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

North Sagamore Water District

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	North Sagamore Water District
PWS Address	14 Squanto Road
City/Town	Bourne, MA 02532
PWS ID Number	4036002
Local Contact	Paul Gibbs
Phone Number	508-888-1085

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.

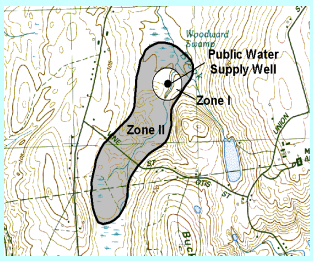
Refer to Table 3 for Recommendations to address potential sources of contamination. Department of Environmental Protection (DEP) staff are available to provide information about funding and other resources that may be available to your community.

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

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.



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.

Section 1: Description of the Water System

Zone II #: 417 ***Susceptibility:*** **High**

Well Names	***Source IDs***
Beach well (GP Well #1)	4036002-01G

Zone II #: 418 ***Susceptibility:*** **High**

Well Names	***Source IDs***
Black Pond Well	4036002-03G

The North Sagamore Water District has two active gravel-packed wells, the Black Pond well (the primary source of water) and the Beach well. A third well, the Church Lane well is awaiting the design and construction of a treatment plant for iron and manganese removal. Each well has a Zone I of 400 feet and a Zone II that has been hydrogeologically determined. The wells are located in an 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 to view the boundaries of the Zones I and II.

The wells are treated with potassium hydroxide to control corrosion. For current information on treatment and the results of water quality monitoring, 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 Zone IIs contain predominantly undeveloped forest, 59% of the Zone II for the Black Pond well and 40% of the Zone II of the Beach well. The Zone II for the Black Pond well extends into Plymouth. Land uses and activities that are potential sources of contamination are listed in Table 2.

Key Land Uses and Protection Issues include:

1. Land Uses Within Zone I
2. Residential Land Uses
3. Service Station/Auto. Repair Shop
4. Transportation Corridors
5. Transmission Line Right-of-Way
6. Clandestine Dumping
7. Aquatic Wildlife
8. Baseball Field

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. Land Uses Within Zone I – The Zone I for each of the wells is a 400 foot radius around each wellhead. Massachusetts drinking water regulations (310 CMR 22.00) requires public water suppliers to own the Zone I or control the Zone I through a conservation restriction. Only water supply activities are allowed in the Zone I. However, 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 in the Zone Is of the system wells.

Black Pond well (03G): Black Pond Road passes through the Zone I
Beach well (01G): Pilgrim Road passes through the edge of the Zone I

Zone I Recommendations:

- ✓ 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.
- ✓ Keep any new non-water supply activities out of the Zone I.

2. Residential Land Uses – Approximately 37% and 23% of Zone IIs #417 and #418, respectively, consist of residential land uses. The Zone IIs also contain 40% and 59% forested, undeveloped land. Some portions of the Zone IIs have the potential for more residential development. 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.

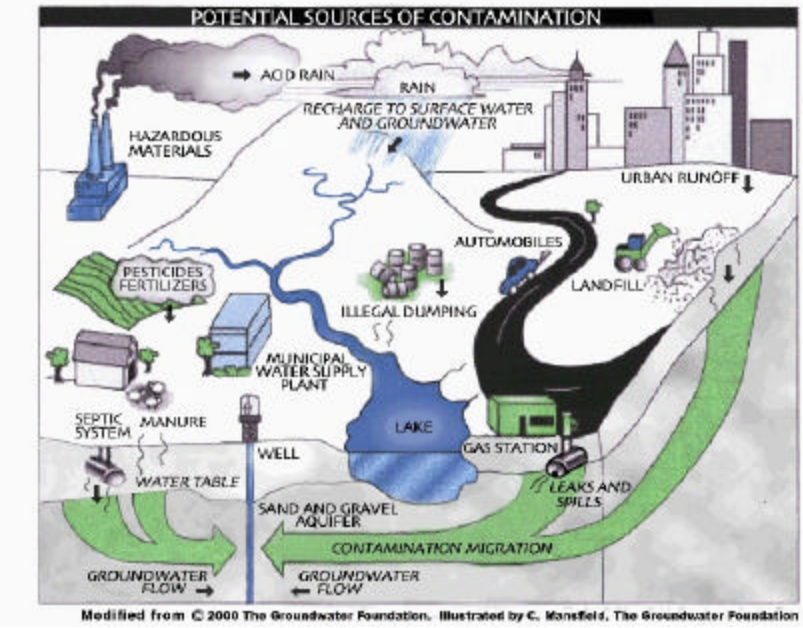
- **Stormwater** – Catch basins transport stormwater from roadways and adjacent properties

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.



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 source protection measures 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. See www.state.ma.us/envir/ to obtain information from the Massachusetts Executive Office of Environmental Affairs on build-out analyses for communities into which Zone IIs extend.
- ✓ Promote Best Management Practices (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.

3. Service Station/Auto. Repair Shop - There is one service station/auto. repair shop within the Zone II of the Beach well. Automotive fluids and solvents can leak or spill from this type of facility.

Service Station/Auto. Repair Shop Recommendations:

- ✓ Talk with the owner/operator about BMPs for storing, handling and disposing of fluids and solvents.

4. Transportation Corridors - Route 3 runs through the Zone II for the Beach well. Local roads run through both Zone IIs. 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 catch basins.

Transportation Corridor Recommendations:

- ✓ Identify stormwater drains and the drainage systems along transportation corridors. Wherever possible, ensure that drains discharge to outside the Zones I & II.
- ✓ Work with the Town and State to have catch basins inspected, maintained, and cleaned on a regular schedule. Street sweeping reduces the amount of potential contaminants in runoff.
- ✓ Work with local emergency response teams to ensure that any spills within the Zones I & II can be effectively contained.
- ✓ 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.

5. Transmission Line - There is an electric utility line that runs through the Zone IIs.

(Continued on page 6)

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 Isabel Collins in DEP's Lakeville office at (508) 946-2726 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.

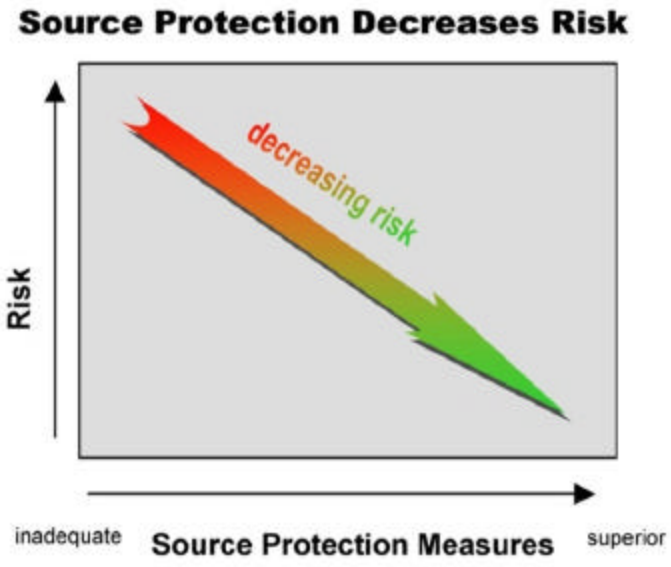


Figure 2: Risk of contamination decreases as source protection increases. This is true for public water systems of any susceptibility ranking, whether High, Moderate, or Low.

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)

Activities	Quantity	Threat*	Potential Source of Contamination
Residential (Zone IIs 417 & 418)			
Septic Systems	3+ in each Zone II	M	microbial contaminants, improper disposal of hazardous chemicals
Fuel Oil Storage	3+ in each Zone II	M	spills, leaks or improper handling of fuel oil
Lawn Care	3+ in each Zone II	M	over-application of improper storage and disposal of pesticides
Commercial (Zone II 417)			
Service Station/Auto. Repair Shop	1	H	leaks or spills of automotive fluids and solvents
Miscellaneous			
Transportation Corridors are within Zone I for well 01G & within both Zone IIs (417 & 418)	local roads; Route 3 (417)	M	leaks or spills of fuel and other hazardous materials; over-application or improper handling of pesticides; erosion from construction
Transmission Line Right-of-Way (Zone IIs 417 & 418)	1 electric	L	spills from over-application or improper handling of pesticides, erosion from construction
Clandestine Dumping (Zone II 418)	sometimes	H	debris containing hazardous materials or wastes
Aquatic Wildlife (Zone II 418)	on Black Pond	L	microbial
Recreation (Zone II 417)	1 baseball field	M	runoff and spills from fertilizer use 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.

*** THREAT RANKING** - The rankings (high, moderate or low) represent the relative threat of each land use compared to other P SCs. 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.

Transmission lines are potential sources of contamination because of the possibility of over-application or improper handling of herbicides during rights-of-way maintenance.

The Rights-of-Way Management Regulations (333 CMR 11.00) were designed to minimize any potential harmful effects of herbicides use for vegetation control along rights-of-way in Massachusetts. The regulations promote the use of an integrated pest management (IPM) approach to vegetation control and require application setback distances to protect drinking water sources and other environmentally sensitive areas. Utilities must submit a Vegetation Management Plan (VMP) and a Yearly Operating Plan (YOP) to the Mass. Department of Food and Agriculture for approval and to the municipalities into which herbicide application is proposed.

Transmission (Utility) Lines Recommendations:

✓ Monitor the YOP for pesticide application.

6. **Clandestine (Illegal) Dumping** - Illegal dumping of solid waste is often a problem on undeveloped lands. Sometimes this debris contains hazardous materials or wastes. Illegal dumping occurs sometimes within the Zone II of the Black Pond well .

Clandestine Dumping Recommendations:

✓ Educate the public about the contamination threats associated with illegal dumping.
✓ Work with local towns to conduct household hazardous waste collection days.
✓ Maintain a presence in the watershed and work with local police to discourage illegal dumping.

7. **Aquatic Wildlife -** There is aquatic wildlife on Black Pond.

Aquatic Wildlife Recommendations:

✓ Discourage feeding of the waterfowl.
✓ Post signs denoting the drinking water supply protection area.

8. **Recreation** - There is a baseball field within the Zone II of the Beach well. Fertilizer use and storage may be associated with athletic fields.

Recreation Recommendation:

✓ Work with the Town to reduce fertilizer use and properly store materials.

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.

Section 3: Source Water Protection Conclusions and Recommendations

Protection Planning – Currently, the Town of Bourne has a water supply protection bylaw that meets DEP's Wellhead Protection regulations, 310 CMR 22.21(2). The North Sagamore Water District needs to demonstrate to DEP that the Town's Water Resource Protection District protects the Zone IIs for the District's wells. In addition, the District needs to make a best effort to have Bourne adopt a non-zoning floor drain control that is consistent with 310 CMR 22.21(2)(a)(8).

A local Wellhead Protection Plan coordinates community efforts, identifies protection strategies, establishes a timeframe for implementation, and provides a forum for public participation. There are resources available to help communities develop a plan for protecting drinking water supply wells.

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?	**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.
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 daily inspections of drinking water protection areas.
Are water supply-related activities the only activities within the Zone I?	**NO**	Continue monitoring activities in 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 Bourne**	The Town "Aquifer Protection District" bylaw meets DEP's requirements for wellhead protection. The District needs to show DEP that the bylaw covers the Black Pond and Beach wells, too, or make a best effort to have them covered. A floor drain control should also be passed.
Do neighboring communities protect the Zone II areas extending into their communities?	**YES Plymouth**	Continue to work with Plymouth regarding wellhead protection.
Planning		
Does the PWS have a Wellhead Protection Plan?	**NO**	Work with other local water systems to 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**	Conduct drills with local emergency planning committee to test procedures.
Does the municipality have a wellhead protection committee?	**NO**	A committee can be helpful with implementing wellhead protection measures.
Does the Board of Health conduct inspections of commercial and industrial activities?	**YES**	Commercial - no industrial present.
Does the PWS provide wellhead protection education?	**YES**	Talks at elementary school and distribution of CCR.

Protection Planning Recommendations:

- ✓ Develop a Wellhead Protection Plan. 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".
- ✓ Provide documentation to DEP that the Town of Bourne's Water Resource Protection District protects the District's wells, also, or make a best effort to have Bourne include them in the bylaw.
- ✓ Make a best effort to have Bourne pass a floor drain regulation that is consistent with 310 CMR 22.21(2)(a)(8).
- ✓ 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.

Current Land Uses and Source Protection:

As with many water supply protection areas, this system's Zone IIs 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:

? working with the towns of Bourne and Plymouth to protect the public wells;
? conducting Board of Health inspections of commercial facilities;
? conducting public outreach efforts; and
? purchasing land for water supply protection.

Source Protection Recommendations:

To better protect the sources for the future:

- ✓ Continue to inspect the Zone I regularly.
- ✓ Educate residents on ways they can help you to protect drinking water sources.
- ✓ Work with emergency response teams to ensure that they are aware of the stormwater drainage in your Zones I & II and to cooperate on responding to spills or accidents.

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.

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

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.

DEP staff, documents, and other resources are available to help you build on this SWAP report to continue to improve drinking water protection. 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 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: Appendix

A. Source Protection Fact Sheets