



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

<i>PWS Name</i>	Williamsburg Water Department
<i>PWS Address</i>	141 Main Street, P.O. Box 447
<i>City/Town</i>	Williamsburg, Massachusetts
<i>PWS ID</i>	1340000
<i>Local Contact</i>	Mr. Walter Kellogg
<i>Phone Number</i>	(413) 268-7579

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 stormwater 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

Section 1: Description of the Water System

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.

System Susceptibility:

High

Groundwater Sources

MA GIS Zone II ID #: 163

Susceptibility: High

<i>Well Name</i>	<i>Source ID#</i>
GP Well #1	1340000-01G
Well #2	1340000-02G

Williamsburg is a small, rural town located in western Massachusetts, in the foothills of the Berkshire Hills. The early agricultural community developed primarily as an industrial town utilizing waterpower from the Mill River. Many of the mills were destroyed by a flood in 1874 and were not rebuilt. The community presently is primarily a small, rural, residential community with increasing development pressure as a bedroom community. The Williamsburg Water Department maintains and operates two groundwater sources, Well #1 (01G) and Well #2 (02G). The two wells are within 50 feet of each other and Well #2 operates as the primary well with GP Well #1 operating as a mechanical back-up source. The Water Department also maintains a reservoir (Unquomok Brook Reservoir 01S) as an Emergency Source of water. The Emergency Source will not be further addressed in this report.

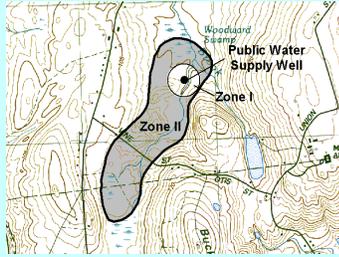
The Wells are located within the narrow Unquomok Brook valley. The aquifer is a semi-confined, buried valley, sand and gravel aquifer adjacent to the Unquomok Brook in the south central part of town. Data from the well development and Zone II delineation study indicate the aquifer is within a glacially deepened bedrock valley that was filled with sand and gravel during the glacial recession (melting) some 12,000 years ago. The sand and gravel deposits in the narrow bedrock valley aquifer utilized by this well are mapped as glacial lake, esker, stream outwash and terrace deposits. During the time of the glacial retreat, a temporary glacial lake was formed in the valley depositing a confining clay layer in parts of the valley. Generally clay units pinch out toward valley walls where much of the recharge to the aquifer occurs through the kame terrace sand and gravel deposits. The bedrock underlying the area is mapped as a marble and quartzite schist of the Conway Formation; the peaks of Scott, Unquomok and Petticoat Hills are mapped as Williamsburg granodiorite and pegmatite. The Water Department owns the entire 400-foot, Zone I protective radius around the wells and several acres of land within the Zone II and Zone III of the wells.

The well logs indicate coarse sand and gravel with evidence of a semi-confining protective clay layer in the aquifer. Although the clay layer was identified in the boring logs of observation wells in the immediate vicinity of the production wells, water level data and stream flow data collected during the extended duration pumping tests indicate the confining unit is not continuous and the Unquomok Brook can contribute water to the aquifer under pumping conditions. Therefore, the aquifer is considered to be highly vulnerable to contamination because the hydrogeologic barrier (i.e. clay) is not continuous throughout the developed recharge area. The Zone II for the wells was delineated when Well #2 was installed utilizing empirical data, analytical modeling, seismic data and geologic mapping. There is no municipal sewer available in the Zone II area and therefore on-site septic disposal is used.

The dominant land use in the Zone II area is low to medium density residential with a few commercial and non-commercial livestock activities. There is only one main road, South Street, within the Zone II. Please refer to the attached map to view the boundaries of the Zone II.

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.



The pH of the water from the wells is adjusted for corrosion control prior to distribution. For current information on monitoring results and treatment and for a copy of the most recent Consumer Confidence Report, please contact the Public Water System contact person listed above in Table 1. Drinking water monitoring reporting data is also available on the web at <http://www.epa.gov/safewater/ccr1.html>.

Section 2: Land Uses in the Protection Areas

The Zone II area (# 163) is 46% forested, 33% cropland, pasture and/or open land, 18% low to medium density residential with the remaining area mapped as wetland. As noted previously, municipal sewer is not available in the Zone II. Two observations made during the site visit were the proximity of recreational farm animals to the Unquom Brook and beaver activity. Pumping test data confirms that Unquom Brook is a losing stream under pumping conditions. Therefore, the Water Department should control beaver activity in the brook and work with the Conservation Commission and upgradient land owners to use buffer strips to protect the water quality in Unquom Brook. Land uses and

activities that are potential sources of contamination are listed in Table 2. There are no regulated facilities or known underground storage tanks within the Zone II.

Key Land Uses and Protection Issues include:

1. Activities in Zone I
2. Residential Land Uses
3. Transportation Corridors
4. Agricultural activities
5. Comprehensive Wellhead Protection Planning

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

1. Activities in Zone I – The Zone I for the wells is a 400-foot radial area around each of the wellheads. 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 a conservation restriction. Activities other than those directly related to the public water supply or those that pose no significant threat are prohibited within the Zone I. However, many public water supply sources were developed prior to promulgation of the Department's regulation and contain non-water supply activities such as homes and public roads. The Water Department does own the entire Zone I for the wells. There is an access road to the wells and a bridge across Unquom Brook to the two water tanks on the adjacent hill.

Beaver activity was noted within the Zone I along Unquom Brook. It was also observed that horses and passive recreation occurs along the access road in Zone I. Under stressed (pumping) conditions, the brook contributes water directly to the aquifer and well. Activities conducted in the wetland and adjacent brook may impact the water quality in the well.

Zone I Recommendations:

- ✓ Prohibit all non-water supply activities from the Zone I.
- ✓ Ensure that residents upstream along the Unquom Brook are aware of Best Management Practices with respect to household hazardous materials, lawn chemicals and manure management.
- ✓ Use BMPs for the storage, use, and disposal of hazardous materials such as water supply chemicals and maintenance chemicals.
- ✓ Do not use or store pesticides, fertilizers or road salt within the Zone I.
- ✓ Protect the floor drain located in the well house from potentially hazardous materials.
- ✓ Manage beavers within the Unquom Brook, especially in immediate proximity of the well.

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 Water Supply Protection Areas

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

Land Uses	Quantity	Threat	Potential Contaminant Sources*
Miscellaneous			
Livestock	3	M	Leaks and spills of petroleum products from equipment, pesticides and microbial contaminants from manure.
Aquatic Wildlife	Occasional	M-H	Microbial contaminants
Transportation Corridors	Few	H/M	Accidental leaks or spills of fuels and other hazardous materials, over-application or improper handling of pesticides
Residential			
Fuel Oil Storage (at residences)	Numerous	M	Fuel oil: spills, leaks, or improper handling
Lawn Care / Gardening / Hay / Household Hazardous Waste	Numerous	M	Pesticides/fertilizers and household hazardous waste: over-application or improper storage and disposal
Septic Systems / Cesspools	Numerous	M	Hazardous chemicals: microbial contaminants, and improper disposal

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; the characteristics of the contaminants (such as toxicity, environmental fate and transport); and the behavior and mobility of the pollutants in soils and groundwater.

Environmental Quality Incentives Program (EQIP). The USDA web site is www.ruraldev.usda.gov or call Oliver Miranda, at the local office in Hadley office at 413-585-1000. 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>.

- ✓ Visit DEP's Nonpoint Source Pollution web site for additional information and assistance at <http://www.state.ma.us/dep/brp/wm/nonpoint.htm>.
- ✓ The USDA has various funding sources for government, non-government organizations and agricultural facilities in small communities through programs such as those listed on the USDA web site <http://search.sc.gov.usda.gov/>.

Additional information is available on the web site www.ruraldev.usda.gov or call the local office in Hadley at 413-585-1000.

- ✓ Do not plow snow or debris from the access road into Unquomok Brook.

7. Agricultural Activities – The SWAP map indicates cropland, pasture and open lands comprise 33% of the Zone II. Although most of this is actually pasture and open land. Pesticides and fertilizers 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. Improper management of hazardous materials such as petroleum products, commonly found on farms, also poses a potential threat to the groundwater. In addition, most of the area within the Zone II is served by private wells. There is one boarding stable and other livestock and agricultural uses that are non-commercial activities.

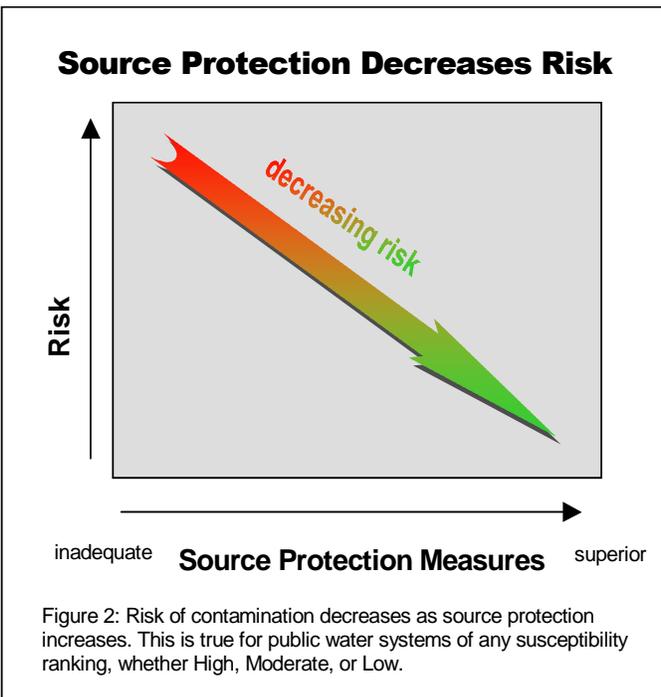
Agricultural Activities Recommendation:

- ✓ Work with landowners 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 as a model to protect water supplies.
- ✓ Where appropriate, ensure landowners use back-flow prevention devices for any connections to public water supplies but also for on-site wells. Supply information about BMPs for sanitary seals and back flow prevention for any private wells.
- ✓ Offer information about BMPs from NRCS, MA Department of Food and Agriculture and the MA DEP web site <http://www.state.ma.us/dep/brp/dws/protect.htm>. Specifically, encourage the use of buffer strips to prevent animals from accessing Unquomok Brook and allowing attenuation from pasture runoff.

6. Protection Planning – Protection planning protects drinking water by managing the land area that supplies water to a well or reservoir. The

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

- ➊ Reduces Risk to Human Health
- ➋ Cost Effective! Reduces or Eliminates Costs Associated With:
 - ♦ Increased monitoring and treatment
 - ♦ Water supply clean up and remediation
 - ♦ Replacing a water supply
 - ♦ Purchasing water
- ➌ Supports municipal bylaws, making them less likely to be challenged
- ➍ Ensures clean drinking water supplies for future generations
- ➎ 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.



Williamsburg Protective bylaw for the Water Supply Protection District covers the entire Zone II and III for the wells. The bylaw has recently been reviewed and is not in complete compliance with DEP’s Wellhead Protection regulation 310 CMR 22.21(2). Although Williamsburg does not have a health regulation that prohibits floor drains that discharge to the ground, the land uses in the Zone II are residential and agriculture related and not industrial.

The MA DEP Boston office reviewed the existing Protective Bylaw. Comments and recommendations were submitted to the Planning Board and Zoning Bylaw Review Committee for consideration of revisions to the bylaw. The committee reported to the MA DEP regional office staff that they were reluctant to propose changes to the existing bylaw without a request from the Water Department. Williamsburg Water Department should note that water quality monitoring waiver approval may be contingent upon having bylaws in compliance with 310 CMR 22.000.

Williamsburg does not have a Wellhead Protection Plan. A Wellhead Protection Plan coordinates

community efforts, identifies protection strategies, establishes a timeframe for implementation, and provides a forum for public participation. Williamsburg owns approximately 5% of the Zone II area. Protection planning should include education of the residents within the Zone II regarding the potential impact of their activities to the water quality of the aquifer.

Protection Planning Recommendations:

- ✓ Establish a protection team, and refer them to <http://mass.gov/dep/brp/dws/protect.htm> for a copy of DEP's guidance, "Developing a Local Wellhead Protection Plan" and continue efforts in wellhead protection planning. This process can be promoted through other planning activities being conducted in town such as the Community Development planning process and zoning.

Land uses and activities within the Zone II that are potential sources of contamination are included in Table 2. It should be noted that the Unquomok Brook does contribute water to the aquifer and the well. The Water Department should note activities upstream and include all potential threats along the brook in the protection plan and include remedial actions in an emergency response plan.

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, the system 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:

- purchasing land within the Zone I and Zone II.

Source Protection Recommendations:

To better protect the sources for the future:

- ✓ Communicate with and educate residents and hobby farmers on ways they can help you to protect drinking water sources, especially those proximal to the Unquomok Brook. Provide information on BMPs.
- ✓ Work with emergency response teams to ensure that they are aware of the stormwater drainage in your Zone II and to continue their cooperation responding to spills or accidents.
- ✓ Develop and implement a Wellhead Protection Plan.
- ✓ Visit DEP's web site for additional information and assistance on source water protection at <http://www.state.ma.us/dep/brp/dws/protect.htm>

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.

➤ Educate Residents:

If managed improperly, household hazardous waste, septic systems, lawn care, and pet waste can all contribute to water supply contamination. Hazardous materials include petroleum products, automotive wastes, paints, solvents, pesticides,

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.

fertilizers, and other substances. If a septic system fails or is not properly maintained, it could be a potential 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 of the most effective means of protecting water supplies is local planning, including adoption of local controls to protect land use and regulations related to watersheds and groundwater protection. These controls may include health regulations, discharge prohibitions, general ordinances, and zoning bylaws/ordinances 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 governmental, non-governmental 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 (Amherst 413-253-4350 or Hadley 413-585-1000) of the NRCS for assistance <http://www.nrcs.usda.gov/programs/farbill/2002/pdf/EQIPFct.pdf>.

The Department's Wellhead Protection Grant Program provides 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. If funding is available, each spring DEP posts a new Request for Response for the grant program (RFR) on the website <http://www.comm-pass.com/>.

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. 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.

Section 4: Appendices

- A. Protection Recommendations
- B. Additional Documents on Source Protection

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 in DEP's Springfield Regional 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 boards.

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. Keep trespassers out of Zone I and limit activities to those that will pose no threat to the groundwater or brook water quality.
Are the protection areas posted with "Public Drinking Water Supply" Signs?	YES	Additional economical signs are available from the Northeast Rural Water Association (802) 660-4988.
Is the Zone I regularly inspected?	YES	Continue inspections of drinking water protection areas.
Are water supply-related activities the only activities within the Zone I?	YES	Prohibit non-water supply activities in Zone I. Monitor recreational activity in Zone I and continue to control access.
Municipal Controls (Zoning Bylaws/Ordinances, Health Regulations, and General Bylaws/Ordinances)		
Does the municipality have Wellhead Water Protection Controls that meet Wellhead Protection Controls that meet 310 CMR 22.21(2) ?	Partial	Request that the Planning Board/Bylaw Review Committee compare land use controls to see that they meet current requirements of 310 CMR 22.21(2). Request a revision to the bylaw as is appropriate. Refer to mass.gov/dep/brp/dws/ for model bylaws and health regulations, and current regulations. Request that the Board of Health adopt floor drain regulations for the entire town.
Do neighboring communities protect the water supply protection areas extending into their communities?	N/A	
Planning		
Does the PWS have a local wellhead protection plan?	NO	Develop a wellhead protection plan. Follow "Developing a Local Wellhead Protection Plan" available at: www.state.ma.us/dep/brp/dws/ .
Does the PWS have a formal "Emergency Response Plan" to deal with spills or other emergencies?	YES	Augment the plan by developing a joint emergency response plan with fire department, Board of Health, Highway Department and local and state emergency officials. Coordinate emergency response drills with local teams.
Does the municipality have a wellhead protection committee?	NO	Assemble a committee and include representatives from citizens' groups, and the Town Boards/Committees affiliated with community planning. Consider using members of existing committees currently involved in planning.
Do the Boards of Health conduct inspections of commercial and industrial activities?	N/A	Request adoption hazardous materials handling regulations. For more guidance see "Hazardous Materials Management: A Community's Guide" at www.state.ma.us/dep/brp/dws/files/hazmat.doc to protect all groundwater in town.
Does the PWS provide watershed protection education?	YES	Continue communication through the school and increase residential outreach through bill stuffers, Drinking Water Week activities, and coordination with educating resident within the Zone II in particular.