

Protecting Shared Drinking Water Resources

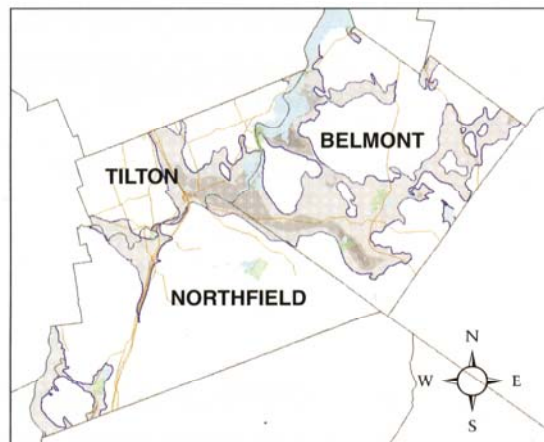
A Collaborative Initiative of Belmont, Northfield, and Tilton

This project was developed based on community interest in the preservation of the quality and quantity of existing and potential future drinking water supplies through aquifer protection measures. The Water Resources Committee, comprised of community representatives, participated in the many components of this project and contributed extensive knowledge of town-specific concerns and issues. Planning assistance was provided by the Lakes Region Planning Commission (LRPC). The communities are now beginning to implement key project recommendations in a continued effort to protect the stratified drift aquifer as a drinking water resource. This brochure summarizes the project. Funding provided by a Source Water Protection Grant from the New Hampshire Department of Environmental Services (NHDES) and the Lakes Region Planning Commission.



Beneath the towns of Belmont, Northfield, and Tilton lies a sizable stratified drift aquifer which currently supplies drinking water to 29% of the towns' residents, and which has the potential to provide additional sources of drinking water to meet future needs. A stratified drift aquifer is made of deposits of sand and gravel (called stratified drift) left behind by the glaciers, which have the ability to store water in the empty spaces between their particles in a quantity large enough to yield a sufficient water supply to a well. This project's focus is on the long-term protection of the stratified drift aquifer as a drinking water resource. The map below should help you get a sense of where the stratified drift aquifer is located beneath the three towns.

Stratified Drift Aquifer
Belmont, Northfield, Tilton



Stratified Drift Aquifer
Transmissivity (ft²/day)

- 0 - 1000 ft²/day
- 1000 - 2000 ft²/day
- 2000 - 4000 ft²/day
- Surface water

- Aquifer boundary
 - Approximately located
 - Inferred
 - Concealed
- Study Area boundary/closure line
- Stream or Shoreline
- Primary/Secondary Road
- Conservation Lands

On the map above you will see three different shades of color within the outline of the aquifer. A darker shade of color indicates a zone of higher transmissivity, or an area of the aquifer that has a higher potential to yield a good supply of water. For additional information on aquifer transmissivity, please refer to the complete project report.

Data from: NHDES, USGS and GRANIT

Map prepared by NH Dept. of Environmental Services
In Cooperation with the Lakes Region Planning Commission, 2003

Why Is It Important To Protect Drinking Water Resources in Belmont, Northfield, and Tilton?

Adequate and clean drinking water supplies are extremely important for overall community health, economic well-being, growth potential, and quality of life. Since over a quarter of the current three-town population is served by systems drawing from the stratified drift aquifer, and since future public water supplies will likely draw from this resource to meet increases in demand, the protection of this resource is extremely important to ensure adequate supplies of clean drinking water for present and future generations.

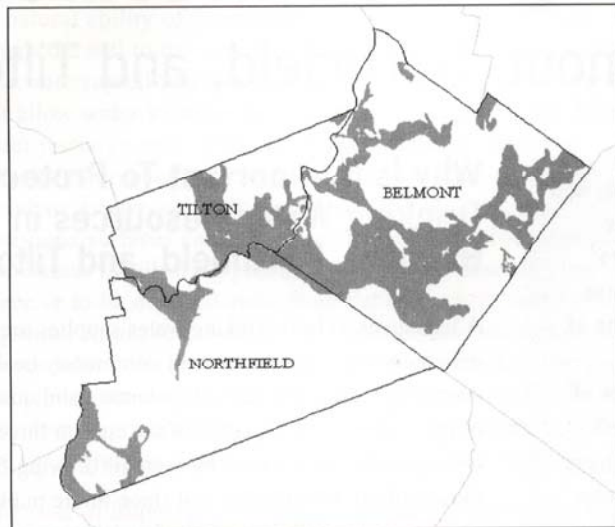
Why Do the Towns Need to Plan Ahead To Protect Shared Resources?

Planning is critical for the long-term protection of the quality and quantity of water supplied by the aquifer. Once groundwater becomes contaminated it is very difficult and extremely costly to clean, and if recharge is not adequate, quantity can diminish over time. This project seeks to provide information and resources which will assist Belmont, Northfield, and Tilton in implementing strategies to minimize negative impacts to existing and potential future drinking water supplies drawn from the aquifer while taking into account current and future growth trends, economic needs, and associated land uses. By identifying threats to groundwater resources comprehensively, the three towns will have the information they need to plan effectively to ensure the viability of this important drinking water source.

Why Should the Towns Work Together On This Project?

The three towns recognize that the stratified drift aquifer does not fit neatly within any one town's boundaries and that there is a need to work together to protect this shared drinking water resource. The framework, methods, and outcomes of this effort will serve as a model for collaborative drinking water protection efforts throughout the region.

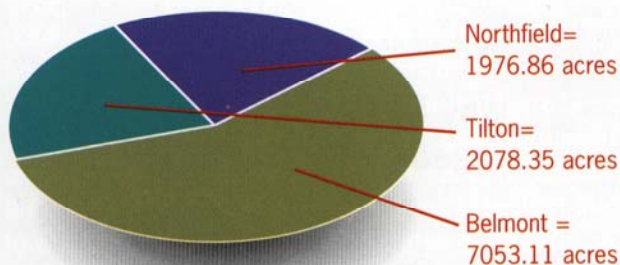
Direct Recharge Area of Stratified Drift Aquifer



Source: Stratified Drift Aquifer data developed by the US Geological Survey in cooperation with NHDES Water Division, February 2000.

The water found stored in the aquifer is replenished (called "recharged") when rain and snowmelt soaks into the ground and moves down through the soil to the saturated area below the water table, rather than evaporating or running off into surface waters. The total area of the three towns is 46,550 acres, and approximately 24% of this total acreage is located within the direct recharge area of the aquifer, which is the area which lies directly over the stratified drift deposit. Land use activities that take place in this direct recharge area have the potential to impact groundwater quality and quantity.

Direct Recharge Area by Town



Total Direct Recharge Area = 11,108.32 acres

Source: Stratified Drift Aquifer data developed by the US Geological Survey in cooperation with NHDES Water Division, February 2000.

As you read through the following information on growth, development, and land uses, and their potential impacts on drinking water in the subregion, keep in mind this key question:

How can the three towns balance growth and development with the long-term protection of the quality and quantity of existing and potential future water supplies provided by the aquifer?

Threats to water quality and quantity within the aquifer are divided into four broad topic areas in the final project report:

- **Growth and Development**
- **Present and Future Land Uses**
- **Potential Contamination Sources**
- **Reductions in Recharge**

Growth and Development

Demographic trends and population projections need to be taken into consideration when thinking about future drinking water supply needs. The towns of Belmont, Northfield, and Tilton have been experiencing growth in many areas: total population, housing supply, and commercial and industrial activity.

- As a subregion, the total growth in population of the three towns between 1990 and 2000 was 1442 people, an increase of 10.8% during that decade.

Source: US Census 1990 and 2000

- Each town is projected to experience population increases in the 25-year span between 2000 and 2025.

Source: New Hampshire Office of State Planning (NHOSP) population projections for 2000-2025. The NHOSP projections should be viewed as a starting point for exploring in which direction and at what rate communities might grow as a reflection of past and emerging trends and should be used for general planning purposes only.

- There were 374 additional housing units located in the three towns in 2000 than there were in 1990.

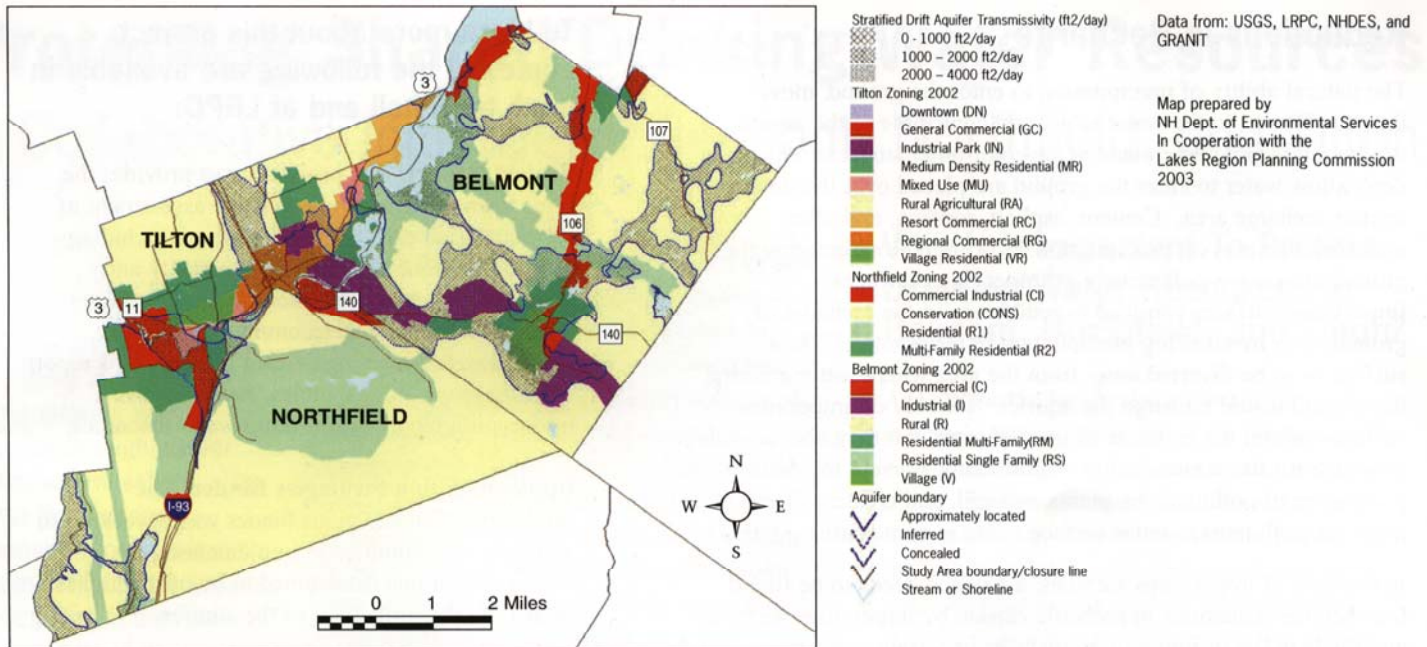
Source: Lakes Region Planning Commission. Demographic Profile 2003

- In total, 52 net commercial permits and 5 net industrial permits were issued in the sub-region during the 10-years between 1992 and 2001.

Source: Lakes Region Planning Commission. Development Activity in the Lakes Region: 2003 Annual Report. March 2003

Present and Future Land Uses

After obtaining information on the amount and rate of growth in the three towns, the characteristics and patterns of distribution can be examined, and the potential impacts to the stratified drift aquifer which may result can be identified.



Stratified Drift Aquifer and Zoning (2002)

The map above depicts the aquifer, the road network, and the current zoning of the three towns.

- A large portion of the major roads of the three towns, including I-93, Route 140, and Route 3/11, are located in the direct recharge area.
- Average Annual Daily Traffic counts provided by the New Hampshire Department of Transportation show an increase in the numbers of people utilizing the road network in the subregion from 1995 to 2001.

Source: Average Annual Daily Traffic for Belmont, Northfield, and Tilton. State of New Hampshire, Department of Transportation, Bureau of Transportation Planning, August 2002

The layout of the roads influences access to parcels of land and how zoning is laid out in the three communities. The map above displays the current zoning maps of the three towns overlain by the aquifer area. As shown on the map, there is a large area zoned commercial and/or industrial in the area directly above the aquifer, which follows along the major roadways.

- In total, 29.2% of the total direct recharge area is located within a commercial and/or industrial zone.
- Although only 29.2% of the total direct recharge area is zoned some form of commercial and/or industrial, 48.3% of the aquifer area with the highest of the three categories of transmissivity is zoned for some form of commercial and/or industrial use. This has implications for the availability of future new public water supply sources.

The zoning ordinances of the three towns describe what types of potential uses might take place in delineated zones. In order to gain a clearer picture of potential land uses in the direct recharge area, a complete review of the current zoning ordinances and regulations of each town was conducted. This review is found in the project report.

Potential Contamination Sources

Potential sources of contamination of the stratified drift aquifer were identified as one component of this project. "Potential contamination sources are facilities that typically use, produce, handle, or store contaminants of concern, which, if improperly managed, could find their way to a source of public drinking water." In addition, certain activities and land uses, if not conducted and designed following Best Management Practices, can result in the release of potential groundwater contaminants. If proper management practices are followed, a potential contamination source may never become an actual contamination source. An understanding of the location, types, and number of potential contamination sources can assist the three towns in planning for the protection of existing and potential future drinking water supplies.

The project report reviews potential contamination sources at two scales: those found within the Wellhead Protection Areas (WHPA) of existing public water supplies which draw from the stratified drift aquifer (within a 75-400 foot radius of a well), and those found within the entire direct recharge area of the stratified drift aquifer. By looking closely at the vulnerability of existing wells to potential contamination threats, the towns and water suppliers can take steps to reduce any significant threats and plan for long-term water supply protection. By identifying potential threats in the entire direct recharge area, the towns gain a broad understanding of potential contamination sources which will assist in taking steps to minimize those threats which have the potential to degrade water quality. Detailed information on potential contamination sources is included in the project report.

* Source: "Viewing an Explanation of the Assessment Reports" and "Explanation of Assessment Reports for Non-Transient Systems". NHDES web-site, Water Division, Drinking Water Source Protection Program (www.des.state.nh.us/dwspp).

Reductions in Recharge

The natural ability of precipitation to enter the ground, move through the soil to the water table, and contribute to the aquifer can be interrupted when land is paved or other surfaces which don't allow water to enter the ground are placed over the direct aquifer recharge area. Cement, asphalt, roofing, and other materials that prevent precipitation and runoff from entering the ground are known collectively as impervious surfaces. Impervious surfaces can lead to reductions in the recharge of groundwater by allowing precipitation to evaporate off their surface or to be diverted away from the area where water entering the ground would recharge the aquifer. Not only do impervious surfaces inhibit the recharge of groundwater, but they also provide a surface for the accumulation of pollutants, prevent the natural processing of pollutants by plants and soil, and create a direct route for pollutants to enter surface water in some cases.

In the case of impervious surfaces, a balance needs to be found between the reductions in recharge caused by impervious surfaces and the benefits of impervious surfaces in certain cases in preventing contamination from entering the ground and potentially contaminating the aquifer resource.

Examples where the use of impervious surfaces might be warranted to prevent groundwater contamination: to properly store regulated substances and road salt; to contain hazardous substances and to prevent contamination in the case of an accidental spill; and to redirect polluted stormwater runoff through stormwater management systems designed following Best Management Practices to ensure that clean water is recharged to the aquifer.

Detailed information on impervious surfaces can be found in the project report.

Common Vision

The towns of Belmont, Northfield, and Tilton are very fortunate, in regards to our existing and potential future needs for drinking water, to be located on a large stratified drift aquifer. Water is the most basic of resources, and the three towns have a great responsibility to assure that we preserve water quality and conserve water quantity for future generations. Each of our towns recognizes that we share this valuable resource and agree that there is the need for continued collaborative drinking water resource planning. In order for one town's efforts to be effective, they must be complemented by actions in each of the other towns. Thoughtful planning which works to balance economic growth with groundwater protection will assist our towns in maintaining the viability of common drinking water resources into the future.

Developed by the Water Resources Committee as a common vision for the protection of the aquifer for the three towns.

To learn more about this project, copies of the following are available in each town hall and at LRPC:

Project Report: The project report provides the three towns with a comprehensive assessment of their stratified drift aquifer resources, including exploring potential threats to the quality and quantity of present and potential drinking water sources and providing recommendations for addressing the most significant threats. This report includes maps, charts, tables, and extensive information regarding drinking water resources.

Implementation Strategies Binder: The implementation strategies binder was developed to assist the communities in implementing the recommendations determined to be of the highest priority to the protection of the aquifer.

Large Format Potential Contamination Sources Map: The large format map provides a higher level of detail than the 11x 17 version of this map found in the project report.

This four-page summary provides an overview of the project and the contents of the report. Additional copies of this summary are available in each Town Hall and at the Lakes Region Planning Commission.

How Can I Get Involved?

To learn more about project implementation, please contact the Planning Department, Planning Board, and/or Conservation Commission of Belmont, Northfield, or Tilton for additional information.

If you're interested in learning more about this project or the contents of the report, please contact:
Lakes Region Planning Commission (LRPC)
103 Main Street, Suite No. 3
Meredith, NH 03253
(603) 279-8171

If you would like information on statewide efforts to protect groundwater and drinking water, please contact:

New Hampshire Department of Environmental Services (NHDES)
Drinking Water Source Protection Program
P.O. Box 95, 6 Hazen Drive
Concord, NH 03302
(603) 271-1168