Source Water Assessment Program (SWAP) Report For Mullein Hill Christian Academy

What is SWAP?

The Source Water Assessment Program (SWAP), 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.

SWAP and Water Quality

Susceptibility of a drinking water source does *not* imply poor water quality. Actual water quality is best reflected by the results of regular water tests.

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

Prepared by the Massachusetts Department of Environmental Protection, Bureau of Resource Protection, Drinking Water Program

Date Prepared: September 13, 2001

Table 1: Public Water System (PWS) Information

PWS NAME	Mullein Hill Christian Academy
PWS Address	111 Highland Road
City/Town	Lakeville, Massachusetts
PWS ID Number	4146044
Local Contact	Clint Eastman, Headmaster
Phone Number	508-947-2898

Well Name	*Source ID#*	*Zone I (in feet)*	*IWPA (in feet)*	*Source Susceptibility*
Well #1	4146044-01G	136	439	Moderate

Introduction

We are all concerned about the quality of the water we drink. Drinking water wells may be threatened by many potential sources of contamination, including septic systems, 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. 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:
1. Description of the Water System
2. Discussion of Land Uses within Protection Areas
3. Recommendations for Protection
4. Attachments, including a Map of the Protection Areas

1. Description of the Water System

The well for the Mullein Hill Christian Academy (the "Academy") is a public water supply currently serving the 156 students. Well #1 is located in the playground approximately 140 feet north of the school. Well #1 is a 4-inch bedrock well drilled to a depth of 205 feet. Based on the current approved Zone I of 136 and the Interim Wellhead Protection Area (IWPA) of 439 feet (established in 1998 sanitary survey), the average daily withdrawal for the well is limited to 1750 gallons per day. The IWPA provides an interim protection area for a water supply well when the actual recharge area has not been delineated. The actual recharge area to the well may be significantly larger or smaller than the IWPA. The well is located in a bedrock aquifer with a high vulnerability to contamination due to the absence of hydrogeologic barriers (i.e. clay) that can prevent contaminant migration. Please refer to the attached map of the Zone I and IWPA.

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 an Interim Wellhead Protection Area (IWPA).

- **The Zone I** is the area that should be owned or controlled by **the** water supplier and limited to water supply activities.
- **The IWPA** is the larger area that is likely to contribute water to the well.

In many instances the IWPA does not include the entire land area that could contribute water to the well. Therefore, the well may be susceptible to contamination from activities outside of the IWPA that are not identified in this report.

What is Susceptibility?

Susceptibility is a measure of a well's potential to become contaminated due to land uses and activities within the Zone I and Interim Wellhead Protection Area (IWPA).

The water from the well serving the facility is treated at the kitchen sink with a point of use device (filter) for occasional taste problems. For current information on monitoring results and treatment, please contact the Public Water System contact person listed above in Table 1.

2. Discussion of Land Uses in the Protection Areas

There are a number of land uses and activities within the drinking water supply protection areas that are potential sources of contamination.

Key issues include:

1. **Inappropriate activities within the Zone I,**
2. **Athletic Fields,**
3. **Septic System,**
4. **Storm water,**
5. **Storage, Use and Handling of Hazardous Material/Oil.**

The overall ranking of susceptibility to contamination for the well is **Moderate**, based on the presence of at least one **Moderate** threat land use or activity in the IWPA, as seen in Table 2.

1. **Zone I**–Currently, the well does not meet the Department requirements that the public water supplier own or control all land encompassed by the Zone I. The Department records indicate that the eastern edge of the Zone I for the well is not owned by the Academy. The facility's Zone I contains Academy buildings, athletic fields, playgrounds and parking areas. Please note that systems not meeting Department Zone I requirements must get DEP approval and address Zone I issues prior to increasing water use or modifying systems.

   Recommendations:

- If it's not feasible to purchase privately owned land within the Zone I at this time, consider a conservation restriction that would prohibit potentially threatening activities or a right of first refusal to purchase the property.
- Keep non-water supply activities out of the Zone I.
- Do not use or store pesticides, fertilizers or road salt within the Zone I.
- Well #1 casing should be extended to 18-inches above grade in order to reduce the

Table 2: Table of Activities within the Water Supply Protection Areas

Potential Contaminant Sources	Zone I	IWPA	Threat	Comments
Septic System	No	Well #1	Moderate	Refer to septic systems brochure in the attachments
Parking lot, driveways & roads	No	Well #1	Moderate	Limit road salt usage and provide drainage away from wells
Athletic Fields	Well #1	Well #1	Moderate	Do not use pesticides or fertilizers in Zone I
Storage, use and handling of oil and hazardous materials	No	Well #1	Moderate	Lawn mower, gas cans, and small amounts of chemical storage
Residential	No	Well #1	Moderate	2 Residences-septic systems, heating fuel storage, lawn care
Structures	Well #1	Well #1	-	Non water supply structures in Zone I

*** -For more information on Contaminants of Concern associated with individual facility types and land uses please see the SWAP Draft Land Use / Associated Contaminants Matrix on DEP's website - www.state.ma.us/dep/brp/dws/.**

Glossary

Zone I: The area closest to a well; a 100 to 400 foot radius proportional to the well's pumping rate. To determine your Zone I radius, refer to the attached map.

IWPA: A 400 foot to ½ mile radius around a public water supply well proportional to its pumping rate; the area DEP recommends for protection in the absence of a defined Zone II. To determine IWPA radius, refer to the attached map.

Zone II: The primary recharge area defined by a hydrogeologic study.

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 that resists penetration by water.

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

potential for storm water infiltration into the well.

2. **Athletic Fields -** There are playing fields located within the Zone I and IWPA of Well #1. Over-application of pesticides and fertilizers on athletic fields is a potential source of contaminants to the water supply.

Recommendations:

- Do not apply fertilizer and pesticides within the Zone I.
- Use BMPs for applying, handling and storing of pesticides and fertilizers in the IWPA.
- Refer to attachments, "Protecting Water Sources from Fertilizer" and, "Protecting Groundwater from Pesticides".

3. **Septic Systems -** The septic system's leaching field is located approximately 150 feet west of the well. The septic system is designed for 1800 gallons per day. However, based on the current population and using Title 5 calculation the facility is producing in excess of 2000 gallons per day. The Department issued a notice of noncompliance in 2001 requiring the Academy to reduce school population or install a new well through the Department's source approval process. If a septic system fails or is not properly maintained it is a potential source of nutrients and microbial contamination. Improper disposal of household hazardous chemicals or industrial wastewater to the septic system is also a potential source of contamination to the water supply.

Recommendations:

- Septic system components should be located, inspected, and maintained on a regular basis. Refer to attachment for more information regarding septic systems.
- Educate staff on septic systems about using cleaning compounds that are safe for the septic system, on proper disposal practices, i.e. only sanitary waste in the septic system. Workers should dispose of used oil, antifreeze, paints, and other household chemicals properly-not in septic systems. Information on septic systems can be found at mass DEP web site http://www.state.ma.us/dep/brp/files/yoursyst.htm.
- Monitor water usage, as exceeding the septic system design capacity could cause premature failure of the septic system.
- Continue to work the Department and Board of Health to resolve the unapproved expansion of the facility and potential overloading of the septic system.

4. **Storm water – T**he Academy's paved parking areas are located west and south of the Zone I for Well #1. Storm water from the western edge of the parking lot and roof runoff discharges to a catch basin located between the school and Highland Road. Storm water is then routed from this catch basin to an underground pipe. The underground pipe daylights along the northeastern edge of the parking lot where it discharges into a 6 - inch gully located within the athletic fields. As flowing storm water travels, it picks up debris and contaminants from streets, parking areas and lawns. Common potential contaminants include lawn chemicals, pet waste, leakage from dumpsters, household hazardous waste, and contaminants from vehicle leaks, maintenance, washing or accidents. Catch basins transport storm water from the roadway and adjacent properties to the ground.

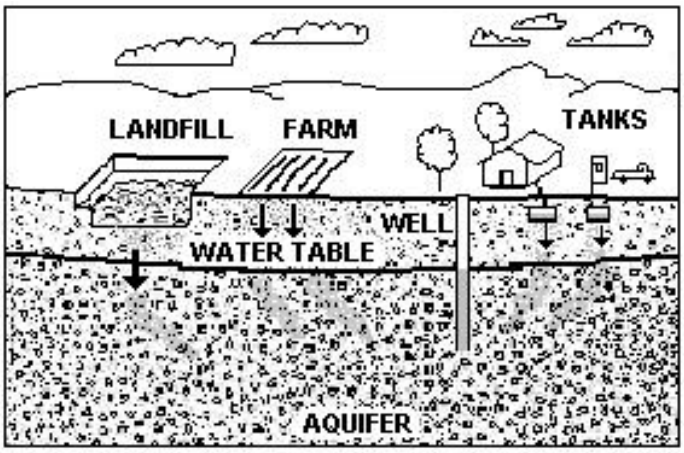

Figure 1: Example of how a well could become contaminated by different land uses and activities.

Recommendations:

- Have catch basins inspected, maintained, and cleaned on a regular schedule.
- The Department recommends the public water supplier consider nonstructural techniques such as parking lot sweeping to reduce the amount of potential contaminants in storm water runoff. Additionally, the public water supplier

For More Information:

Contact Mark Dakers in DEP's Lakeville Office at (508) 946-2847 for more information and for assistance in improving current protection measures.

More information relating to drinking water and source protection is available on the Drinking Water Program web site at: www.state.ma.us/dep/brp/dws/

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

Copies of this assessment have been provided to the public water supplier, town boards, and the local media.

may want to consider structural BMPs (e.g. stormwater swales, installation of curbs along the paved areas, detention basin, etc.) as part of a comprehensive storm water management plan for the site. To learn more refer to the *Storm Water Management Handbook*, *Volume 1 and 2* for information on BMPs and documents available at http://www.state. ma.us/dep/brp/ww/wwpubs.htm.

5. **Storage, Use, and Handling of Hazardous Materials/Oil:** - A storage shed containing lawn mower, gas cans and other chemical storage is located in the IWPA near the school's southern entrance on County Road. If managed improperly, household hazardous materials can all contribute to groundwater contamination. Hazardous materials may include automotive products, household cleaners paints, solvents, pesticides, and other substances. The materials within the shed pose a potential threat to the well due to their proximity and potential for accidental release.

Recommendation:

- Train staff on proper hazardous material use, disposal, emergency response, and best management practices; include custodial staff, and food preparation staff. Post labels as appropriate on raw materials and hazardous waste.
- To learn more, refer to the hazardous materials guidance documents at www.state.ma.us/dep/bwp/dhm/dhmpubs.htm and the household hazardous waste documents available at http://www.state.ma.us/dep/recycle/hazards/hhwhdome.htm

Implementing the following recommendations will reduce the system's susceptibility to contamination.

3. Protection Recommendations

Implementing protection measures and best management practices (BMPs) will reduce the well's susceptibility to contamination. The Academy should review and adopt the **key recommendations above** and the following:

Zone I:

- Keep non-water supply activities out of the Zone I.
- Prohibit public access to the well and pump house by locking facilities, gating roads, and posting signs.
- Conduct regular inspections of the Zone I. Look for illegal dumping, evidence of vandalism; check any above ground tanks for leaks, etc.
- Do not use or store pesticides, fertilizers or road salt within the Zone I.

Training and Education:

- Work with your community to ensure that stormwater runoff is directed away from the well and is treated according to DEP guidance.

Facilities Management:

- Implement standard operating procedures regarding proper storage, use and disposal of hazardous materials. To learn more, see the hazardous materials guidance manual at www.state.ma.us/dep/bwp/dhm/dhmpubs.html.
- Implement Best Management Practices (BMPs) for the use of fertilizer, herbicides and pesticides on facility property.
- Concrete pads should slope away from well and well casing should extend above ground.

Planning:

- Work with local officials in Lakeville to include the facility IWPA in Aquifer Protection District Bylaws and to assist you in improving protection.
- Have a plan to address short-term water shortages and long-term water demands. Keep the phone number of a bottled water company readily available.

- Supplement the SWAP assessment with additional local information and incorporate it into water supply educational efforts. Use a land use inventory to assist in setting priorities, focusing inspections, and creating educational activities.

Agricultural:
- Encourage farmers in the IWPA to seek assistance from the Natural Resource Conservation Service (NRCS) in addressing farm management issues.

Funding:

The Department's Wellhead Grant Protection Program provides funds to assist public water suppliers in addressing Wellhead protection through local projects. Protection recommendations discussed in this document may be eligible for funding under the "Wellhead Protection Grant Program". For additional information, please refer to the attached program fact sheet. Please note: each program year the Department posts a new Request for Response for the Grant program (RFR). Other funding opportunities are described in "Grant and Loan Programs: Opportunities for Watershed Protection, Planning and Implementation" at http://www.state.ma.us/dep/brp/mf/files/glprgm.pdf.

These recommendations are only part of your ongoing local drinking water source protection. Citizens and community officials should use this SWAP report to spur discussion of local drinking water protection measures.

4. Attachments

- Map of the Public Water Supply (PWS) Protection Area.
- Recommended Source Protection Measures Factsheet
- Your Septic System Brochure
- Healthy Schools Fact Sheet
- Wellhead Protection Grant Program Fact Sheet
- Source Protection Sign Order Form
- Pesticide and Fertilizer Use Fact sheets