

Massachusetts Department of Environmental Protection
Source Water Assessment and Protection (SWAP) Report
for
South Hadley Fire District No. 2

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

<i>PWS Name</i>	South Hadley Fire District No. 2
<i>PWS Address</i>	20 Woodbridge Street
<i>City/Town</i>	South Hadley
<i>PWS ID Number</i>	1275001
<i>Local Contact</i>	William Selkirk
<i>Phone Number</i>	(413) 532-9210

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.

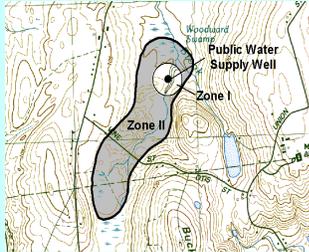
This report includes the following sections:

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

Section 1: Description of the Water System

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.



Zone II #: 615

Susceptibility: High

Well Names	Source IDs
Dry Brook Well	1275001-04G

South Hadley is a medium sized community in western Massachusetts located on the east bank of the Connecticut River. The Town was settled in the late 1600s and incorporated in the late 1700s. South Hadley developed as an agrarian community and later as an industrial community with the influx of the paper industry. Today South Hadley is predominantly a residential community with a prominent college. South Hadley has municipal water and wastewater disposal. However, some areas of town are not served by the municipal sewer system and therefore discharge wastewater through on-site septic systems. Water is supplied by two separate water systems; although the systems are connected and could supply water to the other system in the event of an emergency. South Hadley Fire District No. 1 serves the southern section of town and receives its water from the Massachusetts Water Resources Authority (MWRA), the source being Quabbin Reservoir. South Hadley Fire District No. 2 serves the northern section of Town and receives its water from one groundwater source, Dry Brook Well. Dry Brook Well is located along the Connecticut River near the Hadley town line. The District is proposing to install a well within 50 feet of the existing well as a mechanical backup to Well #1.

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.

The well is an artesian, gravel packed well that is approximately 112 feet deep. The well utilizes water from a confined to semi-confined, sand and gravel aquifer located within a buried, bedrock valley. The bedrock valley, is comprised primarily of sedimentary (sandstone) and volcanic (basalt) rocks of the Hartford Basin, that was somewhat deepened by advancing glaciers and were later filled in with sand and gravel from the receding glaciers and overlain by silt and clay from glacial Lake Hitchcock some 18,000 years before present. Recent alluvial deposits cover the entire valley area. The glacial feature located immediately south of the Dry Brook Well is a delta (sand and gravel) formed when stalled ice melted and discharged meltwater and sediment into Lake Hitchcock. The confining clay layer is primarily contiguous in the immediate vicinity of the well but is known to pinch out south of the well and to the west.

The Zone I is the area immediately surrounding the wellhead, while the Zone II is the land area that contributes water to the pumped well. The Dry Brook Well has a Zone I radius of 400 feet. The Zone II contribution area was delineated by the USGS as part of the SWAP program. The delineation included an analysis of empirical data from an extended duration pumping test and use of the numerical model MODFLOW. The well is located in an aquifer with a high vulnerability to contamination due to the absence of hydrogeologic barriers (i.e. clay) throughout the Zone II that can prevent contaminant migration. A hydrogeologic barrier does exist in the immediate vicinity of the well and in portions of the Zone II. The hydrogeologic barrier that does exist provides some protection relative to impeding the downward migration of contaminants from areas overlying the barrier. Please refer to the attached map to view the boundaries of the Zone II.

Currently the well water does not receive treatment. For current information on monitoring results and treatment, please contact the Public Water System contact person listed above in Table 1 for a copy of the most recent Consumer Confidence Report. Drinking water monitoring reporting data are also available on the web at <http://www.epa.gov/safewater/ccr1.html>.

Section 2: Land Uses in the Protection Areas

The land uses for the Zone II for South Hadley Fire District No. 2 are predominantly pasture, cropland, mining, and residential. Land uses and activities that are potential sources of contamination are listed in Table 2.

Key Land Uses and Protection Issues include:

1. Non-conforming Zone I
2. Sand and Gravel Mining
3. Residential land uses
4. Underground Storage Tanks
5. Manure Spreading
6. Comprehensive wellhead protection planning

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, with further detail provided in the Table of Regulated Facilities and Table of Underground Storage Tanks in Appendix A.

1. Non-conforming Zone I – The Zone I for Dry Brook Well is a 400 foot radius around the wellhead. Massachusetts drinking water regulations (310 CMR 22.00 Drinking Water) requires public water suppliers to own the Zone I, or control the Zone I through a conservation restriction. Many public water supplies were developed prior to the Department's regulations and contain non water supply activities such as homes and public roads. The following non- water supply activities occur within the Zone I:

Zone I Activities: Although South Hadley Fire District No. 2 owns the entire Zone I area, a dock and storage shed originally belonging to an abutting property owner still exists and is in use within the Zone I.

Zone I Recommendations:

- ✓ To the extent possible, remove all non-water supply activities from the Zone I to comply with DEP's Zone I requirements.

2. Sand and gravel mining – A sand and gravel mining operation is located within the Zone II. Sand and gravel mining is a potential source of contamination due to the possibility of spills or leaks from heavy equipment, fuel storage, and clandestine dumping.

Recommendations:

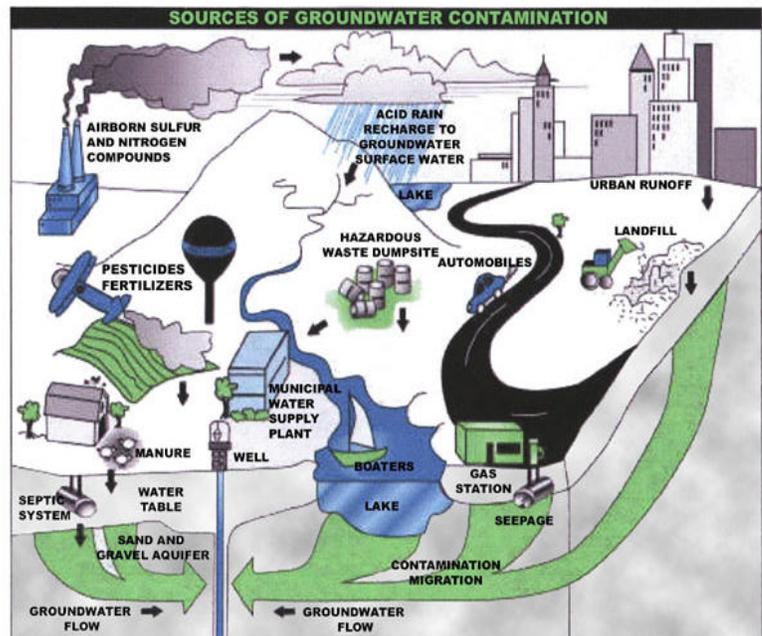
- ✓ Work with the owner to install or allow for the installation of monitoring wells on the northwest side of the mining operations. Annual monitoring for extractable petroleum hydrocarbons (EPH) would potentially allow for the early detection of releases of diesel fuel or gasoline that could impact the well.
- ✓ Encourage Best Management Practices for storage, use, and disposal of oil,

Benefits of Source Protection

Source Protection helps protect public health and is also good for fiscal fitness:

- Protects drinking water quality at the source
- Reduces monitoring costs through the DEP Waiver Program
- Treatment can be reduced or avoided entirely, saving treatment costs
- Prevents costly contamination clean-up
- Preventing contamination saves costs on water purchases, and expensive new source development

Contact your regional DEP office for more information on Source Protection and the Waiver Program.



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- fuel, and hazardous materials.
- ✓ Inspect the Zone II for signs of clandestine dumping on a regular basis.

3. Residential Land Uses – The residential areas within the Zone II do not have public sewers and, therefore, use septic systems. 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) and the associated fuel lines 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 from automotive leaks, maintenance, washing, or accidents.

Residential Land Use Recommendations:

- ✓ Educate residents on best management practices (BMPs) for protecting water supplies. Distribute the fact sheet “Residents Protect Drinking Water” available in Appendix C and on www.mass.gov/dep/brp/dws/protect.htm, which provides BMPs for common residential issues.
- ✓ Work with planners to control new residential developments in the water supply protection areas.
- ✓ Promote BMPs for stormwater management and pollution controls. Visit DEP’s web site for additional information and assistance at <http://www.state.ma.us/dep/brp/wm/nonpoint.htm>.

4. Underground Storage Tanks – At least one UST is located within the Zone II area based upon a UST survey conducted by the water supplier. If managed improperly, underground storage tanks and the associated fuel lines can be potential sources of contamination due to leaks or spills of the chemicals they store.

Recommendation:

- ✓ Encourage the UST owner to replace the UST with an above ground tank (AST) located on an impervious surface with proper spill containment. Grant money may be available for the UST removal through Massachusetts Department of Revenue. See the conclusions in Section 3 below for more information regarding grant/loan programs.

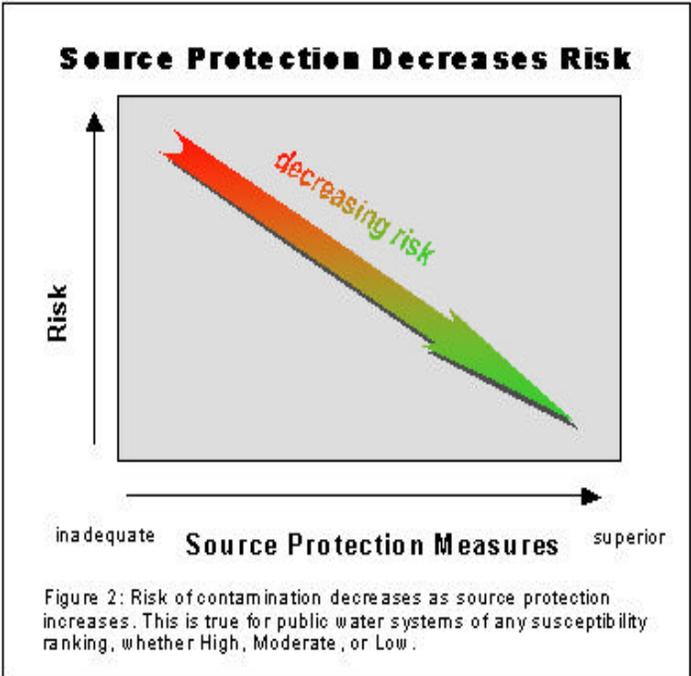
What are "BMPs?"

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.

For More Information

Contact Catherine Skiba in 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, board of health, and the town.



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 Use in the Protection Areas (Zones I and II)

For more information, refer to Appendix A: Regulated Facilities within the Water Supply Protection Areas

Activities	Quantity	Threat*	Potential Source of Contamination
Agricultural			
Livestock Operations	1	Moderate	Manure (microbial contaminants): improper handling
Manure Spreading	some	High	Manure (microbial contaminants): improper handling
Residential			
Fuel Oil Storage (at residences)	numerous	Moderate	Fuel oil: spills, leaks, or improper handling
Lawn Care / Gardening	numerous	Moderate	Pesticides: over-application or improper storage and disposal
Septic Systems / Cesspools	numerous	Moderate	Hazardous chemicals: microbial contaminants, and improper disposal
Miscellaneous			
Fishing/Boating	-	Low	Fuel and other chemical spills, microbial contaminants
Transportation Corridor	1	Moderate	Fuels and other hazardous materials: accidental leaks or spills; pesticides: over-application or improper handling
Underground Storage Tanks	1	High	Stored materials: spills, leaks, or improper handling

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 A: 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 B: Tier Classified Oil and/or Hazardous Material Sites.

* **THREAT RANKING** - 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.

(Continued from page 4)

5. Manure Spreading – Manure spreading on crop land occurs within the Zone II. Given the semi-confined nature of the Dry Brook aquifer, microbial contamination is probably not a significant concern. However, nitrate and nitrite contamination from manure spreading applications could potentially impact the water quality at the well.

Agricultural Activities Recommendation:

- ✓ 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.
- ✓ Work with farmers to investigate grants and loans designed to protect surface and groundwater. See <http://www.nrcs.usda.gov/programs/farmland/2002/pdf/EQIPFct.pdf> for more information on the USDA Environmental Quality Incentives Program (EQIP). Information on the MA Department Agricultural Resources' Agricultural Environmental Enhancement Program (AEEP) is available on the web at <http://www.state.ma.us/dfa/programs/aEEP/>.

6. Protection Planning – Currently, the Town of South Hadley has water supply protection controls that meet DEP's Wellhead Protection regulations 310 CMR 22.21(2). However, the Town's Water Supply Protection District bylaws should clearly define the boundaries of the district as corresponding to the Primary and Secondary Recharge Areas for Existing and Potential Public Water Supply Wells and Watershed Area for Public Water Supply Reservoir as shown on the map titled "South Hadley Water Protection Area". Protection planning protects drinking water by managing the land area that supplies water to a well. A Wellhead Protection Plan coordinates community efforts, identifies protection strategies, establishes a timeframe for implementation, and provides a forum for public participation. South Hadley currently has a Wellhead Protection Plan.

Protection Planning Recommendations:

- ✓ Verify that the newly approved Zone II is covered by the existing Water Supply Protection District.
- ✓ Work with town boards to review and provide recommendations on proposed development within your water supply protection areas. To obtain information on build-out analyses for the town, see the Executive Office of Environmental Affairs' community preservation web site, <http://commpres.env.state.ma.us/>.

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 like those below should be used to better protect your water supply.

Section 3: Source Water Protection Conclusions and Recommendations

Current Land Uses and Source Protection:

As with many water supply protection areas, Dry Brook Well's Zone II contains 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:

- Having a Wellhead Protection Plan;
- Having a formal Emergency Response Plan;
- Having a wellhead protection committee;

Top 5 Reasons to Develop a Local Wellhead Protection Plan

- ❶ Reduces Risk to Human Health
- ❷ Cost Effective! Reduces or Eliminates Costs Associated With:
 - ♦ Increased groundwater 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.



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 a 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 into the Zone II.
2. The groundwater in this area discharges to a 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.

- Providing wellhead protection education to schools and colleges; and,
- In general being proactive relative to wellhead protection issues.

Source Protection Recommendations:

To better protect the sources for the future:

- ✓ Continue working with emergency response teams to ensure that they are aware of the stormwater drainage in your Zone II and to cooperate on responding to spills or accidents.
- ✓ Monitor progress on any remedial action conducted for oil or hazardous waste contamination sites that may be identified in the Zone II in the future.
- ✓ 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 and Appendix A.

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. 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>. Grants are also available from the Massachusetts Department of Revenue's (DOR's) Underground Storage Tank (UST) Program for the removal of

underground storage tanks. For more information regarding the DOR UST, program visit their website at: http://www.dor.state.ma.us/ust/ust_home.htm.

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.

Section 4: Appendices

- A. Regulated Facilities within the Water Supply Protection Area
- B. Table of Tier Classified Oil and/or Hazardous Material Sites within the Water Supply Protection Areas
- C. Additional Documents on Source Protection

Additional Documents:

To help with source protection efforts, more information is available by request or online at mass.gov/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

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?	YES	Follow Best Management Practices (BMP's) that focus on good housekeeping, spill prevention, and operational practices to reduce the use and release of hazardous materials.
Is the Zone I posted with "Public Drinking Water Supply" Signs?	YES	Additional economical signs are available from the Northeast Rural Water Association (802) 660-4988.
Is Zone I regularly inspected?	YES	Continue routine inspections of drinking water protection areas.
Are water supply-related activities the only activities within the Zone I?	NO	Continue relationship with the owner of the dock and shed to not store chemicals, pesticides, petroleum products or other hazardous materials within the Zone I.
Municipal Controls (Zoning Bylaws, Health Regulations, and General Bylaws)		
Does the municipality have Wellhead Protection Controls that meet 310 CMR 22.21 (2)?	YES	Verify that the recently approved Zone II falls within the existing Water Supply Protection District. Request a modification of the District boundaries as appropriate.
Planning		
Does the PWS have a Wellhead Protection Plan?	YES	Update the plan as appropriate to include any new information from the Zone II delineation.
Does the PWS have a formal "Emergency Response Plan" to deal with spills or other emergencies?	YES	Continue current efforts in the joint emergency response plan with fire department, Board of Health, DPW, and state emergency response officials. Coordinate emergency response drills with local teams.
Does the municipality have a wellhead protection committee?	YES	
Does the PWS provide wellhead protection education?	YES	