

# **Municipal Planning for Groundwater Protection: Act 199 and Local Options for Groundwater Management**



revised May 2012

**This report was prepared by the Vermont Natural Resources Council (VNRC). The report was funded by the Park Foundation and general support from VNRC's membership. The authors were Kim Greenwood (VNRC Water Program Director and Staff Scientist), Brian Shupe (VNRC Executive Director) and Kate McCarthy (Sustainable Communities Director). The designer was James Sharp (VNRC Office Manager).**

**Founded in 1963, the Vermont Natural Resources Council (VNRC) is Vermont's oldest conservation organization. With the support of nearly 5,000 members and activists, VNRC has worked to protect, restore and promote Vermont's surface and ground waters, viable communities, forest and wildlife resources, working landscape, and energy independence.**

## **Introduction**

Managing our groundwater resources means considering more than threats of contamination or where a private well can be drilled. Global water shortages, climate change, and the “privatization” of water by bottling companies who view water as a commodity for export all have the potential to put pressures on local decision makers. In Vermont, groundwater is an important source of potable water, supplying drinking water to approximately two-thirds of Vermonters. An estimated 320,000 state residents – over half of the population – get their water from approximately 100,000 private wells (not including dug wells or springs).<sup>1</sup>

Because of the importance of groundwater and the issues related to it, the Vermont Legislature passed Act 199 in 2008, creating new groundwater protection options for municipalities. For instance, now, large groundwater withdrawals must comply with town and regional plans, and the public has an opportunity to weigh in on a new state permitting process for large withdrawal projects.<sup>2</sup>

Act 199 also declares groundwater to be a public trust resource. That means it belongs to all Vermonters – a significant step in protecting the water we depend on. Declaring groundwater a public trust resource means that Vermonters – not any private individual or corporation – own Vermont’s water. The Agency of Natural Resources (ANR) is entrusted with the stewardship of our groundwater, and is enabled to regulate it in a way that benefits all Vermonters.

This guide summarizes what Act 199 means to municipalities. Maintaining the quality and availability of current and future groundwater supplies will require vigilance and involvement by

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1 State of Vermont 2006 Water Quality Assessment, Clean Water Act Section 305(B) Report.

2 “Large” withdrawals are defined by language from Act 199, and are those over 56,700 gallons per day.

private citizens, local officials, and state regulatory bodies, and each group has a role to play. This guide is designed to clarify those roles and help towns understand how they may take action to manage their local groundwater resources.

### **How to use this guide**

This guide is designed for municipal officials, citizens and anyone else interested in the management of groundwater at the local level in Vermont. In it, you will find:

- an overview of groundwater and its properties
- a summary of relevant state law relating to groundwater
- new ways that municipalities may protect groundwater, and
- draft groundwater management language for town plans and bylaws for local officials to consider.

This guidebook is meant to be a starting point. There is considerable additional information available to help Vermonters who are contemplating groundwater management efforts, and a summary of these resources is included at the end of the guide. The Vermont Natural Resources Council can provide guidance, but each town should decide for themselves what the best course is. This guidebook is designed to assist in decision-making at the local level.

## **Part I – Groundwater – the Big Picture**

Groundwater, as its name implies, is water that is underground. Water cycles from the atmosphere, as precipitation, to surface water and seeps below the ground in the hydrologic cycle. Water molecules spend time in each stage.

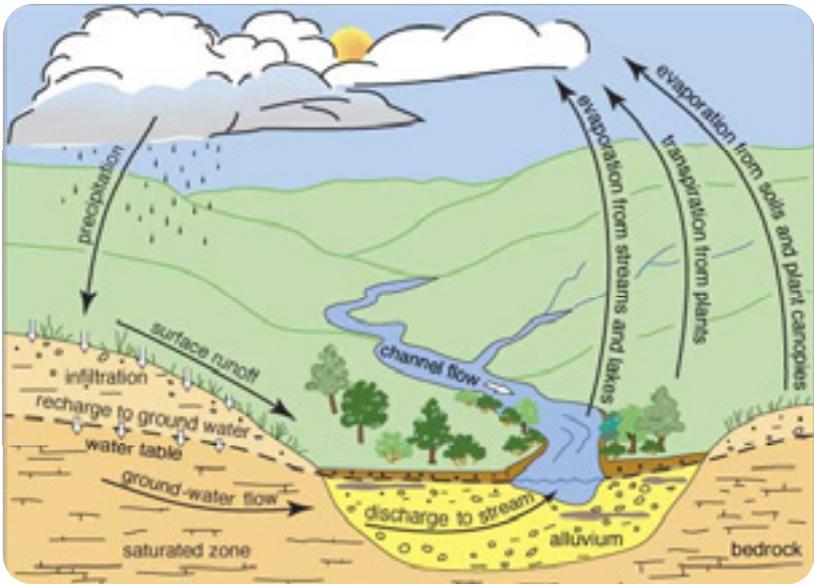
People often think of groundwater and surface water as separate types of water. Our regulatory system often segregates the two, but in reality they are connected. Groundwater contributes to surface water, and surface water contributes to groundwater.

Generally speaking, water spends about a week and a half in the atmosphere, two weeks in stream channels, about ten years in lakes and ponds, a thousand years in glaciers, four thousand years in the ocean, and anywhere from two weeks to ten thousand years in groundwater depending on aquifer characteristics. Therefore, once water enters the groundwater system, it can reside there for a very long time. Because of this, pollutants that enter groundwater can linger much longer than they do in streams or rivers, making groundwater more vulnerable to contamination. In addition, impacts from large groundwater withdrawals on nearby wells can be profound and dangerous – from the withdrawal itself or from the withdrawal “pulling in” nearby contaminants into water supplies and water resources.

### **Groundwater and Surface Water Connections**

Groundwater is an important source of water for surface waters like streams, lakes and wetlands, and it provides other benefits to surface waters. For instance, groundwater helps maintain a base flow of water in streams during drier times of the year, like the hot days of August. Because it’s cooler, groundwater flowing into streams keeps the temperature of the water low enough so that oxygen-loving organisms can survive through the “dog days” of summer. The factors that dictate this flow are discussed below.

Because of this connection, it is impossible to talk about surface water without also considering groundwater flow.



**Figure 1. The hydrologic cycle illustrates how water moves from place to place in the environment.<sup>3</sup>**

Groundwater comes from rainfall, snowmelt or surface water that percolates into the ground. This movement is called groundwater recharge. As much as 50 percent of annual precipitation contributes to groundwater recharge. The amount varies depending on climate, land use, soil type, geology and many other factors. Left untouched, groundwater naturally arrives at a balance, discharging and recharging to and from streams and other surface waters depending on hydrologic conditions such as rain and snowmelt. In other words, there is no such thing as “extra” water in a natural

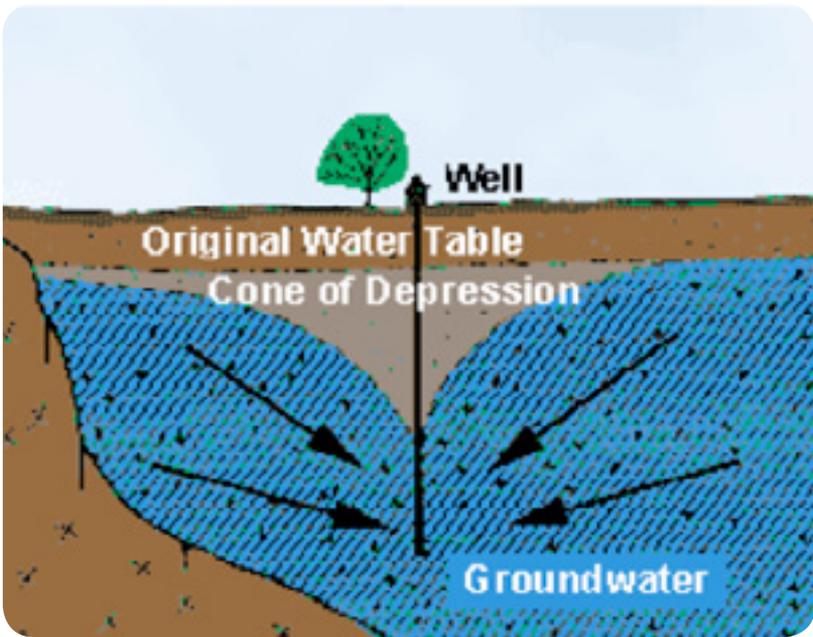
<sup>3</sup> <http://www.kgs.ku.edu/Publications/PIC/PIC23.pdf>

system, and the interconnections mean that what happens in one part of the system may affect other parts.

### **Groundwater Availability**

Groundwater ebbs and flows naturally in the hydrologic cycle. But in addition, human beings pump groundwater out of aquifers for various reasons. Aquifers are bodies of underground permeable rock that hold or transmit water that can be withdrawn via a well.

When water is pumped from an aquifer faster than additional groundwater can reach the well, the water table – or water level – is depressed around the well. This results in what is called a “cone of depression.”



**Figure 2. When water is withdrawn from a well, a cone of depression forms where the water table is drawn down. Depending on several factors such as the amount withdrawn and aquifer characteristics, the depression can be small or large.<sup>4</sup>**

<sup>4</sup> <http://www.rcrc.nm.org/glossary/gl-cone-of-depression.html>

These cones of depression can be very large – up to half a mile across or more in some cases. If the cone of depression reaches another well, that well may run dry. If it reaches nearby streams, it could cause the streams to dry up.

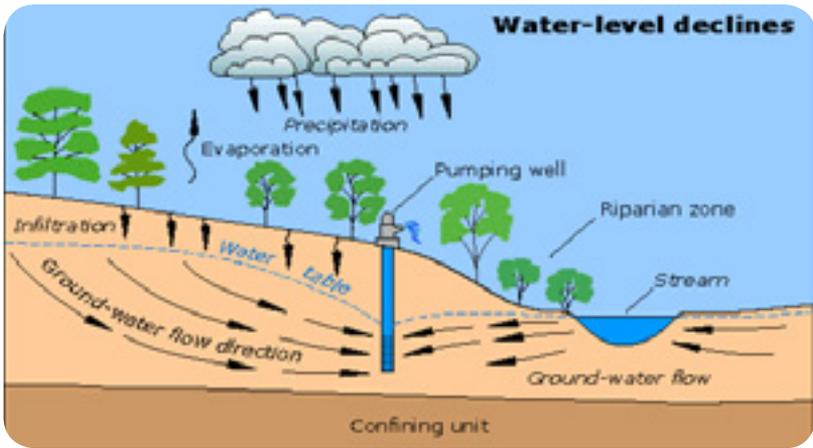


Figure 3. Natural conditions enable groundwater to recharge streams, bringing in cool groundwater to warmer streams.<sup>5</sup>

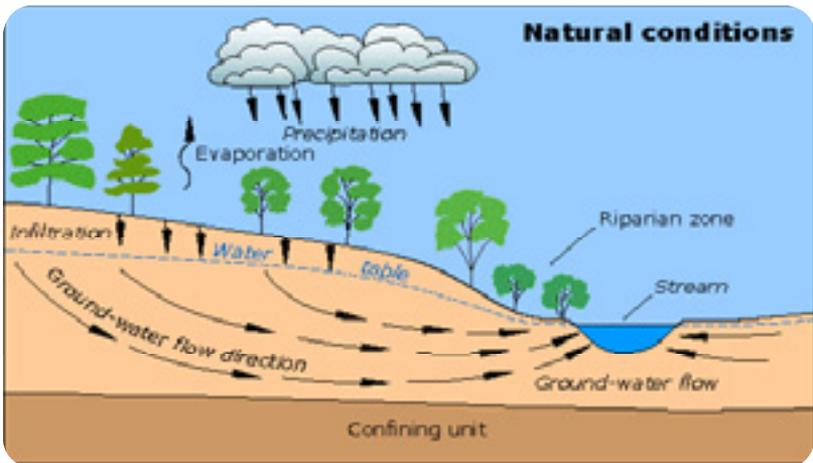


Figure 4. When water is withdrawn from a well, it can lower the water table enough to draw water from nearby surface waters. An example of this is the pervasive sea-water intrusion into fresh water wells in Florida.<sup>5</sup>

<sup>5</sup> <http://www.amiadini.com/newsletters/environmental-enlightenment-061.html>

## **Groundwater and Aquifer Mapping in Vermont**

Because of the connections described above, it can be very useful to understand what groundwater resources exist locally. Most groundwater in the United States has not been comprehensively mapped, however, and groundwater in Vermont is no exception. Individual towns in Vermont have worked cooperatively with state and federal partners to get a better understanding of groundwater resources in their communities. Better mapping of these resources can inform decision makers and the general public about:

- potentially valuable aquifers for future water supply sources
- predicting impacts to groundwater resources from land use activities
- understanding where groundwater is and how it flows on a local scale
- public education opportunities of these resources
- town planning opportunities

Groundwater maps don't look like the topographical maps most of us are used to – they are often much more complex. A groundwater “map” isn't simply a map of where groundwater is located but is often a composite map made up of information about bedrock and surficial geology/glacial deposits, streams, soil types, existing wells and their related data, and any other information that is already available. This information is combined to estimate the characteristics of the particular aquifer. Maps can also show areas of high yield, the geologic overburden material, the groundwater table contour (indicating direction of flow), and the thickness (or potential) of aquifers. Vermont's complex geology makes mapping groundwater resources difficult. Examples of these maps can be found on the website of the Vermont Geological Survey (<http://www.anr.state.vt.us/dec/geo/vgs.htm>).

## Mapping Your Groundwater

Many communities are becoming aware of the pressures on their groundwater and want more information to make informed decisions. Groundwater and aquifer mapping in Vermont can provide important information for community planning and resource protection work and good information is critical for protecting groundwater. Unfortunately, groundwater mapping is labor intensive and expensive.



Limited funds are available each year to assist with groundwater mapping in concert with the U.S. Geologic Mapping STATEMAP program (administered by the Vermont Geological Survey). Often these maps will show geologic mapping, water well data, potential recharge areas, and low and high yield areas. The knowledgeable staff at the Vermont Rural Water Association

**Figure 5. This map of Vermont shows well yields across the state.<sup>6</sup>**

6 <http://www.anr.state.vt.us/dec/geo/gwaterSTATEinx.htm>

is also available for help on how to proceed with groundwater mapping projects and municipal planning considerations. Contact Information for STATEMAP and the Vermont Rural Water Association can be found in the “Resources” section of this guide.

Municipalities wishing to explore groundwater mapping in their communities may decide to do so as a result of interest from involved citizens, a local committee such as a conservation commission or planning commission or municipal staff (e.g., local planning office). The Vermont Natural Resources Council can help to put you in touch with the right officials to get the conversation started.

## **Part II: Act 199 and tools for municipalities to manage groundwater**

### **Act 199 – An Overview**

In 2008, the Vermont legislature enacted Act 199, the Vermont Groundwater Act. This law does several things: it declares groundwater to be a public trust resource, it sets up a permitting and reporting program for large withdrawals, and it gives towns new power to manage groundwater in their communities.

### **The Public Trust**

At the heart of Act 199 is the designation of groundwater as a public trust resource. Public trust resources, such as wildlife, air and streams and lakes, belong to all Vermonters. The private use of these public resources is enabled through permitting or other regulatory means, which ensure that these resources are maintained for the public good.

The public trust doctrine is rooted in common property concepts under Roman law. Air, running water (rivers and streams), the sea and seashore, were “common to all.”<sup>7</sup> This concept has endured and, in some areas, including Vermont, spread to cover groundwater as well. Act 199 provides that “groundwater resources of the state are held in trust for the public.”<sup>8</sup> Although this provision does not create a *new* right of legal action to anyone other than the State, a right to “remedy injury to a particularized interest related to water quantity” remains.<sup>9</sup> This means that there are now clear remedies that are expected if, for instance, a nearby large groundwater withdrawal causes your well to “run dry.” Both the state and individual citizens have interests in protecting groundwater. The potential for both depletion and pollution

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7           INSTITUTES OF JUSTINIAN 2.1.1.

8           10 V.S.A. § 1390 (5)

9           *Id.*

should be considered when drafting town plans in order to protect groundwater.

### **Act 199 Permitting and Reporting Requirements**

Act 199 creates a permitting program for newly established, large volume withdrawals (greater than 57,600 gallons per day), and a reporting requirement for new or existing lower volume groundwater withdrawals (greater than 20,000 gallons per day). Both the permitting and reporting programs have several exemptions, including withdrawals for fire suppression, emergency purposes, domestic uses, agricultural and dairy uses, public water systems, and some types of heat pumps.

Act 199's permitting component requires "new or increased" withdrawals of groundwater for commercial or industrial uses to obtain a permit from the Agency of Natural Resources (ANR). Parties seeking permits must demonstrate that their withdrawal "will not have an adverse effect on other, existing water supplies, significant wetlands or Vermont water quality standards."

In addition to other notification requirements, the Act requires applicants, on or before the date of filing for a withdrawal permit with the ANR, to notify the regional planning commission in the region where the proposed withdrawal is located.<sup>10</sup>

The Act also requires applicants to hold informational hearings before filing for a permit. These informational hearings are held in municipalities where the proposed withdrawal will occur in order

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<sup>10</sup> 10 V.S.A. § 1418(c)(2)(c)

to provide information and answer questions about the proposed project.

Also under Act 199, withdrawals of 20,000 gallons per day or more are subject to a reporting requirement. Groundwater reports filed with the ANR must include: “(1) the location, capacity, frequency, and rate of the withdrawal; (2) a description of the use of the water withdrawn; and (3) where feasible, the distance of each withdrawal from the nearest surface water source and wetland.”<sup>11</sup> As mentioned above, some groundwater withdrawals – even when exceeding 20,000 gallons per day – are exempt from reporting. Withdrawals for fire suppression, withdrawals reported to the ANR under any other program that requires reporting of substantially similar data, withdrawals for domestic uses, agricultural and dairy uses, public water systems, and some types of heat pumps, are among the exempt withdrawals.<sup>12</sup>

Additionally, a proposed withdrawal must be planned in “a fashion that provides for efficient use of the water.”<sup>13</sup> Town officials may tailor the applicability of this provision by narrowing the definition of “efficient use” in their town or regional plan. In order to comply with the statute, withdrawals may not pose undue adverse effects on “existing uses of water dependent on the same water source, public water system(s) permitted by the ANR, [and] significant wetlands under the VT wetland rules...”<sup>14</sup> Finally, the “proposed withdrawal [may] not violate Vermont water quality standards.”<sup>15</sup>

### **Act 199’s Municipal Provisions**

Aside from Act 199, Vermont state statute<sup>16</sup> requires that municipalities who choose to undertake planning to develop plans

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11 10 V.S.A. §1417

12 Id.

13 10 V.S.A. §1418(e)(1)

14 10 V.S.A. §1418(e)(4-6)

15 10 V.S.A. §1418(e)(7)

16 24 VSA Chapter 117 §4302

and associated implementation measures that conform to certain statutory planning and development goals. These include:

*“To identify, protect and preserve important natural and historic features of the Vermont landscape, including ... outstanding water resources, including lakes, rivers, aquifers, shorelands and wetlands;”* and

*“To maintain and improve the quality of air, water, wildlife and land resources.”*



In most communities, these planning goals have been addressed by adopting municipal plan policies calling for the protection of groundwater from contamination from inappropriate land uses (e.g., such as failed or poorly designed septic systems, waste disposal, and leaking fuel tanks). Such policies are commonly implemented through zoning bylaws that establish standards for development within identified groundwater source protection areas (as noted previously, there are several good resources available to assist communities to plan for groundwater protection from

contamination). Few towns, however, have directly regulated groundwater extraction.

Act 199 now gives towns additional power to manage groundwater in their communities. Under Act 199, the Agency of Natural Resources may only issue a permit for new or increased groundwater withdrawal if the secretary determines – among other factors – that the proposed withdrawal is “*consistent with the town or regional plan in which [it] is located,*” and with any policies managing groundwater as a public trust resource.



This provision provides a new opportunity for communities to be proactive in the protection of their groundwater if they so choose. When drafting plan provisions related to groundwater extraction, communities should consider:

- *Using broad language to establish the importance of groundwater protection* – General language regarding the importance of groundwater resources to the community can provide a foundation for restrictions or permitting

requirements and ensure that plan policies are not arbitrary and are intended to protect a broad public interest.

- *Identifying local groundwater issues* – Groundwater issues, such as availability, potential impacts of associated development, and the consequences of increased withdrawals, can vary significantly according to town or region, and so should be articulated in the plan.
- *Including specific examples of the types of activities contemplated in provisions of a municipal plan (e.g. withdrawals for bottling facilities)* – Connecting groundwater extraction policies to the land use plan, and the type and scale of related land uses that are appropriate or inappropriate, will best support land use policies and associated regulations.
- *Listing specific reasons for restrictions on withdrawals* – For example an aquifer is limited in quantity and extraction for commercial purposes could deplete the aquifer and eliminate drinking water sources for its residents, or there is a known connection between a wetland or surface water that could be adversely impacted by a withdrawal. This will establish the need for any regulatory policies.
- *Being sure that plan policies are clear and unambiguous* – Avoiding vague or overly broad policies related to groundwater extraction is important for providing clear direction to the Agency on what a municipality is expecting. It can also guide the development of specific language in the town's bylaws.

Below are some examples of language that could be considered in a town plan provision that protects groundwater resources. *Please note:* This is sample language only, and local officials should

consider their municipality's particular circumstances and needs in order to adapt these suggestions or develop new ones.

*General foundational plan narrative and supporting data:*

- Groundwater is a public trust resource that must be managed by the state in the best interest of all Vermonters.



- [Name of Town] values groundwater as a vital resource that must be protected from degradation because [list reasons specific to your town – these may include protecting the ecological functions of wetlands, ensuring adequate streamflow, maintaining potable water supplies for future generations, avoiding adverse impacts associated with the development of groundwater resources (e.g., trucking), etc.].
- Groundwater is particularly important to [Name of Town]’s natural resources due to the connection between surface water and groundwater [Specify the areas in the town where groundwater is known to be vital to the health of natural resources in town and how protecting groundwater will protect these resources].
- [Relevant data may include identified source protection areas for public or community water supplies, the number of residents reliant on private wells, or mapped groundwater resources.]

*More specific policies regarding large withdrawals:*

- In [specified land use or zoning] Districts in the Town of [Name of Town], groundwater is particularly important to protect because \_\_\_\_\_. Accordingly, the withdrawal of water for uses other than residential or agricultural use should not exceed \_\_\_\_\_ gallons per day (gpd) *[Note: Towns can fill in the blank with a limit and must decide if it wants to exempt residential and agricultural use from this provision. Residential and agricultural uses are presumed to be public trust uses – that*

*is, they are uses that cannot be regulated by municipalities – of groundwater under Act 199.]*

- In [Name of Town], groundwater shall be used first and foremost for residential and agricultural uses. Accordingly, in [specified land use or zoning] Districts of Town where residential and/or agricultural uses are promoted, high intensity commercial uses of groundwater are prohibited. High intensity uses” are those that use more than [a certain threshold in gallons per day] based on the thresholds in Act 199. [*Note: Towns can define prohibited uses by disallowing high intensity uses in general, or by actually listing known high intensity uses*].

The town plan is also a place to specify what actions the town will take next to manage its groundwater. This is another place in the town plan where the need for groundwater mapping may be identified.

*Possible town plan strategies/actions related to groundwater:*

- Research feasibility of undertaking groundwater mapping in [Town].
- Work with the Vermont Rural Water Association to learn about local water resources and how to undertake groundwater mapping.
- Explore funding mechanisms for groundwater mapping in [Town].
- Update zoning bylaw to regulate large groundwater extraction. Define districts in which different types of

extraction are allowed and update review processes for such uses.

Local regulation of water extraction as a defined land use is authorized under state enabling legislation for land use regulation (24 V.S.A. Chapter 117). If the municipality has adopted zoning bylaws, it is important that those bylaws be in conformance with the plan. It is also important that any terms related to groundwater, such as “high intensity use,” are clearly defined in the definitions section of the bylaw. In defining various types of groundwater extraction, it can be useful to make the distinction between community or public systems that serve residences and business uses within a defined service area and commercial extraction for the off-site sale of bulk wholesale or retail water.

Zoning bylaws can effectively prohibit commercial extraction by not identifying it as an allowed use in one or more districts (provided the zoning bylaw stipulates that only identified uses are allowed in respective districts). This would be in conformance with a municipal plan policy that calls for a prohibition or high level of groundwater protection. Another option is to place a cap on the rate of withdrawal allowed in the community (e.g., a cap of 57,600 gpd would prohibit large scale extraction as defined by Act 199), or limiting water extraction to an accessory use serving other land uses allowed in the community (although if a community has a broad definition of industry or commercial business, a bottling plant could fall under that definition).

Municipalities can also choose to allow some form of commercial extraction and impose appropriate standards for such uses. Defining the use and allowing it as a conditional use in appropriate districts, and including specific use standards that apply to

commercial extraction can easily achieve this. Reasonable standards might include:

- Assurances that the extraction won't impact neighboring properties or the long term viability of the aquifer (i.e. withdrawal rate not exceed recharge).
- Limitations on land use and management activities within the defined source protection (recharge) area.
- Traffic impact standards associated with trucking of bulk water, and related performance standards for secondary impacts (typically included in conditional use review);
- Site development standards to address related facilities (pumphouse, access, etc.)

Local regulation of water extraction as a defined land use authorized under state enabling legislation for land use regulation (24 V.S.A. Chapter 117), and is not authorized under the Groundwater Protection Act. Such regulation, however, should be consistent with applicable state review processes.

### **Conclusion**

Act 199 provides municipalities with important tools that allow them to have a say in how groundwater resources are managed. This document has provided some examples of how a municipality might opt to protect its groundwater. Water issues will only become more pressing in the years to come. By thinking ahead, having a community conversation, and planning for uses based on the resources available, municipalities will be able to prevent conflicts and preserve this precious resource.

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## **Additional Information**

Funding for groundwater mapping efforts: Vermont Geological Survey <http://www.anr.state.vt.us/dec/geo/statemap.htm>

Existing mapping information and examples of groundwater maps: Vermont Geological Survey <http://www.anr.state.vt.us/dec/geo/grndwaterinx.htm>

Training, source water protection and onsite assistance programs: Vermont Rural Water Association <http://vtruralwater.org/>

Drinking water quality and testing: Vermont Department of Health [http://healthvermont.gov/enviro/ph\\_lab/water\\_test.aspx](http://healthvermont.gov/enviro/ph_lab/water_test.aspx)

General questions, Vermont water regulations, policy and science: Vermont Natural Resources Council <http://www.vnrc.org/>



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