The regulations are primarily designed to address aesthetic issues by controlling architectural features and signs in the district. Environmental criteria are also included through a two acre minimum lot size requirement, a 30 foot setback requirement, and conformance with the state's Comprehensive Shoreline Protection Act.

The Historic District Regulations do establish certain permitted uses which include residential (single and multi-family), agricultural, municipal, institutional, and some commercial businesses. All of these permitted uses must be consistent with the architectural and environmental criteria established in the regulations.

### Road Policy

A Class VI Highway/Private Road Policy for the Town of Canaan was adopted in 2008 by the Board of Selectmen. This policy addresses accessibility to structures on private roads and Class VI roads for the purpose of safety. The Road Policy relates to the Canaan Subdivision Regulations in terms of the design of new private roads. The Road Policy does not address road maintenance beyond requiring that private roads and Class VI roads with structures be maintained by private parties in such a manner that allows access at all times. Criteria for road maintenance that relate to water quality, such as the application of road salt, storm drainage, and sediment control, are not included in the Road Policy.

### Septic Survey

Septic systems are commonly used in more rural areas to treat sewage. A septic tank and leach field system are an effective method for treating waste and allowing liquids to be purified by percolation through soil. However, these systems must be properly designed and maintained. When they are not functioning properly the result may be contamination of surface and ground water. In 2009, Canaan conducted a septic survey using a questionnaire and interviews to collect data about the septic systems on Canaan Street Lake shoreline properties. This information will help locate older systems and identify potential problem areas. Mapping the data would allow concentrations of septic systems to be seen. Combined with the septic survey has been an effort to educate shoreline property owners about proper septic system use and maintenance. This effort needs to be ongoing.

RSA 485-A:39 requires an assessment of existing septic systems on shorefront properties prior to execution of a purchase and sale agreement. The intent of this assessment is to give buyers of shorefront property information about the condition of existing septic systems.

### Env-Ws 386, Rules for Protecting the Purity of Regulated Watersheds

Canaan Street Lake is currently covered by the New Hampshire Code of Administrative Rules Env-Ws 386, Rules for Protecting the Purity of Regulated Watersheds. These rules prohibit certain uses,

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including land uses, that could contaminate water quality. Env-Ws 386.18(g)

(<http://des.nh.gov/organization/commissioner/legal/rules/documents/env-ws386.pdf>) states that:

1. A person shall not build, continue or maintain a building or structure of any kind in which animals or fowl are kept, within 75 feet of Canaan Street Lake or within 75 feet of any inlet or tributary thereto;
2. A person shall not permit wastes, or waters that have been used for washing or cleansing either materials, persons, or food, to run into said lake, or into any inlet or tributary thereto;
3. A person shall not throw or deposit any dead animal, fish, or parts thereof, or any food or article perishable or decayable, or any dung either human or animal, into said lake, or permit any wastes to remain within 75 feet of any inlet or tributary thereto, or on the ground surface within 75 feet of any inlet tributary thereto;
4. A person shall not throw any sawdust or allow any sawdust to fall into said lake, or into any inlet or tributary thereto;
5. A person shall not trespass, boat, bathe, swim, fish or carry on any activity whatever whether of recreational, occupational or other nature, in the waters or on the ice of Canaan Street Lake, south of a line about 1,200 feet northwest of the lake's southern most part, beginning at a point on the westerly shore at the center line of the road which exists adjacent to the present property line between the properties identified on tax map I-D as lots 38B and 39D, and extending across said lake to the stone jetty on the easterly shore on the property identified on tax map I-D as lot 56-1. The 2 extremities of such a line shall be properly marked by the local water works authority so that they can be readily identified and observed by the general public; and
6. A person shall not throw, deposit or allow to remain upon the ice of the waters of said lake, or upon that of any inlet or stream tributary thereto, any matter, waste, or materials such as are described in (2), (3) and (4) above.

Enforcement of Env-Ws 386.18(g) is the responsibility of Canaan's health officer, Board of Health, and Water Commission.

The land uses that are prohibited by Env-Ws 386.18(g) (listed above) are minimal. NHDES has developed a "Model Rule for the Protection of Water Supply Watersheds" (<http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-00-3.pdf>) that includes a more extensive list of prohibited uses with a restricted area and a protected area. The restricted area is the land 200 feet from the shore of water supply, and 100 feet from the shore of tributaries to the supply. The protected area is the land 300 feet from the shore of the water supply, and 200 feet from the shore of tributaries to the supply. Within these areas, there are restrictions on the storage of waste and certain materials, the management of stormwater, vegetation removal, types of land uses, and the use of fertilizers.

### Shoreland Protection

The Comprehensive Shoreland Protection Act (CSPA), RSA 483-B, is a state law that regulates activities within 250 feet, referred to as the protected shoreland, of larger lakes and rivers in New Hampshire. The law was originally adopted in 1991 and revised in 2008. The current CSPA regulates new construction and expansion of existing uses, clearing of vegetation, removal of stumps, the use

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of fertilizers, and other activities within the protected shoreland area. The purpose of this regulation is to protect water quality by limiting development activities that might result in excess erosion and pollution along these shorelines.

Detailed and current information about the CSPA is available on the NHDES Web site at <http://des.nh.gov/organization/divisions/water/wetlands/cspa/index.htm> and since the shoreland around Canaan Street Lake is subject to this state law, it is important for the Town of Canaan to be familiar with it.

### Summary of Issues

#### Protection of drinking water

In New Hampshire, public drinking water is supplied by both groundwater and surface water sources. In Canaan, approximately 600 residents and businesses are served by a municipal water system and Canaan Street Lake is the source for this system. Other residences in the community use private wells or privately owned community water systems.

Recently, the Town of Canaan pursued adding ground water to the municipal water system in order to dilute the water from Canaan Street Lake and improve the quality of the water in the municipal water system. The Town has drilled one bedrock well located next to the water treatment plant that filters and treats the water from Canaan Street Lake before it enters the distribution system. This well is undergoing testing in 2009 and additional wells are being considered. The cost of this first well is approximately \$600,000.

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Recently, the Town of Canaan pursued adding ground water to the municipal water system in order to dilute the water from Canaan Street Lake and improve the quality of the water in the municipal water system. The Town has drilled one bedrock well located next to the water treatment plant that filters and treats the water from Canaan Street Lake before it enters the distribution system. This well is undergoing testing in 2009 and additional wells are being considered. This first well will cost several hundred thousand dollars when completed. As of the date of this report, approximately \$180,000 has been spent on the well and the Town has up to \$600,000 available in Federal stimulus funds available for additional costs if needed.

Surface and groundwater can be contaminated in a variety of ways. Human impacts from land development and land uses can cause pollutants and excessive nutrients to enter the surface water

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body or to travel through the ground and contaminate ground water. The Canaan Street Lake Watershed Protection Plan, which has been adopted as part of the Town's Master Plan, outlines the current water quality concerns and potential contamination sources.

Given the Town's reliance on Canaan Street Lake as a public water supply, and more recently supplemented by groundwater, Canaan needs to consider protecting their investment in the community's water system. The recent addition of a ground water well is a significant cost for a small community and should be considered an investment worth protecting. If contaminated, Canaan Street Lake, the surface water supply, would cause Canaan difficulty and financial hardship to either replace or additionally treat the water before it enters the municipal distribution system. The Canaan Master Plan, as noted above, supports protecting water quality and the public water supply.

### Erosion and Stormwater Management

Erosion is a natural process. It cannot be prevented, only reduced to an acceptable level. In theory, soil erosion on a developed site should be maintained at a rate that either is equal to or is below the natural rate of soil formation. Vegetation is typically the best means for preventing erosion as it intercepts runoff, but land use and development often results in the removal of vegetation or changes to the natural vegetation cover. When vegetation is removed or substantially changed and soils are disturbed erosion can occur at an increased rate. As soils move, or erode, they are eventually deposited in a different location. These sediments from erosion often enter a water body and impact water quality by increasing turbidity or introducing a variety of nutrients or pollutants causing additional water quality problems.

Stormwater is the water from rainfall or snowmelt that runs off across a landscape into surface waters. In a natural forested landscape, common for New Hampshire, about half of rainfall soaks into the ground and forty percent either evaporates or transpires through vegetation back into the atmosphere. This leaves ten percent of the remaining precipitation or snowmelt as stormwater which runs off across the forest floor and into surface waters. All of this changes greatly when the landscape changes, particularly with urban and suburban development. The more developed a landscape becomes the more forests are replaced with homes, buildings, roads, and infrastructure, resulting in an increase in impervious surfaces. Impervious surfaces like roads (paved or gravel), driveways, parking lots, and rooftops are surfaces that do not soak in water and provide a surface for water to runoff across a landscape quickly. Developed landscapes, depending on the percent of impervious surfaces, can have many degrees of reduced groundwater infiltration and increased surface runoff. This landscape change disrupts the natural hydrologic cycle and can adversely affect ecosystem health, which also impacts public health and welfare.

Traditionally, the biggest concerns about stormwater runoff have been erosion and localized flooding. But, as runoff from precipitation and snowmelt travels over the land, wastes and residues are picked up and carried to surface water bodies creating what is commonly known as nonpoint

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source pollution. The list below from the Environmental Protection Agency (EPA) lists many of the negative effects that can be caused by stormwater runoff:

- **Sediment** can cloud the water and make it difficult or impossible for aquatic plants and animals to grow and thrive. Sediment also can destroy aquatic habitats.
- **Excess nutrients** can cause algae blooms in surface water bodies. When algae die, they sink to the bottom and decompose in a process that removes oxygen from the water. Fish and other aquatic organisms can't exist in water with low dissolved oxygen levels.
- **Bacteria and other pathogens** can wash into swimming areas and create health hazards, often making beach closures necessary.
- **Debris** - plastic bags, six-pack rings, bottles, and cigarette butts - washed into waterbodies can choke, suffocate, or disable aquatic life like ducks, fish, turtles, and birds.
- **Household hazardous wastes** like insecticides, pesticides, paint, solvents, used motor oil, and other auto fluids can poison aquatic life. Land animals and people can become sick from eating diseased fish and shellfish or ingesting polluted water.
- **Polluted stormwater** often affects drinking water sources. This, in turn, can affect human health and increase drinking water treatment costs.

Conventional stormwater management practices focus on mitigating erosion and flooding caused by increases in stormwater volume from impervious surfaces. Historic storm drain networks with the sole purpose of collecting and routing stormwater runoff to the nearest stream, river, lake, or pond, with little to no treatment. This method can cause contamination of our water bodies. It is now recommended that land use regulations and ordinances address not just the volume of stormwater, but also the quality of the stormwater by creating requirements that help to minimize nonpoint source pollution.

### Land Use Recommendations for the Protection of Drinking Water Sources

The Town of Canaan has a considerable investment in a drinking water system that supplies a portion of the community and measures are needed to protect the drinking water supply. As indicated in the 2006 Canaan Street Lake Watershed Protection Plan, water quality monitoring data from Canaan Street Lake indicate that the quality of this water supply has been deteriorating and actions taken now will help protect the supply in the future. To achieve this goal, the following land use actions are recommended:

#### Amend the Canaan Subdivision Regulations:

Subdivision Regulations are designed to follow from goals established in the Master Plan, which specifically mentions amending these regulations to protect surface water bodies. Subdivision

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regulations should include design and construction standards for stormwater and erosion control best management practices. A review of Canaan's Subdivision Regulations indicates only a short section on "General Requirements for the Subdivision of Land" (Section III) and some additional standards for roads and driveways in Appendix B. These sections are not very specific and should be amended to establish comprehensive and detailed standards that future subdivisions must meet in order to protect water quality.

Controlling the quantity of stormwater runoff from a site is important for mitigating potential flooding and soil erosion. Standards typically call for drainage systems that are designed for a certain magnitude of storm event, such as a 10 or 20 year storm. Stormwater management and erosion control features should be required both during and after construction in order to protect water resources. The Planning Board has a benchmark by which to evaluate applications and to enforce substandard construction practices once construction proceeds. The state and EPA regulate larger construction projects as part of the Alteration of Terrain (AoT) Program and National Pollution Discharge Elimination System (NPDES), respectively. Establishing standards at the municipal level will give Canaan the ability to apply standards to a proposal regardless of project size. These standards can also be more stringent than either AoT or NPDES.

It is recommended that Canaan amend its Subdivision Regulations to include more specific guidelines to address stormwater management practices and erosion controls to protect community water quantity and quality. Specifically, these amendments might require that developments:

- Minimize the area of disturbed soil and reduce the time that soil is left disturbed by phasing construction.
- Maximize the protection of native vegetation.
- Prevent stormwater from outside the site from entering areas of disturbed soil on site and control water on site.
- Control sediment transport on site through seeding, mulching, and structural measures, and preventing sediment from leaving the construction site.
- Control post-development peak rate of runoff so that it does not exceed pre-development runoff for the 2-year, 10-year, and 25-year/24-hour storm events.
- Use low impact development techniques to intercept, treat, and infiltrate runoff from developed areas.
- Require development buffers to restore, enhance, or protect natural areas such as riparian areas, stream channels, wetlands, and forests.
- Prevent stormwater systems from discharging post treatment and detention runoff within 100 feet of surface water in the Canaan Street Lake Watershed.

In addition, Subdivision Regulations can also set standards that help to maintain the quality of water. For example, the Town of Thornton, NH's Subdivision Regulations (<http://www.thorntonnh.org/downloads/SubdivisioinREG081607.pdf>) require that all drainage

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systems must demonstrate features that provide 80% removal of total solids and 40% removal of phosphorus. Applicants are given options as to how to meet this goal by either providing adequate infiltration or other means which could include mechanical devices designed to remove sediments and phosphorus provided documentation is provided that the device is designed to meet the established goal. Many new systems are available that can meet these standards. It is important to note that mechanical treatment systems need to be maintained over time to ensure that they function properly, so the Subdivision Regulations should include a provision that approved subdivisions must be built and maintained in accordance with the approved plan. Evidence of compliance into the future could also be included by requiring developers to regularly submit water quality monitoring results. The amended regulations would need to be carefully worded to enable the Town to enforce mitigation by the property owner if the monitoring results do not meet the standards.

It is also recommended that the Canaan Planning Board review its procedures for reviewing and approving subdivision proposals. Assuring compliance with regulations is time consuming and requires detailed review of submitted applications and plans. Site visits can be an important part of the approval process to assure that site details are adequately covered.

Review of applications by qualified design professionals, such as surveyors and civil engineers, can be conducted at the applicant's expense and Canaan is encouraged to regularly utilize this option to ensure that development plans meet standards set by the Town. During construction, it is important to regularly conduct site visits to ensure that the work is being done in accordance with the plan and that all required erosion control devices are in place and properly maintained. Visits during and after storm events would be a necessary part of this program. Consulting engineers can assist the town with these inspections and, if made a requirement of the approval, it can be accomplished at the applicant's expense. It is recommended that the Canaan Planning Board amend the town's Subdivision Regulations to allow for review of applications and construction inspection by qualified professionals and the collection of funds from applicants for this purpose.

### Adopt a Zoning Ordinance for the Canaan Street Lake Watershed:

In towns with a town meeting form of government, Zoning Ordinances are usually developed by Planning Boards, but must be voted on by the town. It is recognized that the Canaan Planning Board recently developed a zoning ordinance that was defeated by the town in 2006 and there is reluctance to proposing an ordinance at this time.

While Canaan has traditionally relied on Canaan Street Lake for its water supply, the community has more recently added ground water to its system. The community should now look at both Canaan Street Lake and the aquifer that supplies the new well as part of the water system and an investment to be protected. Land uses can also negatively impact ground water and a land use ordinance is needed to protect ground water and the community's investment.

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Zoning Ordinances regulate several functions including the use of land, density of land development, building size, aesthetics, and environmental impacts for the public benefit, health, and welfare. Because there is a correlation between water quality and how land is used and developed, the most effective method to regulate land uses in the Canaan Street Watershed is through establishing land use limitations as part of a zoning ordinance. It is possible for the Planning Board to recommend and create a simple ordinance that establishes a limited number of land use districts. This ordinance could be thought of as a “land use ordinance” focusing on the Canaan Street Watershed for protecting water quality in Canaan Street Lake and ground water in order to protect the town’s drinking water system.

While it is recommended that Canaan adopt a land use ordinance to protect water quality in Canaan Street Lake, New Hampshire’s state statutes do not specifically allow or prohibit a single purpose zoning ordinance. This situation makes it unclear if municipalities can legally adopt an ordinance for only a portion of the community, such as a watershed. RSA 674:20 indicates that a zoning ordinance should divide the municipality into districts and allows for different regulations in each district (although some New Hampshire zoning ordinances have only one district that includes the entire municipality.) Therefore, it is recommended that the Town develop a zoning ordinance that has two districts, a Canaan Street Lake Watershed District and a Non-Canaan Street Lake Watershed District. Within the Canaan Street Lake Watershed District, the goal would be to have land use restrictions to protect water quality and RSA 624:21 gives authority for innovative land use controls, which includes environmental characteristics zoning, as part of a zoning ordinance. In the Non-Canaan Street Lake Watershed District, the controls on land use could be minimal. Alternatively, the Town could adopt a zoning ordinance that has one zone for the entire town with land use restrictions to protect water quality in all parts of the community.

Accurately delineating the boundaries of the watershed and the ground water recharge area around the town’s well is an important step in establishing the geographic limits for a zoning ordinance with the two zones recommended above. If the Planning Board believes that it is necessary to establish tighter land use controls around the lake than is already enacted as part of the CSPA, then a local shoreline buffer could also become part of the ordinance. Mapping these buffer areas is also needed. The UVLSRPC can assist with this process.

Zoning ordinances need to be established from goals in the Master Plan and Canaan has adequate goals in their plan to do this. The ordinance for the Canaan Street Lake Watershed should:

- Prohibit uses that have a higher probability of contaminating the surface and ground water within the watershed and ground water well recharge area (such as junkyards, snow dumps, road salt storage areas, gas stations, automobile service facilities, storage of pesticides, underground storage tanks, and businesses that utilize hazardous wastes).
- In other areas in the watershed, allow land uses with a higher probability of contaminating the surface and ground water only if specified conditions are met.
- Prohibit snow from being plowed or piled within at least 15 feet of a wetland or waterbody.

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- Require stormwater management plans with appropriate operation and maintenance plans for new developments. Prevent stormwater systems from discharging within 100 feet of surface water in the Canaan Street Lake Watershed.
- For new developments or changes to existing uses, control post-development peak rate of runoff so that it does not exceed pre-development runoff for the 2-year, 10-year, and 25-year/24-hour storm event.
- Require the use of low impact development techniques to intercept, treat, and infiltrate runoff from developed areas distributed throughout the site.
- Establish development buffers or encourage techniques that restore, enhance, or protect natural areas such as riparian areas, stream channels, wetlands, and forests.
- Require that all drainage systems must demonstrate features that provide 80% removal of total solids and 40% removal of phosphorus.
- Establish limits on the clearing of vegetation and construction within a certain distance of the Canaan Street Lake shoreline and its tributaries. This local regulation should be considered only if the Town believes that more restrictive protections to the CSPA are necessary.

In 2008, NHDES published “Innovative Land Use Planning Techniques: A Handbook for Sustainable Development”

([http://des.nh.gov/organization/divisions/water/wmb/repp/innovative\\_land\\_use.htm](http://des.nh.gov/organization/divisions/water/wmb/repp/innovative_land_use.htm)) which has model ordinances that address the above recommendations. Three of these (Model Drinking Water Ordinance, Model Ordinance for Shoreland and Riparian Protection, Permanent Post-Construction Stormwater Management Model Ordinance) are attached as appendices for easy reference. It is recommended that Canaan review these model ordinances and work with the UVLSRPC on modifying them to fit the needs of Canaan.

An additional advantage of adopting a zoning ordinance is that it would allow Canaan to develop additional land use regulations for commercial and multi-family developments. These regulations are known as site plan review regulations in New Hampshire and can help address water quality during and after construction for new developments and also substantial changes to existing developments.

### Other Alternatives:

Although Canaan Street Lake is currently covered by the New Hampshire Code of Administrative Rules Env-Ws 386, Rules for Protecting the Purity of Regulated Watersheds, the Town can petition NHDES to modify Env-386.18 and add more restrictions on land use around Canaan Street Lake, such as those outlined in the model rule included in the NHDES publication “Model Rule for the Protection of Water Supply Watersheds,”

(<http://des.nh.gov/organization/commissioner/pip/publications/wd/documents/wd-00-3.pdf>). The

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process for requesting the rule change is outlined in this document. However, NHDES would require evidence of why this approach is necessary and preferred to a local zoning ordinance.

Another alternative approach is to address land use activities in a health ordinance if it can be shown that certain activities and land uses threaten public health due to contamination of the water supply. A zoning ordinance is a preferred method for regulating land uses, and consultation with NHDES and a municipal attorney is recommended before regulating land uses through a health ordinance.

### **Conclusion**

The Town of Canaan took a proactive step to assess its drinking water supply in 2006 by completing the Canaan Street Lake Watershed Protection Plan and adopting it as part of the Master Plan. However, this plan will only be effective if it impacts local policy decisions. Land use regulations and ordinances reflect the policy decisions of a community. They can be difficult to write, adopt, and enforce, but they are the best available means for addressing the impacts of land use on water quality.

In 2009, Canaan appropriated approximately \$600,000 to cover the cost of improvements to the town's drinking water system and drilling a ground water well. This well water is to be added to the drinking water system that has historically relied on Canaan Street Lake as its source. While adding an additional water source is a good idea, it is important to remember that the town now has two sources to protect, and that protection of these sources, both in terms of quantity and quality, will be less expensive in the long term than adding additional sources or restoring the current ones if water quality problems occur in the future. In addition, the Canaan Capital Improvement Plan discusses the need for the replacement of water lines at an estimated cost of \$750,000. These investments in the town's drinking water system are substantial for a town with a \$3.4 million budget.

The town needs to make a decision about the importance of protecting its drinking water supplies. Amendments should be made to the Canaan Subdivision Regulations and the town should adopt a land use ordinance for the Canaan Street Watershed. It is recognized that a town wide Zoning Ordinance was presented to the town in 2006 and it failed to pass. Despite this, a new effort to address land use issues in the watershed should be made for the purpose of protecting the town's drinking water supply.

## Land Use Recommendations for Protecting Water Quality in Canaan Street Lake, Canaan, NH

### References and Resources

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