Massachusetts Department of Environmental Protection
Source Water Assessment and Protection (SWAP) Report
for

Greenfield Water Department

What is SWAP?

The Source Water Assessment and Protection (SWAP) Program, established under the federal Safe Drinking Water Act, requires every state to:

- inventory land uses within the recharge areas of all public water supply sources;
- assess the susceptibility of drinking water sources to contamination from these land uses; and
- publicize the results to provide support for improved protection.

Susceptibility and Water Quality

Susceptibility is a measure of a water supply's potential to become contaminated due to land uses and activities within its recharge area.

A source's susceptibility to contamination does *not* imply poor water quality.

Water suppliers protect drinking water by monitoring for more than 100 chemicals, disinfecting, filtering, or treating water supplies, and using source protection measures to ensure that safe water is delivered to the tap.

Actual water quality is best reflected by the results of regular water tests. To learn more about your water quality, refer to your water supplier's annual Consumer Confidence Reports.

Table 1: Public Water System Information

PWS Name	Greenfield Water Department
PWS Address	384 Deerfield Street
City/Town	Greenfield, Massachusetts
PWS ID Number	1114000
Local Contact	Ms. Sandra Shields
Phone Number	413-772-1539

Introduction

We are all concerned about the quality of the water we drink. Drinking water wells may be threatened by many potential contaminant sources, including storm runoff, road salting, and improper disposal of hazardous materials. Citizens and local officials can work together to better protect these drinking water sources.

Purpose of this report:
This report is a planning tool to support local and state efforts to improve water supply protection. By identifying land uses within water supply protection areas that may be potential sources of contamination, the assessment helps focus protection efforts on appropriate best management practices (BMPs) and drinking water source protection measures.

Refer to Table 3 for Recommendations to address potential sources of contamination. Department of Environmental Protection (DEP) staff are available to provide information about funding and other resources that may be available to your community.

This report includes the following sections:

1. Description of the Water System
2. Land Uses within Protection Areas
3. Source Water Protection
4. Appendices

Glossary

Aquifer: An underground water-bearing layer of permeable material that will yield water in a usable quantity to a well.

Hydrogeologic Barrier: An underground layer of impermeable material (i.e. clay) that resists penetration by water.

Recharge Area: The surface area that contributes water to a well.

Zone I: The area closest to a well; a 100 to 400 foot radius proportional to the well's pumping rate. This area should be owned or controlled by the water supplier and limited to water supply activities.

Zone II: The primary recharge area for the aquifer. This area is defined by hydrogeologic studies that must be approved by DEP. Refer to the attached map to determine the land within your Zone II.

Zone A: is the most critical for protection efforts. It is the area 400 feet from the edge of the reservoir and 200 feet from the edge of the tributaries (rivers and/or streams) draining into it.

Zone B: is the area one-half mile from the edge of the reservoir but does not go beyond the outer edge of the watershed.

Zone C: is the remaining area in the watershed not designated as Zones A or B.

The attached map shows Zone A and your watershed boundary.

Class B River Intakes

Class B water sources do not have Zone A , B and C protection areas as the Class A sources do. For the purposes of this report, an "Emergency Planning Zone" has been delineated. The **Emergency Planning Zone** is the land area within 400 feet of both sides of the river including all tributary streams and surface water bodies.

Section 1: Description of the Water System

Water Sources

System Susceptibility: ***High***

Ground Water Sources: ***Susceptibility: High***

MA GIS Zone II ID#: 145

Source Name:	***Source ID***
GP Well #1	1114000-04G
GP Well #2	1114000-05G
GP Well #3	1114000-06G

Surface Water Sources: ***Susceptibility: High***

Source Name:	***Source ID***
Leyden Glen Reservoir	1114000-01S
Green River	1114000-03S

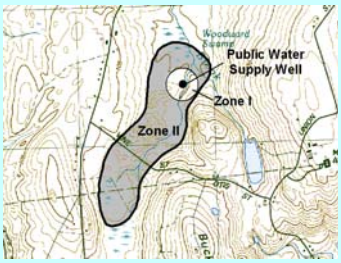
Greenfield is a middle sized industrial, agricultural and residential community located in northwestern Massachusetts near the Vermont border. Greenfield's water supplies are all located within the Green River basin. The Green River flows south into the Deerfield River which forms a portion of the southern border of the town; the Deerfield River flows into the Connecticut River which forms a portion of the eastern border of Greenfield. Greenfield Water Department maintains and operates five public water supply sources. The three Millbrook Wells: Wells #1 (1114000-04G), #2 (1114000-05G), and #3 (1114000-06G) are located in close proximity to each other and withdraw water from the same, semi-confined, deep buried valley, sand and gravel aquifer. In addition, there are two surface water sources: the Leyden—Glen Brook Reservoir (1114000-01S) and the Green River intake (1114000-03S). The surface water supplies are located in the uplands, north of Greenfield. The bedrock in the vicinity of the reservoirs is generally described as part of the upper Leyden formation composed of metamorphosed argillite with interbeds of quartzite.

The wells are located in the northeast section of the City. The wells draw water from a confined to semi-confined, sand and gravel aquifer located within a buried, bedrock valley. The bedrock valley, comprised primarily of metamorphic and sedimentary rocks, was deepened by advancing glaciers and later filled in with sand and gravel from the receding glaciers and overlain by silt and clay from glacial Lake Hitchcock and Lake Lawrence some 12,000 years before present. Recent alluvial deposits cover the entire valley area. The confining clay layer is primarily contiguous through the center of the buried valley with the clay layer pinching out toward the edges of the aquifer allowing significant recharge along the basin boundaries.

Each well has a Zone I radius of 400 feet. The Zone II for the wells (#145) includes an area of about 293 acres extending north into the Town of Bernardston. The Zone II, funded through the Aquifer Land Acquisition program, was delineated utilizing pumping test data, analytical modelling and aquifer mapping. The Zone II watershed area is 29% forested and 50% crop or pasture.

What is a Protection Area?

A well's water supply protection area is the land around the well where protection activities should be focused. Each well has a Zone I protective radius and a Zone II protection area.



About 50% of the land area is protected from development, primarily through municipal ownership and agricultural restrictions. The watershed for the Leyden Glen Reservoir includes over 3000 acres of land, much within the community of Leyden. Approximately 70% of the watershed is forested and 56% is protected open space through methods such as municipal or state ownership, conservation or agricultural restrictions or other development limiting restrictions.

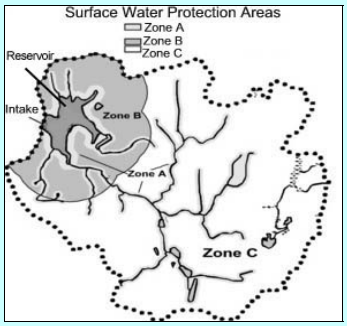
The Green River is classified as a Class B water body, though the Massachusetts Department of Environmental Protection (the Department) is presently reviewing its Class B status. A Class B water body source such as the Green River does not have Zone A, B and C protection areas, as does the Leyden Reservoir, a Class A water body source. For the purposes of the SWAP assessments, a 400 foot setback area along the river and all feeder streams has been delineated for Class B water body sources that is referred to as an "Emergency Planning Zone". Land uses and activities within this zone are of particular concern for source protection and emergency planning because of their proximity to the water supply.

The portion of the Green River source watershed that is in Massachusetts, includes 4,075 acres in Leyden and Colrain; 80% of that watershed area is forested and 50% is the total area is protected open space through either municipal or state ownership or through Conservation or Agricultural Restrictions that may be held by private land owners. The remainder of the watershed is located in the southern Vermont communities of Halifax and Guilford. The watershed in Vermont is primarily low density rural residential and forested. Please refer to the attached maps that illustrate the protection area boundaries. Massachusetts Department of Environmental Protection would like to thank the staff of the U.S. Environmental Protection Agency for their assistance and the Vermont Agency of Natural Resources which supplied the maps and land use information for the watershed in Vermont.

Water from the Green River flows through roughing filters and is then filtered along with the water from the Leyden Reservoir through a slow sand filtration plant and disinfected prior to distribution. The water from the wells is pH adjusted and treated for corrosion control prior to distribution. The Water Department also maintains the capability to chlorinate the well water, if necessary. For current information on monitoring results, please contact the Public Water System contact person listed above in Table 1 for a copy of the most recent Consumer Confidence Report.

What is a Watershed?

A watershed is the land area that catches and drains rainwater down-slope into a river, lake or reservoir. As water travels down from the watershed area it may carry contaminants from the watershed to the drinking water supply source. For protection purposes, watersheds are divided into protection Zones A, B and C or and Emergency Planning Zone for Class B intakes.



Section 2: Land Uses in the Protection Areas

The Zone II of the Millbrook Wells and the watersheds for the Leyden Glen Reservoir and the Green River intake are primarily forested with some residential and agricultural land uses. Rural residential and a small percentage of commercial and light manufacturing land uses are also noted in the watersheds. One facility within the Green River source Emergency Planning Zone was identified on the land use map as an industrial facility based on aerial photograph review. The facility is actually an indoor, sport, shooting range with containment facilities; there is no manufacturing conducted at that facility.

The Zone II area of the wells consists primarily of rural residential and agricultural uses with some light manufacturing, interstate Route 91, State Route 5 and an active railroad line run through the entire recharge area. The aquifer is partially confined meaning that there is a confining (protective) clay layer overlying the productive sand and gravel. The clay layer provides some protection from contamination at the ground surface, however, the clay layer is not continuous throughout the entire valley and is discontinuous along the edges and the headwaters of the valley. Therefore the aquifer is considered to be

highly vulnerable to contamination. Surface water bodies are by their nature considered highly vulnerable to contamination.

Greenfield Water Department has been very proactive in water supply protection. They have purchased Conservation Restrictions for some of the agriculture land within the Zone II, conduct land use and UST inventories within the protection areas and participate with watershed teams in Vermont to protect watershed lands in Vermont. The Water Department conducts frequent inspections of watersheds and recharge areas and provides household hazardous waste disposal for residents within the Zone II from neighboring communities. The Greenfield Water Department actively pursued and was awarded a Source Water Protection Grant to further their protection efforts in the Leyden Reservoir watershed.

Please refer to the attached maps to review land uses in the protection areas.

What are "BMPs?"

Best Management Practices (BMPs) are measures that are used to protect and improve surface water and groundwater quality. BMPs can be structural, such as oil & grease trap catch basins, nonstructural, such as hazardous waste collection days or managerial, such as employee training on proper disposal procedures.

Land uses and activities that are potential sources of contamination are listed in Table 2, with further detail provided in the Table of Regulated Facilities and Table of Underground Storage Tanks in Appendix B.

Key Land Uses and Protection Issues include:

1. Nonconforming Activities in Zone I - 400 foot radius around wells
2. Activities in Zone A/Emergency Planning Zone
3. Residential land uses
4. Transportation corridors
5. Hazardous materials storage and use
6. Agricultural activities
7. Comprehensive wellhead protection planning
8. Railroad Right-of-way

The overall ranking of susceptibility to contamination for the system is high, based on the presence of at least one high threat land use within the water supply protection areas, as seen in Table 2.

1. Non-conforming activities in the Zone I – The Zone 1 is a 400 foot radial area around each wellhead. Massachusetts drinking water regulation (310 CMR 22.00 Drinking Water) requires public water suppliers to own the Zone I, or control the Zone I through some other mechanism such as a conservation restriction. Only water supply activities are allowed in the Zone I. Many public water supplies were developed prior to the Department's regulations and contain non-water supply activities such as homes, utilities and public roads. There are local roads, a railroad track and part of a farm within the Zone I of the wells. However, with the exception of the railroad, the City of Greenfield owns or controls through Conservation Restrictions most of the Zone I. In addition, approximately 50% of the Zone II is protected from further development.

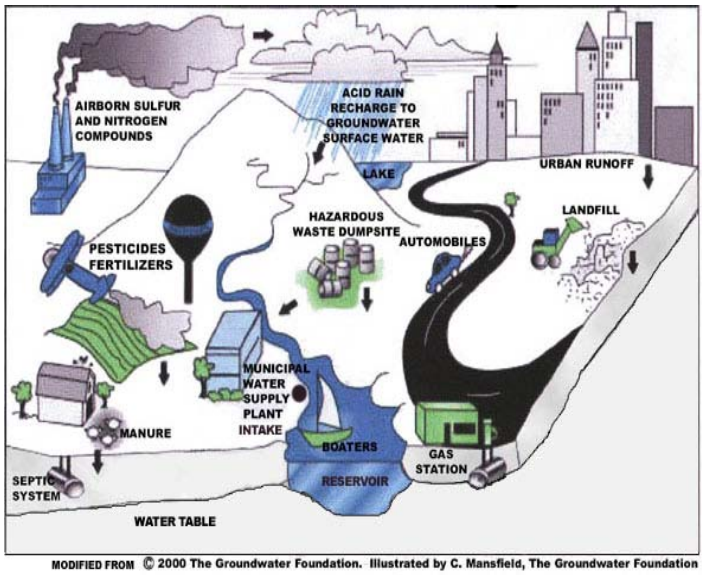


Figure 1: Sample watershed with examples of potential sources of contamination

Zone I Recommendations:

- ✓ To the extent possible, remove all non-water supply activities from the Zone Is to comply with DEP's Zone I requirements.
- ✓ Use BMPs for the storage, use, and disposal of hazardous materials such as water supply chemicals and maintenance chemicals.
- ✓ Continue to enforce the conditions of the Conservation Restriction to not use or store

Potential Source of Contamination vs. Actual Contamination

The activities listed in Table 2 are those that typically use, produce, or store contaminants of concern, which, if managed improperly, are potential sources of contamination (PSC).

It is important to understand that a release may never occur from the potential source of contamination provided facilities are using best management practices (BMPs). If BMPs are in place, the actual risk may be lower than the threat ranking identified in Table 2. Many potential sources of contamination are regulated at the federal, state and/or local levels, to further reduce the risk.

Table 2: Land Uses in the Zone II and Watersheds

For more information, refer to Appendix B: Regulated Facilities within the Water Supply Protection Area

Land Uses	Quantity	Threat	Protection Area	Potential Contaminant Sources*
Agricultural				
Dairy Farms	2	M	Watershed 01S, Zone II	Manure (microbial contaminants): improper handling City has a AR on farm in Zone I and II
Fertilizer Storage or Use	5 ±	M	All	Fertilizers: leaks, spills, improper handling, or over-application. City has a AR on farm in Zone I and II
Forestry Operation	5 ±	L	Watershed 01S, 03S	Erosion, equipment maintenance materials: leaks, spills, or improper handling; road building
Livestock Operations (commercial and recreation)	5 ±	M	All	Manure (microbial contaminants): improper handling City has a AR on farm in Zone I and II
Manure Storage or Spreading	5 ±	H	All	Manure (microbial contaminants): improper handling. City has a AR on farm in Zone I and II
Pesticide Storage or Use	5 ±	H	All	Pesticides: leaks, spills, improper handling, or over-application. City has a AR on farm in Zone I and II
Commercial				
Service Stations/ Auto Repair Shops	1	H	Zone II	Automotive fluids and solvents: spills, leaks, or improper handling
Cemeteries	1	M	Watershed 01S	Application of pesticides: leaks, spills, improper handling; historic embalming fluids
Golf Course (Driving range)	1	M	Zone II	Fertilizers or pesticides: over-application or improper handling (Driving Range)
Junk Yard	1	H	Watershed 01S	Automotive chemicals, wastes, and batteries: spills, leaks, or improper handling (Private Farm)
Railroad Tracks	1	H	Zone II	Transported chemicals, and maintenance chemicals: leaks or spills—Tracks are marked as watershed protection area
Repair Shops (Sales and Service)	1	H	Zone II	Engine fluids, lubricants, and solvents: spills, leaks, or improper handling or storage

Land Uses	Quantity	Threat	Protection Area	Potential Contaminant Sources*
Industrial				
Steel Fabricator	1	H	Zone II	Solvents and other chemicals: spills, leaks, or improper handling or storage
Residential				
Fuel Oil Storage (at residences)	15 +	M	All	Fuel oil: spills, leaks, or improper handling
Lawn Care / Gardening	15 +	M	All	Pesticides: over-application or improper storage and disposal
Septic Systems / Cesspools	15 +	M	All	Hazardous chemicals: microbial contaminants, and improper disposal
Miscellaneous				
Aboveground Storage Tanks	15 +	M	All	Materials stored in tanks: spills, leaks, or improper handling
Aquatic Wildlife	Periodic	L	All	Microbial contaminants; wildlife managed by PWS
Road and Maintenance Depots	1	M	Watershed 01S Zone II	Deicing materials, automotive fluids, fuel storage, and other chemicals: spills, leaks, or improper handling or storage
School	1	M	Watershed 01S	Fuel oil, laboratory, art, photographic, machine shop, and other chemicals: spills, leaks, or improper handling or storage
Stormwater Drains/ Retention Basins	Numerous	L	All	Debris, pet waste, and chemicals in stormwater from roads, parking lots, and lawns
Transmission Line Rights-of-Way - Type: Electric	1	L	Watersheds 01S, 03S	Corridor maintenance pesticides: over-application or improper handling; construction
Transportation Corridors	Numerous	M	All	Fuels and other hazardous materials: accidental leaks or spills; pesticides: over-application or improper handling
Underground Storage Tanks	Numerous	H/M	All	Stored materials: spills, leaks, or improper handling
Utility Substation Transformers	2	L	All	Chemicals and other materials including PCBs: spills, leaks, or improper handling (Newer – do not contain PCBs)
Very Small Quantity Hazardous Waste Generator	2	L	Watershed 01S Zone II	Hazardous materials and waste: spills, leaks, or improper handling or storage

Notes:

1. When specific potential contaminants are not known, typical potential contaminants or activities for that type of land use are listed. Facilities within the watershed may not contain all of these potential contaminant sources, may contain other potential contaminant sources, or may use Best Management Practices to prevent contaminants from reaching drinking water supplies.
2. For more information on regulated facilities, refer to Appendix B: Regulated Facilities within the Water Supply Protection Area information about these potential sources of contamination.
3. For information about Oil or Hazardous Materials Sites in your protection areas, refer to Appendix C: Tier Classified Oil and/ or Hazardous Material Sites.

*** THREAT RANKING** - Where there are two rankings, the first is for surface water, the second for groundwater sources. The rankings (high, moderate or low) represent the relative threat of each land use compared to other PSCs. The ranking of a particular PSC is based on a number of factors, including: the type and quantity of chemicals typically used or generated by the PSC; the characteristics of the contaminants (such as toxicity, environmental fate and transport); and the behavior and mobility of the pollutants in soils and groundwater.

pesticides, fertilizers or deicing materials within the Zone I.

- ✓ Keep any new non-water supply activities out of the Zone I.
- ✓ Continue in your historical and current efforts to acquire and protect land within the Zone A and Emergency Planning Zone in the water supply protection areas.
- ✓ Continue your vigilance and communication with the railroad.

2. Activities in Zone A of the reservoir— A Zone A for a reservoir includes all areas within 400 feet of the reservoir shore line and within 200 feet of either side of all streams and feeder ponds that flow into the reservoir. The Emergency Planning Zone is a 400 foot setback on either side of river and all tributaries to a Class B river intake. Land use activities within a Zone A or Emergency Planning Zone may have an impact on surface water sources. Wild animals, farm animal and domestic pet wastes can carry waterborne diseases such as Giardia, Cryptosporidium, Salmonella, etc. while septic systems and road runoff can carry these as well as other contaminants. The City owns the land immediately around the reservoir and the Green River intake and monitors activities within both watersheds. There are roadways and it is assumed that there are a few residential septic systems within the Zone A and the Emergency Planning Zone of the reservoir and intake.

Zone A Recommendations:

- ✓ Continue your efforts to protect these areas and to monitor and review activities within the Zone A and Emergency Planning Zone for the Green River source.

3. Residential Land Uses – Residential areas make up approximately 5% of the Zone II, 4% of the Leyden Glen Reservoir watershed and 3% of the Green River source watershed. There are no municipal sewers and therefore all areas utilize septic systems for sanitary waste disposal. If managed improperly, activities associated with residential areas can contribute to drinking water contamination. Common potential sources of contamination include:

- **Septic Systems** – Improper disposal of household hazardous chemicals to septic systems is a potential source of contamination to the groundwater because septic systems lead to the ground. If septic systems fail or are not properly maintained they can be a potential source of microbial contamination.
- **Household Hazardous Materials** - Hazardous materials may include automotive wastes, paints, solvents, pesticides, fertilizers, and other substances. Improper use, storage, and disposal of chemical products used in homes are potential sources of contamination.
- **Heating Oil Storage** - If managed improperly, Underground and Aboveground Storage Tanks (UST and AST) can be potential sources of contamination due to leaks or spills of the fuel oil they store.
- **Stormwater** – Catch basins transport stormwater from roadways and adjacent properties to the ground. As flowing stormwater travels, it picks up debris and contaminants from streets and lawns. Common potential contaminants include lawn chemicals, pet waste, and contaminants

Top 5 Reasons to Develop a Local Wellhead and Surface Water Protection Plan

❶ Reduces Risk to Human Health

❷ Cost Effective! Reduces or Eliminates Costs Associated With:

- Increased monitoring and treatment
- Water supply clean up and remediation
- Replacing a water supply
- Purchasing water

❸ Supports municipal bylaws, making them less likely to be challenged

❹ Ensures clean drinking water supplies for future generations

❺ Enhances real estate values – clean drinking water is a local amenity. A community known for its great drinking water in a place people want to live and businesses want to locate.

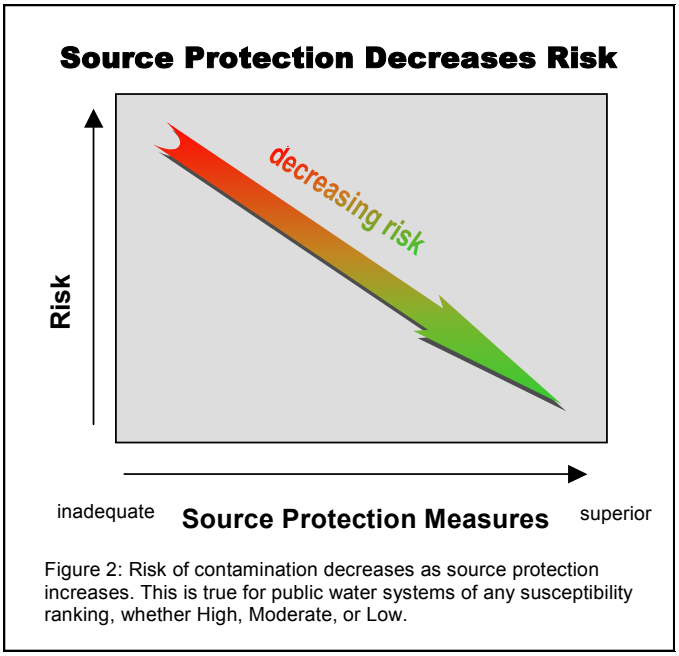


Figure 2: Risk of contamination decreases as source protection increases. This is true for public water systems of any susceptibility ranking, whether High, Moderate, or Low.

from automotive leaks, maintenance, washing, or accidents.

Residential Land Use Recommendations:

- ✓ Educate residents on best management practices (BMPs) for protecting water supplies. Make available the fact sheet your department has prepared and other appropriate fact sheets available from the MA DEP which can be found at www.mass.gov/dep/brp/dws/protect.htm, which provides BMPs for common residential issues. Extend education efforts into Leyden and Colrain.
- ✓ Work with Planning Boards and Boards of Health to manage new residential developments in the water supply protection areas and to inform the boards of the resource areas.
- ✓ Promote BMPs for stormwater management and pollution controls.

3. Transportation Corridors – Interstate 91 and Routes 5 and 10 run through the eastern edge of the Zone II. Local roads are common throughout the Zone II and watersheds of the Leyden Glen Reservoir and the Green River Intake. Roadway construction, maintenance, and typical highway use can all be potential sources of contamination. Accidents can lead to spills of gasoline and other potentially dangerous transported chemicals. Roadways are frequent sites for illegal dumping of hazardous or other potentially harmful wastes. De-icing salt, automotive chemicals and other debris on roads are picked up by stormwater and wash in to catchbasins. The steep topography of the watersheds results in application of de-icing materials to protect public health and safety by keeping the roads passable.

Transportation Corridor Recommendations:

- ✓ Identify stormwater drains and the drainage system along transportation corridors. Wherever possible, ensure that drains discharge stormwater outside of the Zone II and watersheds.
- ✓ Work with the Towns and State to have catch basins inspected, maintained, and cleaned on a regular schedule. Street sweeping reduces the amount of potential contaminants in runoff.

What is a Zone III?

A Zone III (the secondary recharge area) is the land beyond the Zone II from which surface and ground water drain to the Zone II and is often coincident with the watershed boundary.

The Zone III is defined as a secondary recharge area for one or both of the following reasons:

1. The low permeability of underground water bearing materials in this area significantly reduces the rate of groundwater and potential contaminant flow to the Zone II .

2. The groundwater in this area probably discharges to surface water feature such as a river rather than discharging directly into the aquifer.

The land uses within the Zone III are assessed only for sources that are shown to be groundwater under the direct influence of surface water.

- ✓ Communicate with local emergency response teams to ensure they area aware of your water supplies and that any spills within the watersheds and Zone II are effectively contained and that the Water Department is notified.
- ✓ If storm drainage maps are available, review the maps with emergency response teams. If maps aren't yet available, work with town officials to investigate mapping options such as the upcoming Phase II Stormwater Rule requiring some communities to complete stormwater mapping.
- ✓ The USDA also has various funding sources for government, non-government organizations and agricultural facilities through programs such as those listed on the USDA web site http://search.sc.egov.usda.gov/nrcs.asp?qu=eqip&ct=NRCS. Contact your local NRCS office to find out more about this funding program.

4. Hazardous Materials Storage and Use – Approximately 5% of the land area within the Zone II is commercial or industrial land uses. Although the map for Green River source indicates an industrial use, the facility identified is the shooting range noted previously. Many small businesses and industries use hazardous materials, produce hazardous waste products, and/or store large quantities of hazardous materials in UST/AST. If hazardous materials are improperly stored, used, or disposed, they become potential sources of contamination. Hazardous materials should <u>never</u> be disposed of to a septic system or floor drain leading directly to the ground. Please see Appendix B for a list of businesses within the protection areas known to generate hazardous wastes or use USTs.

Hazardous Materials Storage and Use Recommendations:

- ✓ Continue working with local businesses on best management practices for protecting water supplies. Distribute the fact sheet "Businesses Protect Drinking Water" available in Appendix A and on www.mass.gov/dep/brp/dws/protect.htm, which provides BMP's for common business issues.
- ✓ Work with local businesses to register those facilities that are unregistered generators of hazardous waste or waste oil. Partnerships between businesses, water suppliers, and communities enhance successful public drinking water protection practices.
- ✓ Work with the municipalities of Bernardston, Leyden and Colrain regarding Massachusetts floordrain

requirements and hazardous materials handling. See brochure "Industrial Floor Drains" for more information. See http://www.state.ma.us/dep/brp/dws/protect.htm for information regarding handling and management of hazardous materials.

- ✓ The USDA also has various funding sources for government, non-government organizations and agricultural facilities through programs such as those listed on the USDA web site http://search.sc.egov.usda.gov/

5. Agricultural Activites – Cropland and pasture encompass greater than 50% of the total Zone II land area. This includes hay and corn fields, beef cattle farm, pasture lands, and a small horse farm. Agricultural activity encompasses 22% and 8% of the total land uses in the waterhseds of the reservoir and Green River sources, respectively. Pesticides, fertilizers and farm equipment petroleum products have the potential to contaminate a drinking water source if improperly stored, applied, or disposed. If not contained or applied properly, animal waste from barnyards, manure pits and field application are potential sources of contamination to ground and surface water.

Agricultural Activities Recommendation:

- ✓ Continue your current work with farmers in your protection areas to make them aware of your water supply and to encourage the use of a US Natural Resources Conservation Service farm plan to protect water supplies.
- ✓ Continue your current work with hobby farmers by supplying them with information about protecting their own wells and the public water supply by encouraging the use of BMPs. Refer to http://www.state.ma.us/dep/brp/dws/dwspubs.htm and http://www.state.ma.us/dep/consumer/animal.htm#dwqual for additional resources.
- ✓ The USDA also has various funding sources for government, non-government organizations and agricultural facilities through programs such as those listed on the USDA web site http://search.sc.egov.usda.gov/. One program in particular, the Environmental Quality Incentives Program (EQIP) may be utilized in a variety of projects from DPW stormwater management to farm nutrient management designed to protect surface and groundwater. Review the fact sheet available on line and call the local office of the NRCS for assistance http://www.nrcs.usda.gov/programs/farmbill/2002/pdf/EQIPFct.pdf.

Additional Documents:

To help with source protection efforts, more information is available by request or online at www.state.ma.us/dep/brp/dws including:

1. Water Supply Protection Guidance Materials such as model regulations, Best Management Practice information, and general water supply protection information.
2. MA DEP SWAP Strategy
3. Land Use Pollution Potential Matrix
4. Draft Land/Associated Contaminants Matrix

For More Information

Contact Catherine V. Skiba of the DEP's Springfield Office at 413-755-2119 for more information and assistance on improving current protection measures.

Copies of this report have been provided to the public water supplier and the town/City boards.

6. Protection Planning – The Town of Greenfield has adopted zoning by-laws/ordinances to protect areas around the Millbrook Wells. However, Greenfield's other water supplies and the northern reach of the Zone II are not within Greenfield.

Planning protects drinking water by managing the land area that supplies water to a well or surface water source. Greenfield Water Department communicates and works with the watershed host communities to protect the water supplies. Bernardston would benefit from extending their protection to their own wells' Zone II and to Greenfield's Zone II.

A Wellhead and Watershed Protection Plan coordinates community efforts, identifies protection strategies, establishes a timeframe for implementation, and provides a forum for public education and outreach. The development of a successful Protection Plan is outlined in five steps in DEP's "Developing a Local Wellhead Protection Plan" and in "Developing a Local Watershed Protection Plan" (see Appendix A for the full report) as:

- Establish a protection committee or team
- Define the Protection Areas
- Identify potential sources of contamination
- Protect and manage the protection areas
- Conduct ongoing public education and outreach

Although Greenfield has the majority of the components for a Wellhead and Watershed Protection Plans in place, they do not have a formal plan. Greenfield is currently pursuing the development of a plan and has applied for grant funds to complete the plans.

Compile the information supplied in the Zone II reports, this and other reports; include copies of maps outlining the Zone II and detail the protection measures in place. Outline a plan to complete any components of the plan not in place with a timeline for completion. Submit your written report to the DEP Regional office and/or Boston office for approval. This process should be duplicated for the surface water sources, or combined together for one protection plan incorporating protection measures for the surface water protection zones. Continue your current efforts of including the host communities in the planning process and the pursuit of protective by-laws in the towns of Bernardston, Leyden, Colrain and in Vermont.

Protection Planning Recommendations:

- ✓ Formalize the Wellhead Protection Plan and create a separate Watershed Protection Plan, or make one plan outlining protection measures for all sources. Refer to http://mass.gov/dep/brp/dws/protect.htm for a copy of DEP's guidance, "Developing a Local Wellhead Protection Plan" and "Developing a Local Watershed Protection Plan" (see Appendix A).
- ✓ Continue to work with Bernardston, Colrain and Leyden to adopt protective by-laws and regulations for your protection areas extending into their communities. The Department will be instrumental in assisting Greenfield in this effort.

7. Railroad Right-of-Way – The railroad transects the Zone I and Zone II of the wells. Rail corridors that serve passenger and/or freight trains are a potential source of contaminantion due to chemicals released during normal use, track maintenance, and accidents. Normal maintenance of a railroad right-of-way can introduce contaminants to a water supply through herbicide application for vegetation control. Leaks or spills of transported chemicals or train/track maintenance chemicals are also potential sources of contamination to the water supply.

Railroad Right of Way Recommendations:

- ✓ Continue reviewing the railroad right-of-way Yearly Operating Plan to ensure Best Management Practices are implemented with regard to vegetation control in the Zone II, and that the utility has accurate information regarding the locations of the wells and the Zone I. Review the maps the utility uses.
- ✓ Work with local fire departments to review emergency response plans. Updates to this plan should include the railroad rights-of-way including coordination with the owner/operator of the track and trains using the right-of-way. Request emergency response teams to coordinate Emergency Response Drills and practice containment of potential contaminants from train accidents within the Zone II, which should attempt to include representatives from the owner/operator of the trains utilizing the right-of-way.

Other land uses and activities within the Zone II that are potential sources of contamination are included in Table 2. Refer to Appendix B for more information about these land uses. Identifying potential sources of contamination is an important initial step in protecting your drinking water sources. Further local investigation will provide more in-depth information and may identify new land uses and activities that are potential sources of contamination. Once potential sources of contamination are identified, specific recommendations should be used to better protect your water supply.

Section 3: Source Water Protection Conclusions and Recommendations

As with many water supply protection areas, the system's Zone II and watersheds contain potential sources of contamination. However, source protection measures reduce the risk of actual contamination, as illustrated in Figure 2. The water supplier is commended for taking an active role in promoting source protection measures in the Water Supply Protection Areas through:

- Implementing a hazardous waste collection plan in its watershed host community
- Proactive policy to acquire land within the protection areas
- Developing a good working relationship with the communities

Source Protection Recommendations:

To better protect the sources for the future:

- ✓ Inspect the Zone I/A and Emergency Planning Zone regularly; when feasible, remove any non-water supply activities.

- ✓ Educate residents on ways they can help you to protect drinking water sources.
- ✓ Work with emergency response teams in Bernardston, Leyden, Colrain and Greenfield to ensure that they are aware of the stormwater drainage in your Zone II and watersheds to facilitate cooperation and awareness in responding to spills or accidents.
- ✓ Partner with local businesses to ensure the proper storage, handling, and disposal of hazardous materials.
- ✓ Work with farmers in your protection areas to make them aware of your water supply and to encourage the use of a NRCS farm plan to protect water supplies.

Conclusions:
These recommendations are only part of your ongoing local drinking water source protection. Additional source protection recommendations are listed in Table 3, the Key Issues above and Appendix A.

- **Partner with Local Businesses:**
  Since many small businesses and industries use hazardous materials and produce hazardous waste products, it is essential to educate the business community about drinking water protection. Encouraging partnerships between businesses, water suppliers, and communities will enhance successful public drinking water protection practices.

- **Educate Residents:**
  If managed improperly, household hazardous waste, septic systems, lawn care, and pet waste can all contribute to groundwater contamination. Hazardous materials include automotive wastes, paints, solvents, pesticides, fertilizers, and other substances. If a septic system fails or is not properly maintained, it could be a potential source of microbial contamination. Animal waste is also a source of microbial contamination.

- **Provide Outreach to the Community:**
  Public education and community outreach ensure the long-term protection of drinking water supplies. Awareness often generates community cooperation and support. Residents and business owners are more likely to change their behavior if they know where the wellhead protection recharge area is located; what types of land uses and activities pose threats; and how their efforts can enhance protection.

- **Plan for the Future:**
  One and of the most effective means of protecting water supplies is local planning, include adoption of local controls to protect land use, regulations related to watersheds and ground water protection. These controls may include health ordinances/regulations, discharge prohibitions, general ordinances, and zoning by laws that prohibit or control potential sources of contamination within the protection areas.

- **Other Funding Sources:**
  Other grants and loans are available through the Drinking Water State Revolving Loan Fund, the Clean Water State Revolving Fund, and other sources. For more information on grants and loans, visit the Bureau of Resource Protection's Municipal Services web site at: http://mass.gov/dep/brp/mf/mfpubs.htm. The USDA also has various funding sources for government, non-government organizations and agricultural facilities through programs such as those listed on the USDA web site http://search.sc.egov.usda.gov/nrcs.asp?qu=eqip&ct=NRCS. One program in particular, the Environmental Quality Incentives Program (EQIP) may be utilized in a variety of projects from DPW stormwater management to farm nutrient management designed to protect surface and groundwater. Review the fact sheet available on line and call the local office of the NRCS for assistance http://www.nrcs.usda.gov/programs/farmbill/2002/pdf/EQIPFct.pdf.

DEP staff, informational documents, and resources are available to help you build on this SWAP report as you continue to improve drinking water protection in your community. The Department's Wellhead Protection Grant Program and Source Protection Grant Program provide funds to assist public water suppliers in addressing water supply source protection through local projects. Protection recommendations discussed in this document may be eligible for funding under the Grant Program. Please note: each spring DEP posts a new Request for Response for the grant program (RFR).

The assessment and protection recommendations in this SWAP report are provided as a tool to encourage community discussion, support ongoing source protection efforts, and help set local drinking water protection priorities. Citizens and community officials should use this SWAP report to spur discussion of local drinking water protection measures. The water supplier should supplement this SWAP report with local information on potential sources of contamination

and land uses. Local information should be maintained and updated periodically to reflect land use changes in the Zone II. Use this information to set priorities, target inspections, focus education efforts, and to develop a long-term drinking water source protection plan. The water supplier should supplement this SWAP report with local information on potential sources of contamination and land uses. Local information should be maintained and updated periodically to reflect land use changes in the Zone II and watersheds. Use this information to set priorities, target inspections, focus education efforts, and to develop a long-term drinking water source protection plan.

Section 4: Appendices

A. Protection Recommendations
B. Regulated Facilities within the Water Supply Protection Area
C. Additional Documents on Source Protection

Table 3: Current Protection and Recommendations

Protection Measures	Status	Recommendations
Zone I		
Does the Public Water Supplier (PWS) own or control the entire Zone I/Zone A?	**NO**	Follow Best Management Practices (BMPs) that focus on good housekeeping, spill prevention, and operational practices to reduce the use and release of hazardous materials. Investigate purchasing, or obtaining Right of First Refusal of the remaining Zone A land.
Is the Zone I/Zone A posted with "Public Drinking Water Supply" Signs?	**NO**	Use "No Trespassing" signs only. Economical signs are available from the Northeast Rural Water Association: (802) 660-4988.
Is the Zone I/Zone A regularly inspected?	**YES**	Continue daily inspections of drinking water protection areas.
Are water supply related activities the only activities within the Zone I/Zone A?	**NO**	Continue monitoring non-water supply activities in Zone I/A.
Municipal Controls (Zoning Bylaws, Health Regulations, and General Bylaws)		
Does the municipality have Water Supply Protection Controls that meet 310 CMR 22.21(2) or 310 CMR 22.20 C?	**SOME**	The Town of Greenfield has Zoning Bylaws that meet 310 CMR 22.21(2), but do not meet 310 CMR 22.20 C. Bernardston, Leyden and Colrain do not. Refer to www.state.ma.us/dep/brp/dws/ for model bylaws, health regulations, and current regulations.
Do neighboring communities protect the areas of the watershed extending into their communities?	**NO**	Continue working with neighboring municipalities to include surface water protection areas in their water supply protection controls. Encourage these communities to protect these resources. The Department may be of assistance.
Planning		
Does the PWS have Local Source Water Protection Plans (Wellhead and Surface Water)?	**SOME**	Follow "Developing a Local Wellhead Protection Plan" and other guidance available at: www.state.ma.us/dep/brp/dws to create a formal, written plan. Submit up-to-date plan to DEP for approval.
Does the PWS have a formal "Emergency Response Plan" to deal with spills or other emergencies?	**YES**	Augment and update plan by developing a joint emergency response plan with fire department, Board of Health, DPW, departments of surrounding communities, and local and state emergency officials. Coordinate emergency response drills with local teams.
Does the municipality have a water supply protection committee?	**NO**	Establish committee; include representatives from citizens' groups, neighboring communities, and the business community.
Do the Boards of Health conduct inspections of commercial and industrial activities?	**SOME**	Continue working with host communities.
Does the PWS provide water supply protection education?	**YES**	Aim education at schools, commercial, and municipal uses within the watershed. Extend these education practices into the host communities of the surface water supplies.

APPENDIX B:
REGULATED FACILITIES WITHIN OR IMMEDIATELY ADJACENT TO WATER SUPPLY PROTECTION AREA

DEP Permitted Facilities

DEP Facility Number	Facility Name	Street Address	Town	Permitted Activity	Activity Class	Facility Description
	Repair garage *		Leyden	Generator Of Hazardous Waste		Auto Repair
	Highway DPW *		Leyden	Generator Of Hazardous Waste		DPW
	Barton's Garage	Brattleboro Road	Leyden	Generator Of Hazardous Waste	Very Small Quantity Generator	Auto Repair
36641	West Track, Inc.	627 Barton Road	Greenfield	Generator Of Hazardous Waste	Very Small Quantity Generator	Auto – Sales And Service
**Mad985270537	Barton's Garage	Brattleboro Road	Greenfield	Generator Of Hazardous Waste Oil	Very Small Quantity Generator	Auto Repair

** EPA Identification Number
* Facility was not registered but had very good hazardous materials management. Registration materials left at facility.

Underground Storage Tanks

Facility Name	Address	Town	Description	Tank Type	Tank Leak Detection	Capacity (Gal)	Contents
Indoor Action	1385 Bernardston Road	Greenfield	Sports Center	Unknown	Unknown	1000	Fuel Oil
				Unknown	Unknown	1000	Fuel Oil
				Unknown	Unknown	1000	Fuel Oil
D & S Pump Supply	1203 Bernardston Road	Greenfield	Pump Sales & Service	Unknown	Unknown	1000	Fuel Oil

Merriam Graves	1159 Bernardston Road	Greenfield	Welding Supplies	Unknown	Unknown	10000	Fuel Oil

For more information on underground storage tanks, visit the Massachusetts Department of Fire Services web site: http://www.state.ma.us/dfs/ust/ustHome.htm

Note: This appendix includes only those facilities within the water supply protection area(s) that meet state reporting requirements and report to the appropriate agencies, as well as those noted during assessments by the water supplier. Additional facilities may be located within the water supply protection area(s) that should be considered in local drinking water source protection planning.