



New Hampshire  
Office of Energy & Planning

# FORMULATING A WATER RESOURCES MANAGEMENT & PROTECTION PLAN

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## Introduction

In 1986 the New Hampshire Legislature established the Water Protection Assistance Program, (WPAP), under RSA 4-C:19-23, to encourage comprehensive surface and groundwater resources planning and protection. The WPAP is designed to achieve its goals primarily through the development of local water resource management and protection plans. Development of a water plan requires a municipality to inventory its water resources, and to analyze the demands and threats to those resources. These may be defined in terms of threats to water quality from pollutants; the need for public/private water supplies; and demands from competing water uses, such as recreation, wildlife habitat, hydropower production and fire protection. Once adopted, a water plan becomes an element of the conservation and preservation section of the local master plan. As such, it serves as the scientific and statistical basis for water related regulations. It is important that a local water plan provide the most accurate and up-to-date scientific data and analysis available concerning a town's surface water and groundwater resources.

New Hampshire municipalities are not required to develop a local water plan, but are encouraged to do so, if they plan to propose ordinances or amendments intended to protect the municipalities' water resources. RSA 4-C:22 says, "A municipality may include a local water plan in its master plan." This statute does require that such a plan, if developed, be submitted to the Office of Energy and Planning (OEP) for review of its consistency with OEP's administrative rules, before it is adopted by the planning board. The review process is designed to determine whether appropriate data and analysis are incorporated into each local water resource plan. A plan is not required to meet these administrative rules, yet meeting them is in a town's best interest because if a plan is found to be inconsistent with the rules, unsuccessful applicants for a local water-related approval might question the validity of any ordinance based on the plan.

A municipality that chooses not to develop a local water plan may find that its master plan does not include the statistical and scientific data needed to support any proposed ordinances/amendments intended to protect the municipal water resources. As a result, an adopted ordinance might be subject to a challenge. There are towns that have provided scientific studies that adequately document their water resources without actually developing a water plan. Ordinances proposed by such towns are not as vulnerable to legal challenge despite the fact that there is no water plan.

## The Plan

The planning board is responsible for the preparation and adoption of a local water plan, while a regional planning agency or other technical expertise may provide assistance in writing it. OEP's Administrative Rules outline the kinds of information that need to be included in a plan, along with specific data sources. While this technical bulletin describes in a general sense the information a water plan should contain, the administrative rules should be referred to for more detail. Information and data from sources other than those listed in the rules may be provided, if it is at least as up-to-date and accurate as the source of information outlined in the rules. The plan should note if a data source other than that listed in the administrative rules has been used, and should specifically indicate that this information is at least as detailed and accurate as the information sources replaced.

The actual amount, or level of information, which will be included under the different subject areas of a water plan may vary from town to town, depending on a number of factors. These include the extent of existing water resources in a particular town, its land use and growth patterns, particular pollution problems, present population and expected population growth, etc. The format of a water plan may also vary, since significant creativity is allowed

by the rules as to how information and analysis may be presented.

### *Description of Surface Water Resources*

A key aspect of water resources planning is being able to envision a town in terms of its watersheds. Planning board members and other town officials need to understand what a watershed is and how water moves through it, both above and below the ground surface. Such an understanding serves as a continuing reminder that what is introduced in one portion of a watershed can have an effect on another portion. A fundamental part of a water plan is thus the identification of each of the watersheds contained within a town. Any watershed that extends into a surrounding town should also be identified in order to provide a better understanding of potential effects that land uses in these neighboring towns may have on the municipality's water resources.

Delineation of major watersheds on topographic quads has been completed by the Department of Environmental Service's Water Division (DESWD) at a scale of 1:24,000. Approximately 110 watersheds have been delineated and also entered into the state's GRANIT computer mapping system. Watershed boundary data in GRANIT is available from the DESWD as well as from OEP and the regional planning commissions. These delineations can serve as the foundation for the delineation of subwatersheds for a particular town.

A town's surface water resources are valuable for a number of reasons. Lakes and streams provide a variety of recreational opportunities; they may be potential water supplies for a town; they contain important wildlife habitat; and they provide many other intangible benefits. Wetlands are surface water resources that serve as protective buffers against changes in the quantity and quality of the town's other surface waters and its groundwater. They help to regulate stream flow and to protect against floods; they filter nutrients and trap sediments carried by surface and subsurface runoff which otherwise could find its way into lakes or groundwater aquifers. Wetlands are not only complex from a hydrological point of view but they are also extremely complex and productive from an ecological perspective, providing important feeding and/or nesting habitat for many wildlife species.

Floodplains, another surface water resource that may be found in a town, are sensitive resources that should be allowed to function with minimal human intervention. Floodplains are often either wetlands or at least are hydrologically connected to wetlands. They help a town to avoid potential disaster by absorbing floodwaters, thus providing protection to nearby properties from flood damage. Like wetlands, they provide important wildlife habitat, especially for migrating species that use them as travel corridors. They are also generally valuable in encouraging the retention of open space. Since floodplains often contain productive soils, they have value for agricultural purposes if good management practices are used.

Land use activities in and around surface water resources place inevitable pressure on them. Erosion and sedimentation may occur as a result of development and other land use activities. This can seriously affect the ability of surface water to continue to function properly. For example, a wetland may become choked when rainfall washes sediment into it from a nearby building site where there has been poor design and/or construction practices. Or a stream may receive surface runoff after a storm from nearby agricultural or commercial activity, which has not been managed properly. This runoff might contain eroded soil particles and/or pesticide residues. Such runoff occurring after a storm can be even more pronounced when other factors are present such as steep slopes, soils with poor drainage capability, improperly designed and installed drainage systems, or too much impervious cover (roads, paved driveways, parking areas).

Surface waters can also be threatened by other potential contaminant sources. For example, leakage of oil from an underground storage tank may make its way to a wetland or there may be subsurface flow of nutrients into a local lake because leach fields have been placed too close to the lake. A town which has witnessed an increase in development around a local lake or stream may also be threatened by herbicides and pesticide residues as a result of lawn maintenance for shore-front properties; salt runoff from increased road access to the lake; leakage of fuel from motor boats; and so on.

In order to protect a town's surface waters, it is first of all important to document their existence. The following information should be compiled for lakes,

ponds and streams found within each of a town's watersheds: locations and elevations of all lakes, ponds and perennial streams; acreage of lakes and ponds; length of perennial streams (those streams *in* the town that flow all year); the location of any dams; and the location and acreage of wetlands and floodplains which are found within each of the towns watersheds. Finally, any information available on the legislative water quality classification of any surface watercourse or water body should be indicated. It is also important to include information on any large surface water users making withdrawals or discharges of surface water of over 20,000 gallons per day.

#### ***Sources of Information:***

- Topographic maps available from the US Geological Survey, as well as OEP, show watersheds, lakes, ponds and perennial streams. Aerial photographs available from USGS or OEP also show these features.
- Town Master Plan, for any maps prepared as part of municipal planning process.
- Information on dams is available from dam records at DESWD Dam Safety Division.
- Legislative Classification of Surface Waters is available from DES Public Information and Permitting Unit.
- SCS County Soil Surveys can be obtained at County SCS Offices for information on wetland soils.
- Depending on the particular towns, either Flood Hazard Boundary Maps or Flood Insurance Rate Maps have been developed and are available at regional planning commission offices and at OEP. Original copies of these maps can also be ordered from the Floodplain Map Distribution Center in Baltimore, Maryland.
- Average Daily Withdrawal and Discharge Information, available from DESWD.

#### ***Description of the Groundwater Resources***

Groundwater resources are most likely to be the source of water supply for a community, either through public or private wells. Land development, with the resulting buildings, roads and parking areas, can affect groundwater quantity by covering the land surface with impervious material to such an extent that it may not allow adequate recharge of groundwater aquifers. Groundwater quality is

vulnerable to pollution from various land use activities. Pollutants can find their way into an aquifer if nearby septic systems are incorrectly placed on a site or are designed or maintained incorrectly. Aquifers are also at risk from underground storage tanks, household hazardous wastes when disposed of carelessly, from some commercial/industrial facilities, and from landfills and wastewater treatment plants when they are sited or managed improperly.

An important first step in protecting a town's groundwater resources is to document their existence. A water plan should include information about the two most important types of groundwater resources: stratified drift aquifers and bedrock aquifers. Stratified drift aquifers are comprised of sand and gravel materials. Their coarse texture allows for large volumes of water to be stored and they therefore have the potential to yield large volumes of water for public water supplies. A plan should document the acreage of stratified drift aquifers within each of the town's watersheds, as well as indicate those aquifers that extend into neighboring towns.

Bedrock aquifers are made up of fractured rock or ledge. Groundwater may be stored within the fractures, and wells drilled into extensive fractures may yield high amounts of groundwater. On the other hand, wells that do not hit a fractured area are likely to come up dry. Generally speaking, bedrock aquifers yield smaller volumes of groundwater than wells drilled into stratified sand and gravel. A plan should describe the extent of bedrock aquifers within the town's boundaries, based on the most recently available information concerning the kinds of bedrock found within the town.

When considering groundwater resources in a water plan, it is also important to provide as much information as possible about the extent to which groundwater is actually being used in the town. A plan should indicate the number of public and private wells that have been dug or drilled in the town and if these wells have been mapped. Their locations should be indicated in the plan, if possible, in order to observe any relationship between these wells and the groundwater resources that have been identified. Such information can be helpful, when combined with other information, in identifying the future potential of the town's groundwater resources to provide municipal or other public water supply. The plan should also indicate any groundwater

withdrawal or discharge volumes that are greater than 20,000 gallons per day.

#### ***Sources of Information - Stratified Drift Aquifers***

- USGS Aquifer Delineation Maps, or if not available, USGS Groundwater Availability Maps, available from regional planning commissions, DESWD or OEP.
- If neither is available, USGS and Department of Resources and Economic Development Surficial Geology Maps can be used. Available from the DES Public Information and Permitting Unit.

#### ***Source of Information - Bedrock Aquifers***

- 1987 USGS/State of New Hampshire Bedrock Geology Maps (Interim Geology Map), available from the DES Public Information and Permitting Unit.

#### ***Source of Information - Wells and Other Groundwater Use***

- DESWD has Water Well Completion Reports (possibly includes locations) and Average Daily Withdrawal and Discharge Information (same report as for surface water).

#### ***Potential Surface Water and Groundwater Supplies***

Once a town's surface and groundwater resources have been identified, a plan should identify any that are considered to have potential as a public drinking water supply within the next ten years. In order to determine this, those developing the water plan should consider the location of the surface or groundwater resource, the present quality of this water, and the present use of the water. Some or all of this information may already have been gathered as part of local planning efforts to develop a municipal water supply. If it is not clear whether an additional municipal water supply is needed, the plan might include a recommendation for an additional study to determine whether using any of these resources is practical.

#### **➤ Ideas for Presenting Information on Potential Surface Water and Groundwater Supplies**

A base map could be prepared of the town's surface water resources, with separate maps of wetlands and floodplains as appropriate. Overlays could then be developed of: potential pollution threats; any large withdrawals or discharges to surface waters; and

existing and future land uses in the vicinity of these water resources which are or might be threats to them. Such a presentation of the data would help planning board members, other town officials, and members of the public visualize whether or not it is realistic to consider these surface waters as future water supplies for a town.

A similar process could also be followed for potential groundwater supplies. A base map could be created that shows stratified drift aquifers, including those that extend into neighboring towns, and bedrock aquifers. Overlays could be prepared showing information on public and private wells, data on potential threats to groundwater that have been identified within the confines of the town as well as beyond its borders, any large withdrawals and discharges to groundwater, and existing and future land uses which might pose a threat to any of the town's potential water supplies that are considered to contain significant quantities of water.

#### ***Potential Threats to Water Resources***

A water plan should identify as accurately as possible the existence of pollution threats to a municipality's water resources. While various quantitative demands may be placed on a town's water resources over time, threats to water quality are generally more serious because they may be direct threats to public health. Some of this information, reflecting current conditions, is available from the State files, while some can only be gleaned from looking at local planning files that show where various land use activities are allowed, and planned, for the future.

Two categories of potential pollution threats to a town need to be considered. Point pollutant sources are contaminants or discharges that are transported by confined or discrete conveyance structures; for example, pipes, ditches, channels, wells, etc. They are relatively easy to track. The State of New Hampshire requires two kinds of permits to monitor potential point sources of pollution: 1) NPDES permits which are for discharges to surface water, and 2) Groundwater Discharge permits.

### ***Source of Information - Potential Point Pollution***

- DESWD Wastewater Engineering Bureau, for information on any NPDES Permits and Groundwater Discharge Permits, which have been issued.

Potential nonpoint sources of pollution are not as easy to monitor. Examples of potential nonpoint sources are abandoned junkyards, where there may be leakage of organic solvents and movement of this material into the soil at one or more locations on a given site. Another example would be pesticide runoff from an agricultural field or salt runoff from a heavily traveled state road. Nonpoint pollution is usually difficult to observe and its negative impacts are likely to be cumulative.

### ***Source of Information - Potential Nonpoint Pollution***

- DESWD Watershed Management Bureau and DES Waste Management Division (DESWMD) (monitoring well data sometimes available).
- Local planning board files concerning proposed projects, including all approved projects which have not yet received a building permit for pending subdivisions and pending commercial and nonresidential developments required to undergo site plan review; existing and future land use maps from town's master plan, as well as the zoning map.
- Information concerning underground storage tanks should also be documented in a local water plan. This should include the size, age, location, status, contents, and construction of the tanks, and also whether there is an operating leak detection system.

### ***Source of Information - Underground Storage Tanks***

- DESWMD Underground Storage Tank Program.

By referring to the existing and future land use maps from the town master plan, and by looking at the town's zoning map, it is possible to get an idea of the kinds of pollution threats that are likely to threaten a municipality in the future. For example, an increased density of development which is planned for a particular part of town near a future groundwater supply may over time strain the ability of land and water to absorb wastes resulting from this development. The plan should also consider whether the siting of certain structures, materials, high risk activities or land use practices in particular parts of a town now or in the future may threaten surface and/or groundwater quality. It is also important to check the

master plans of any neighboring towns that share any watersheds with the town, since existing and future land uses in those areas also have the potential to affect the municipality's water resources. Finally, It is important to see if any other sections of the town's master plan, if carried out, may result in potential threats to the town's water resources. For example, plans for increasing recreation opportunities on a town's lakes or expansion of a town's highway network. A municipality wishing to undertake a local inventory of potential pollution threats might want to use the recently completed OEP report *Developing a Local Inventory of Potential Contamination Sources*, October 1991, as a guide.

### ***Assessment of Growth in Demand for Water***

Just as a water plan should try to determine the quantity of water that is now, and theoretically could be made available as a water supply for a town if it were needed, it is important to determine how much demand there now is, and is likely to be, for that water in the future. It is therefore important to identify existing and future demand by the various sectors of the community residential, industrial, commercial, agricultural, and institutional sectors. This information will enable the municipality to develop an effective plan to supply water to these various sectors.

### ***Sources of Information - Water Demand***

- OEP population and household projection data, and estimates of persons per household;
- Any engineering or technical studies prepared locally, regionally or by the state.

### ***Description of the Community's Infrastructure***

A water plan should describe the following facilities for handling wastes or supplying water within a municipality.

#### **➤ Septic Systems**

The plan should indicate the estimated area of the town that is served by septic systems only, as well as the population within the town being served by these systems.

### ***Sources of Information:***

- Town's existing land use map in the master plan;
- The zoning map;

- Regional Septage Plans, where available from regional planning commissions;
- Health officer records relative to location and adequacy of septic systems.

Areas of the community where there is potential for growth in the number of septic systems should also be included. It is important to consider which soils in the town have severe limitations for septic system development, or soils with low or very low potential for development.

#### *Source of Information*

- The appropriate Soil Conservation Service County Soil Survey, or soil potential rating system.
- **Solid Waste Facilities Permitted Under RSA 149-M: landfills; transfer stations, recycling facilities, ash landfills, brush and stump dumps, and waste to energy facilities**

Since these facilities have the potential to pollute surface and groundwater supplies, their existence and status needs to be documented. For each facility that is indicated, the plan should note whether monitoring wells are in place to detect any pollution that may be occurring, whether there are any existing permit violations for the facility, and whether there is a need for upgrade or expansion of the facility within the planning period (ten years).

#### *Source of Information*

- DESWMD Solid Waste Compliance Section; DESWMD Solid Waste District plans, if available from regional planning commissions.
- **Public Water Supply Systems Drawing from either Surface or Groundwater, or Both**

A water plan should include a description of the location and service area of any public water systems, the source of their water, whether they are community or non-community in nature, and the adequacy of each system to meet estimated future demand. **RSA 485:1, XII** defines a public water supply as one that provides water to the public for human consumption, if such system has at least 15 service connections, or regularly serves an average of at least 25 individuals daily, or at least 60 days out of the year. Public water systems include both community and non-community systems. Community water system means a public water system that serves

at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents. Non-community systems include all other public water systems. A description should be provided of the location and service area of public water systems, the source of its water, whether it is community or non-community in nature, and the adequacy of the system to meet estimated future demand.

#### *Source of Information*

- DESWD Water Supply Engineering Bureau.
- **Public Wastewater Treatment Plants**

It is important to indicate in the water plan the age, general operating condition, capacity, and adequacy of any public wastewater treatment facility in the town. This includes both municipal as well as smaller public facilities that serve a smaller area of the town.

#### *Source of Information*

- DESWD Wastewater Engineering Bureau

#### *Description of Existing Programs and Policies*

Once a municipality's surface water and groundwater resources have been carefully described, along with demands and threats to these resources, a water plan should evaluate how well the municipality's existing ordinances and regulations address the relevant water quality and quantity issues for that particular community. There are various ways to do this. It is important that the person working on the plan develop a reasonably systematic way of evaluating the regulations, and that this analytical approach is incorporated into the plan itself so that readers can understand the process and will be able to use and update the plan. In other words, once a plan has been completed, a new planning board member or other newly elected official should be able to understand how this analysis was done and what the conclusions were. By doing this, there is likely to be greater continuity in water resources planning for the municipality, and future amendments to the water plan can be developed with greater confidence.

The focus of the review and analysis should be on identifying areas where the substance of an ordinance may be inadequate in terms of providing protection for water resources. This analysis can also be used to identify gaps in local regulations where the result is that one or more types of activities are not addressed

at all. The analysis should consider how well the regulations address the following water resource concerns: control of erosion and sedimentation problems; management of surface water flows; provision of adequate recharge for aquifers; management of existing and potential contaminant sources; maintenance of flood storage capability; prevention of encroachment on wetlands; prevention of high nutrient levels in surface and groundwater; and protection of wildlife and fisheries habitat.

The table found on the last page of this document lists these key water resource concerns that should be addressed in a municipality's existing ordinances and regulations, if protection of surface and groundwater resources is to be guaranteed. The "X's" specifically indicate which concerns should be addressed in which local codes.

A town that is developing a water plan can use this table as a checklist to review each of its existing ordinances and regulations and to determine whether they address the appropriate water resource concerns. In addition, the town can benefit from developing some sort of rating system to evaluate how well their ordinances and regulations address these concerns. This information can also be included in the table.

As an example, a rating of *1* could indicate that the subdivision regulations do not address the control of erosion and sedimentation at all. A recommendation could follow that erosion and sedimentation controls should be included in the regulations, and specific details about such controls could also be included.

A rating of *2* might signify that although the subdivision regulations do deal with erosion and

sedimentation control, they could be improved. Perhaps the erosion and sedimentation controls that are required by the regulations are not based on established Soil Conservation Service standards. Recommendations to utilize such standards could then be included in the water plan.

A rating of *3* could indicate that the town's subdivision regulations do include adequate provisions for addressing the control of erosion and sedimentation, so that revisions are not recommended at the present time.

To summarize, using a framework such as that described above serves a number of important purposes:

- The checklist explicitly identifies for town officials, planners, citizens, and others, the key water resource issues that are or should be of concern to a particular municipality.
- It also identifies how well a town's local ordinances and regulations are presently doing in addressing these water resources concerns. The text then clearly spells out recommendations for improvement to local codes - recommendations that naturally flow from having identified the deficiencies.
- Finally, the checklist and discussion make more visible the thought process that was used by those developing a water plan and can therefore be of benefit to those who will try to make use of the plan and also those who will need to update it in the future.

Review of Local Ordinances and Regulations																
	Erosion and Sedimentation	Rating	Surface Water Flows	Rating	Groundwater Recharge	Rating	Mgmt. of Existing & Potential Contaminant Sources	Rating	Flood Storage	Rating	Encroachment on Wetlands	Rating	Nutrient Levels	Rating	Wildlife & Fisheries Habitat	Rating
Subdivision Regulations	X		X				X		X		X		X		X	
Health Ordinance							X						X			
Zoning Ordinance			X		X		X		X		X		X		X	
Site Plan Review Regulations	X		X				X		X		X		X			
Building Codes							X									
<p>Rating:            1 – Not addressed in Local Regulations            2 – Included in Local Regulations – Revisions advisable            3 – Included in Local Regulations – Adequate provisions provided</p>																