

Brooklyn, Connecticut Source Water Protection Plan



Developed by: The Brooklyn Source Water Protection Team
Prepared by: Atlantic States Rural Water and Wastewater Association
October 2015

SOURCE WATER PROTECTION PLAN

for

Brooklyn, Connecticut

October 2015

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Brooklyn Source Water Protection Team

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1. Introduction

This Source Water Protection Plan was prepared along with the Town of Brooklyn Source Water Protection Team to protect aquifers within the town that have the potential to produce enough water to supply a public water system. Protection of these areas is critical to insuring there will be adequate clean groundwater sources in the future. These aquifer areas are delineated on the Connecticut Geological Survey *Surficial Aquifer Potential Map of Connecticut*. See **Section 1.1**, below, for more detail about that mapping process. A map of potential aquifer areas within the town of Brooklyn is included as **Exhibit I**. The maximum depth of the aquifers in Brooklyn is 100 feet.

This Source Water Protection Plan includes a **Management Plan** in **Section 7** which outlines specific actions available to Brooklyn to protect these aquifers while avoiding adverse impacts on other activities within that area.

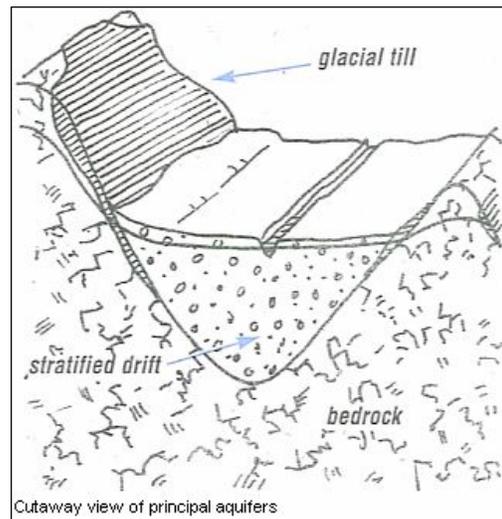
1.1 Background

Atlantic States Rural Water & Wastewater Association (ASRWVA) is working with the CT DEEP to assist rural communities in protecting stratified drift aquifers that may be used as drinking water sources in the future. These areas have been identified by the Connecticut Geological Survey (CGS) and are delineated on their *Surficial Aquifer Potential Map of Connecticut*.

That map was prepared by the CGS for statewide resource protection, water management, non-point source pollution prevention, and land use planning. The map identifies areas with greater potential for ground water supply based upon the texture and thickness of surficial aquifer deposits. The map defines areas of;

- coarse grained deposits (typically gravel),
- coarse overlying fine grained deposits (typically gravel over sand),
- fine grained deposits (typically sand), and
- fine grained deposits over coarse grained deposits.

The map also indicates the aquifer deposit thickness in intervals of 1-50 feet, 50-100 feet, 100-200 feet, 200-300 feet, and 300-400 feet. The map does not include information on saturated thickness, or depth to ground water, so further investigation is required to determine whether the aquifer will yield viable quantities of water.



1.2 Source Water Protection

The ideal drinking water supply would have excellent natural water quality and no potential contaminant sources (PCSs). There would be no development in the watershed or recharge areas. We are fortunate to have good natural water quality in most of Connecticut's drinking water supplies, however PCSs exist for every water supply and development continues to increase the possible threats.

ASRWVA believes that threats from many PCSs can be mitigated by proper construction, applying best management practices (BMPs) and the responsible use of water resources. Therefore education, outreach and the ability to develop and maintain working relationships in the community are important factors in source water protection.

This plan is prepared by the ASRWVA in cooperation with the National Rural Water Association. Program funding is provided by the United States Department of Agriculture's (USDA) Source Water Protection Program. The purpose of the program is to provide technical assistance to rural and small communities for the development of Source Water Protection Plans (SWPPs).

The SWPP process is community based and the main tasks are:

- ◆ Form a Local Source Water Protection Team
- ◆ Assess threats to the drinking water sources
- ◆ Develop management strategies for these threats
- ◆ Form a Steering Committee to oversee implementation and periodically update the plan

2 Local Source Water Protection Team

The Brooklyn Source Water Protection Team is a diverse group. The goal is to represent a cross-section of stakeholders in the watershed, Town officials and board members, water system operators, land trusts and residents. Members of the Team and are listed here:

Harry Adams, Conservation Commission
Jeffrey Arends, Inland Wetlands and Watercourses Commission
Sandy Brodeur, Agriculture Commission and Board of Finance
Dana Heilemann, Conservation Commission
Bob Kelleher, Board of Selectmen
Carlene Kelleher, Planning and Zoning Commission
Charlotte Merrill, Conservation Commission
Jeannine Noel, Conservation Commission
Michael Oatley, Conservation Commission
Tom Rukstela, Public Works
Beverly Thornton, Conservation Commission
Diane Wimmer, Conservation Commission, Chair

3 Brooklyn, Connecticut

3.1 Description

The town of Brooklyn is located in eastern Connecticut. Before European settlement, this area was home to the Native American Mohegans. The land, deeded in 1680 to Captain James Fitch, was sold to the first European settlers in 1703. The Town of Brooklyn was incorporated in 1786. Brooklyn has a mixture of rolling hills with forests and farmland along with more intensive development in the eastern part near Danielson. Agriculture has been important to the town since its beginning and most of the town retains a rural character. The Quinebaug River forms the eastern boundary of Brooklyn and has been an important part of the Town's development, providing water power for 19th century mills and providing recreational opportunities to current residents.

Brooklyn has a total land area of 29.0 square miles. With 8,093 people (2010 data), it has a relatively low population density of 279 people per square mile. 2006 data from the University of Connecticut Center for Land Use, Education and Research (CLEAR) estimates that 9.9% of the land is developed and 58.2% is forested. A CLEAR Land Use map of the town is included as **Exhibit II**.

3.2 Water Quality

Groundwater and Surface Water quality in Brooklyn are mixed. The Quinebaug River is designated as Class B. It is fully supporting recreation use, but is listed as impaired because it is not supporting aquatic life. The cause is not specified, but potential impacts are listed as: *remediation sites, groundwater contamination, industrial discharges, municipal discharges, unspecified urban stormwater*.

The White Brook is listed as not supporting recreation and is included in the state-wide TMDL to limit bacterial contamination. Blackwell Brook is fully supporting aquatic life and has not been assessed for recreation.

Surface Water Quality Classes and Designated Uses

From CT DEEP 2011 Connecticut Water Quality Standards

Class **AA** surface waters are designated for use as: existing or proposed drinking water supplies; habitat for fish and other aquatic life and wildlife; recreation; and water supply for industry and agriculture.

Class **A** surface waters are designated for use as: habitat for fish and other aquatic life and wildlife; potential drinking water supplies; recreation; navigation; and water supply for industry and agriculture.

Class **B** surface waters are designated for use as: habitat for fish and other aquatic life and wildlife; recreation; navigation; and industrial and agricultural water supply.

Groundwater within the town is designated GAA, or GA. Four areas may be impaired. They include the former landfill, the former public works garage and two public well sites.

Ground Water Quality Classes and Designated Uses

From CT DEEP 2011 Connecticut Water Quality Standards

Class **GAA** is ground water used or which may be used for public supplies of water suitable for drinking without treatment; ground water in the area that contributes to a public drinking water supply well; and ground water in areas that have been designated as a future public water supply in an individual water utility supply plan or in the Area wide Supplement prepared by a Water Utility Coordinating Committee pursuant to Title 25 of the General Statutes.

Class **GAA_s** is ground water tributary to a public water supply reservoir.

Class **GA** is ground water within the area of existing private water supply wells or an area with the potential to provide water to public or private water supply wells.

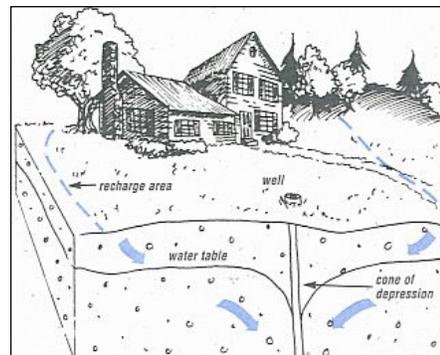
Class **GB** is ground water within a historically highly urbanized area or an area of intense industrial activity and where public water supply service is available. Such ground water may not be suitable for human consumption without treatment.

For more detailed information on water classification, see the DEEP *Water Quality Standards* at <http://www.ct.gov/dep/cwp/view.asp?a=2719&q=325618>. A map of surface and ground water classifications are shown in **Exhibits III & IV**, respectively.

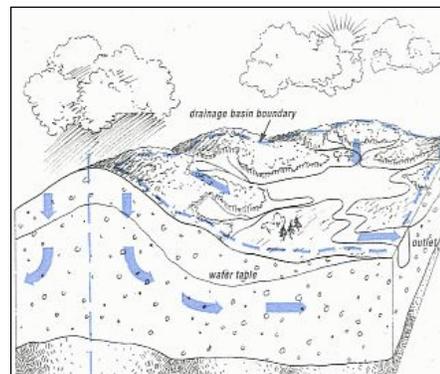
3.3 Source Water Protection Areas

The Source Water Protection Areas (SWPA) for systems that draw water from wells are known as Wellhead Protection Areas (WHPAs). These are the land areas from which groundwater and surface water will flow to the well under pumping conditions. This is also referred to as the recharge area. As such, these land areas are the critical ones for source water protection. The WHPAs for all of the bedrock well systems have been delineated by the State of Connecticut Department Public Health (DPH). These are calculated fixed-radius circles, the radius of which is determined by the volume of withdrawal of the source.

Source Water Protection Areas for surface water supplies are the watersheds (also known as drainage basins) which feed a reservoir or diversion from a river. A watershed or drainage basin can be thought of as a very large bathtub where the rim is the perimeter of the tallest land



A pumping well alters the water table around the well and diverts flow to the well



A drainage basin is much like a bathtub. All the water that enters its perimeter will flow to an outlet

surrounding a stream or lake and the lowest point is the outlet.

Wellhead protection areas in Brooklyn are shown in **Exhibit V**.

3.4 Existing Source Water Inventory

There are eighteen (18) public drinking water systems that have sources within the Town of Brooklyn. These are listed in **Exhibit VI**. One of these is the Connecticut Water Company (formally Crystal Water Co.) gravel pack well in the stratified drift aquifer along the Quinebaug River in East Brooklyn. Of the remaining seventeen (17) sources, sixteen (16) are bedrock wells and one (1) is a dug well. They all serve Brooklyn residents and businesses.

Public drinking water systems are classified into three categories

Community Water Systems (CWS) serve at least 25 residents throughout the year.

Non-transient, Non-Community Systems (NTNC) are not community systems and regularly serve at least 25 of the same people over six months of the year at places like schools and office buildings.

Transient Non-Community Systems (TNC) do not meet the definition of a non-transient, non-community water system such as restaurants, parks, etc.

There are five (3) Community Water Systems, six (4) Non-transient, Non-Community Systems and six (11) Transient Non-Community Systems in Brooklyn. Single family residences not served by the above CWSs have private wells that draw from groundwater.

4 Existing Source Water Protection Measures

Following is a sampling of source water protection initiatives that are already in place or ongoing. This is not a comprehensive list, but is meant to demonstrate the level of commitment by the Town of Brooklyn to this issue.

4.1 Plan of Conservation and Development (PoCD)

The *Open Space & Natural Resources Conservation* section of the Brooklyn PoCD states:

“Objectives for conservation in Brooklyn include: ... protecting ... unique natural and cultural features; preventing degradation of wetlands and water resources and their related natural riparian buffers; protecting ground and surface water resources, including public and private drinking water supply aquifers, from potential pollution;”

4.2 CT DEEP Aquifer Protection Area

The Brooklyn Planning and Zoning Commission has been designated as the Aquifer Protection Agency for the Town. There is one DEEP Aquifer Protection Area in Brooklyn and that is for the Connecticut Water Company wells in the stratified drift aquifer

along the Quinebaug River in East Brooklyn. That area has Level B mapping and Brooklyn will begin implementing the Aquifer Protection Program when Connecticut Water Company develops Level A mapping and it is approved by DEEP.

4.3 Zoning

Brooklyn has a comprehensive zoning regulation for Gravel Banks. These regulations help protect valuable groundwater resources by requiring restoration of the quarried land after exaction and a least 5 feet of cover over the groundwater level and 6 feet over ledge. Creation of a pond or waterbody requires a separate vote of the Planning and Zoning Commission.

5 CT DPH Source Water Assessments

In 2003, the Connecticut Department of Public Health Drinking Water Section completed a state-wide survey of drinking water supplies under the Source Water Assessment Program (SWAP). This program was mandated with the 1996 reauthorization of the Safe Drinking Water Act. The purpose of the program was to evaluate the susceptibility to contamination of each public drinking water source in Connecticut and communicate the results to the public.

The following information was used to assess vulnerability under the Source Water Assessment Program:

- ◆ Sanitary conditions in the source water area
- ◆ The presence of potential or historic sources of contamination
- ◆ Existing land use coverages
- ◆ The need for additional source protection measures within the source water area

Eighteen (18) public drinking water systems have sources within the Town of Brooklyn. One of these sources is the Aquifer Protection Area for the CT Water Company (formally Crystal Springs) system that serves Killingly and Brooklyn. The remaining seventeen (17) sources are Wellhead Protection Areas (WHPAs) within the Town of Brooklyn. A table summarizing the Source Water Assessments for these systems is included as **Exhibit VI**. Of those sources, four (4) were designated with **high** susceptibility to potential contaminate sources, five (5) with **moderate** susceptibility, five (5) with **low** susceptibility. No Source Water Assessment was available for four of the systems.

A copy of the Source Water Assessment for the CT Water Company system is included as **Exhibit VIII** as an example.

6 Assessment of Threats

6.1 Confirmed Contaminant Detects of Concern in Source Water

Each DPH Source Water Assessment reported on contaminants detected in the source water of each system. While this data is somewhat dated (2003), it provides an idea of the scope of contamination within the source water area. This data is included in **Exhibit VI** and indicates that nitrates were found to be present

above the level of 1 mg/l in the sources of one (1) Community Water Systems (CWS), one (1) Non-Transient Non-Community system and five (5) Transient Non-Community systems. The nitrate levels found in these wells are much lower than the maximum 10 mg/l allowed in drinking water and therefore are not a health risk. Detection of nitrate in public wells indicates that it has been released to surface and ground waters and is a potential contamination concern. Typical sources of nitrates are septic systems, lawn care and agriculture. No coliform bacteria or Volatile Organic Compounds (VOCs) were listed as detected on the Brooklyn Source Water Assessments that were available.

6.2 Roadways

Roadways present a significant threat to drinking water sources. The possibility of an accident involving a truck transporting bulk shipments of hazardous materials poses a risk. Roadways are also a potential source of contamination due to potential petroleum leaks from vehicles; the application of road salts, which could cause elevated levels of sodium and chlorides; and maintenance activity which may include herbicide and pesticide applications. US Route 6 and Connecticut Routes 169 and 205 all cross the potential aquifer areas in Brooklyn. These major roadways, along with several local roads, pose a threat to current and future drinking water sources due to accidents, spills, or maintenance activities.

6.3 Residential Land Use

Residential contamination threats to surface or groundwater, if taken on a case-by-case basis, are normally less than other land use contamination, but in the aggregate, form a significant source of contamination. There are roughly 1,100 single family homes in Brooklyn with parcels that overlay potential aquifer areas.

Most citizens are unaware of the effects of numerous potential contaminants stored, used, and disposed of from residential homes. The potential contaminants include:

- ◆ Household chemicals
- ◆ Automotive products
- ◆ Paint/solvents
- ◆ Fuel storage systems
- ◆ On-site septic
- ◆ Lawn/garden chemicals
- ◆ Abandoned wells
- ◆ Riverside/Lakeside homes

On-site septic systems, for instance, represent potential sources of nitrates, chlorides, bacteria and viruses. In addition, if improperly used, such as for disposal of paints, solvents, petroleum products and other hazardous waste, they could be a source of organic compounds.

Potential aquifer areas within Brooklyn are susceptible to pollution from household chemicals, pesticides, fertilizers and on-site septic systems.

6.4 Commercial Land Use

Many commercial operations use toxic and hazardous materials in their processes. Examples include:

- ◆ Auto repair, gas stations, car wash
- ◆ Road maintenance depots
- ◆ Construction areas
- ◆ Dry cleaners, Laundromats
- ◆ Medical institutions, laboratories
- ◆ Photography establishments, printing facilities
- ◆ Restaurants, bakeries
- ◆ Woodworking and finishing facilities

The storage, use, and disposal of chemicals required by these operations can pose a potential threat to water since even small amounts of the hazardous materials can contaminate large amounts of surface or ground water. Storing quantities of the material can also create a serious problem if they are not contained and stored properly. Leaks and spills from storage tanks and pipes can contaminate water, rendering the water unfit for consumption.

Best management practices should be encouraged at existing commercial sites within the potential aquifer areas and some commercial uses should not be allowed in the future within the proposed overlay zone (See **Management Plan, Section 7**).

6.5 Non-Point Sources of Pollution

Non-point sources are described as dispersed contamination from many sources such as soil erosion, on-lot septic systems, storm water discharges, agricultural and forest management activities, and pollution associated with resource extraction. The most significant contamination associated with non-point sources is nitrates associated with the use of manure, fertilizer, and pesticides which drain into streams and infiltrate into ground water. Household hazardous and commercial/industrial waste (e.g., ammonia, chlorides, paint, paint thinners, waste oil, antifreeze, solvents, etc.), which are sometimes discharged into on-lot septic systems, are also sources of non-point source pollution. The potential risk from non-point sources makes potential aquifer areas in Brooklyn vulnerable to contamination.

6.6 Potential Future Sources

Undeveloped land areas represent the potential for future contamination sources that might impact ground and surface water quality if they were to be developed. Based on the amount of undeveloped land within the potential aquifer areas (see **Exhibit II**), there exists the possibility for future contamination.

7 Management Plan

The Brooklyn Source Water Protection Team has considered protection measures that will achieve the greatest public health protection regardless of the source or whether that source supplies public water systems or private residences. For instance, source water protection measures developed for potential aquifer areas in Brooklyn will also protect existing ground water sources. This protects private wells and thus all of the households within the town will benefit.

7.1 Develop Zoning Overlay for Brooklyn Potential Aquifer Areas

The Brooklyn Conservation Commission should draft a zoning overlay regulation to protect the potential aquifer areas in Brooklyn. The regulation should include a map of the designated area and should consider not allowing, or restricting, the following uses:

- ◆ Manufacture, use, storage, transport or disposal of hazardous materials as a principal activity.
- ◆ Sanitary landfill, septage lagoon, waste water treatment facility for municipal or industrial wastes.
- ◆ Road salt storage.
- ◆ Junkyard, salvage yard, truck terminal.
- ◆ Gasoline station, car wash, auto repair or auto body shop.
- ◆ Excavation, filling or removal of earth materials.
- ◆ Underground storage of hazardous materials.
- ◆ Above ground storage of hazardous materials in quantities greater than associated with normal use, other than fuel storage for residential space heating.

The Town of Hebron's Aquifer Protection District regulation is a good model to and is included as **Exhibit IX**. Another example is from Salem and is included as **Exhibit X**

7.2 Conduct Education and Outreach Campaign

Public education and awareness is a key part of this Source Water Protection Plan because everyone in the watershed poses a risk to ground and surface water. Most homeowners will work to protect their local ground and surface water if they know how to minimize contamination risks. Outreach to Brooklyn residents will be done through mailings, media and/or public meetings to increase awareness of the link between land use and drinking water quality and to involve the public in source water protection activities. The most important areas to focus on should be septic system maintenance, lawn care and riparian buffers.

Examples of outreach material are included as **Exhibits XI** through **XVII**. Other materials are available from the DPH, DEEP, Conservation and Health Districts, and MDC. Some useful links are:

CT DEEP: www.ct.gov/dep/cwp/view.asp?a=2719&q=325514&depNav_GID=1654

CT DPH: www.ct.gov/dph/cwp/view.asp?a=3139&q=387304&dphNav_GID=1824

Connecticut NEMO: nemo.uconn.edu/tools/publications.htm

Connecticut Sea Grant: web2.uconn.edu/seagrant/publications/index.php

EPA: www.epa.gov/safewater and www.epa.gov/watertrain

E. Cons. District: www.conservect.org/Default.aspx?alias=www.conservect.org/eastern

7.3 Implement the DEEP Aquifer Protection Area Program

The Source Water Protection Team will work with the Town to implement the CT DEP Aquifer Protection Program When Level A mapping for the Connecticut Water Company well field is complete. Town responsibilities include the following:

- ◆ Authorize an existing board or agency to serve as the local Aquifer Protection Agency (the Planning & Zoning Commission has been so designated);
- ◆ Adopt local Aquifer Protection Area regulations consistent with state regulations;
- ◆ Delineate Aquifer Protection Areas on the town zoning map;
- ◆ Regulate land use activity within the Aquifer protection Areas including:
 - Registering existing regulated activities;
 - Issuing permits for new regulated activities;
 - Inspecting regulated facilities.

7.4 Small Municipal Separate Storm Sewer Systems (MS4) General Permit

Brooklyn is on the list of towns to be added to the MS4 program. The Source Water Protection Team will work with the town to implement this program when the new General Permit is made final.

7.5 Assist the Brooklyn Agriculture Commission

The Source Water Protection Team will work with the Agriculture Commission to provide outreach to agricultural producers regarding best management practices and programs available through the USDA to implement them.

7.6 Form Source Water Protection Steering Committee

The Brooklyn Planning and Zoning, and Inland Wetlands and Conservation Commissions shall seek dedicated individuals who are committed to implementing the prevention measures outlined above, to form a Steering Committee to oversee implementation of the plan; and periodically update and assess its progress at least annually.

8 Contingency Plan

An Emergency Response Plan will be written in the future by the water system that develops the aquifer for a public water supply.

Exhibit I – Brooklyn Potential Aquifer Areas

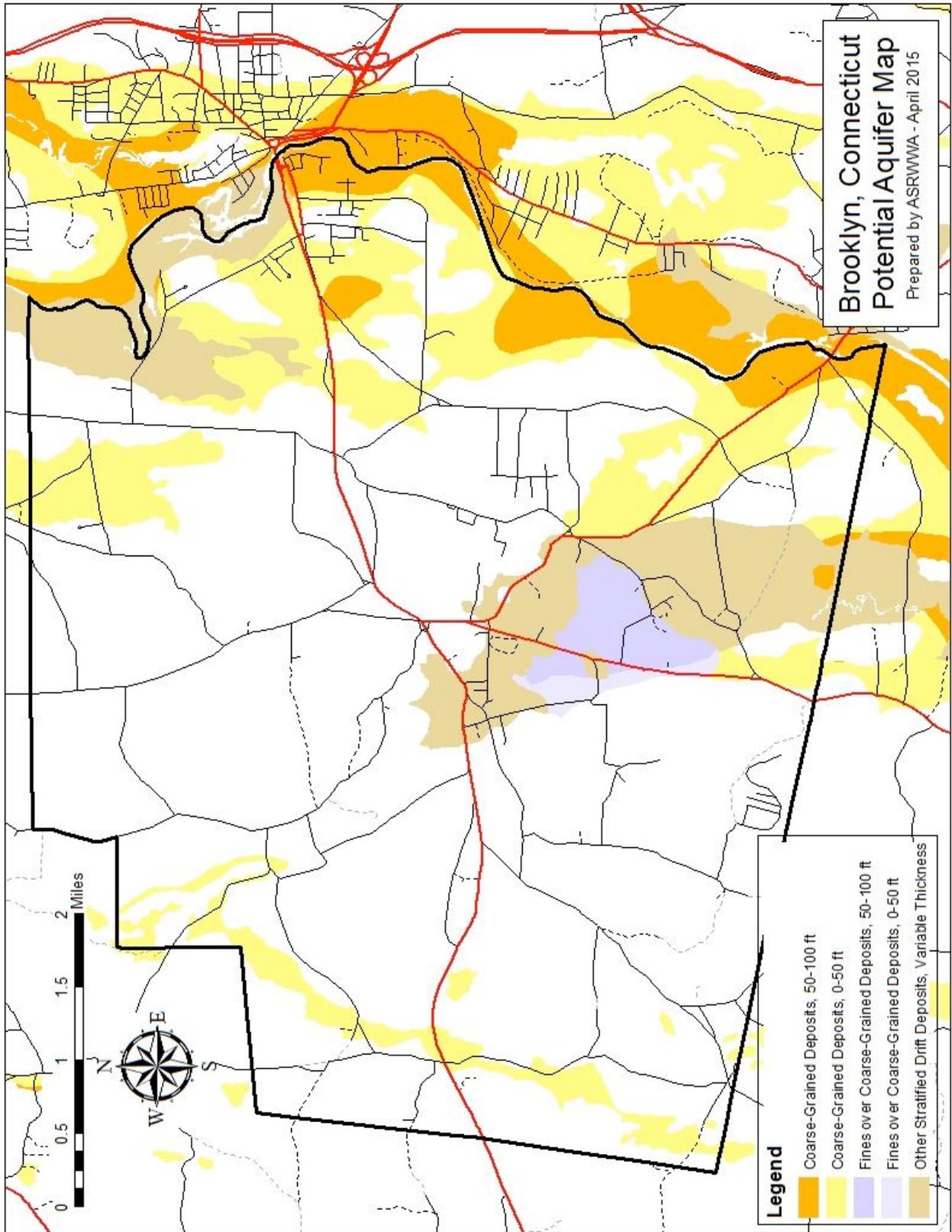
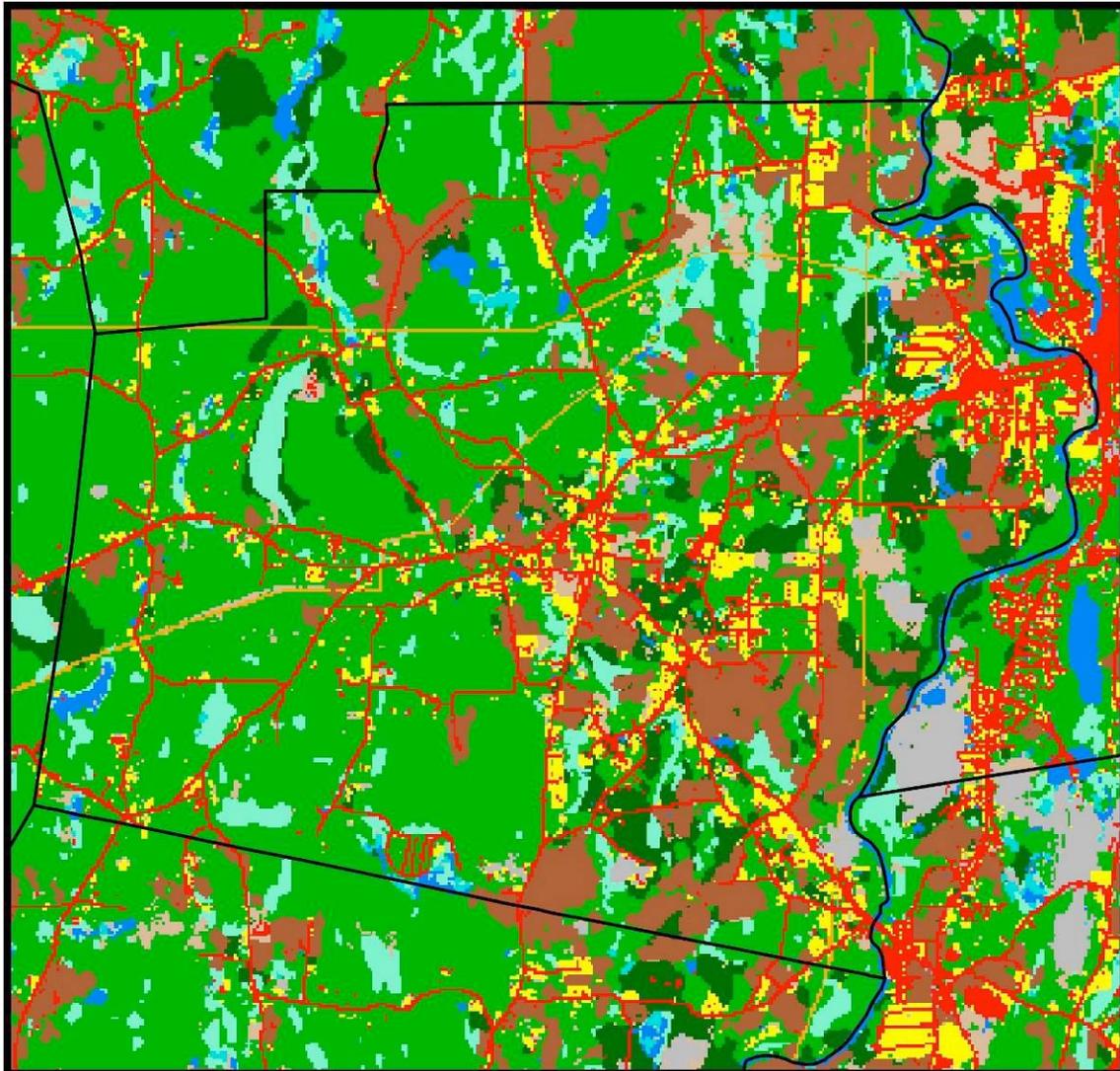


Exhibit II – Brooklyn Land Use

Brooklyn, CT

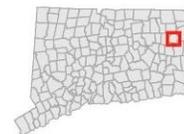
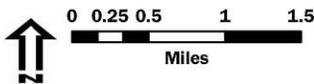
Land Cover 2006

Connecticut's Changing Landscape



2006 Land Cover

 Developed	 Water
 Turf & Grass	 Non-forested Wetland
 Other Grass	 Forested Wetland
 Agricultural Field	 Tidal Wetland
 Deciduous Forest	 Barren
 Coniferous Forest	 Utility (Forest)



This map is a product of the Center for Land use Education And Research (CLEAR) at the University of Connecticut. For more information on CLEAR or this map, visit <http://clear.uconn.edu>.

This map is intended for planning and educational purposes only . It is based on the interpretation and classification of remotely sensed satellite images, and the accuracy at any given location cannot be guaranteed. See CLEAR website for more information <http://clear.uconn.edu>.

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Exhibit III – Brooklyn Surface Water Quality

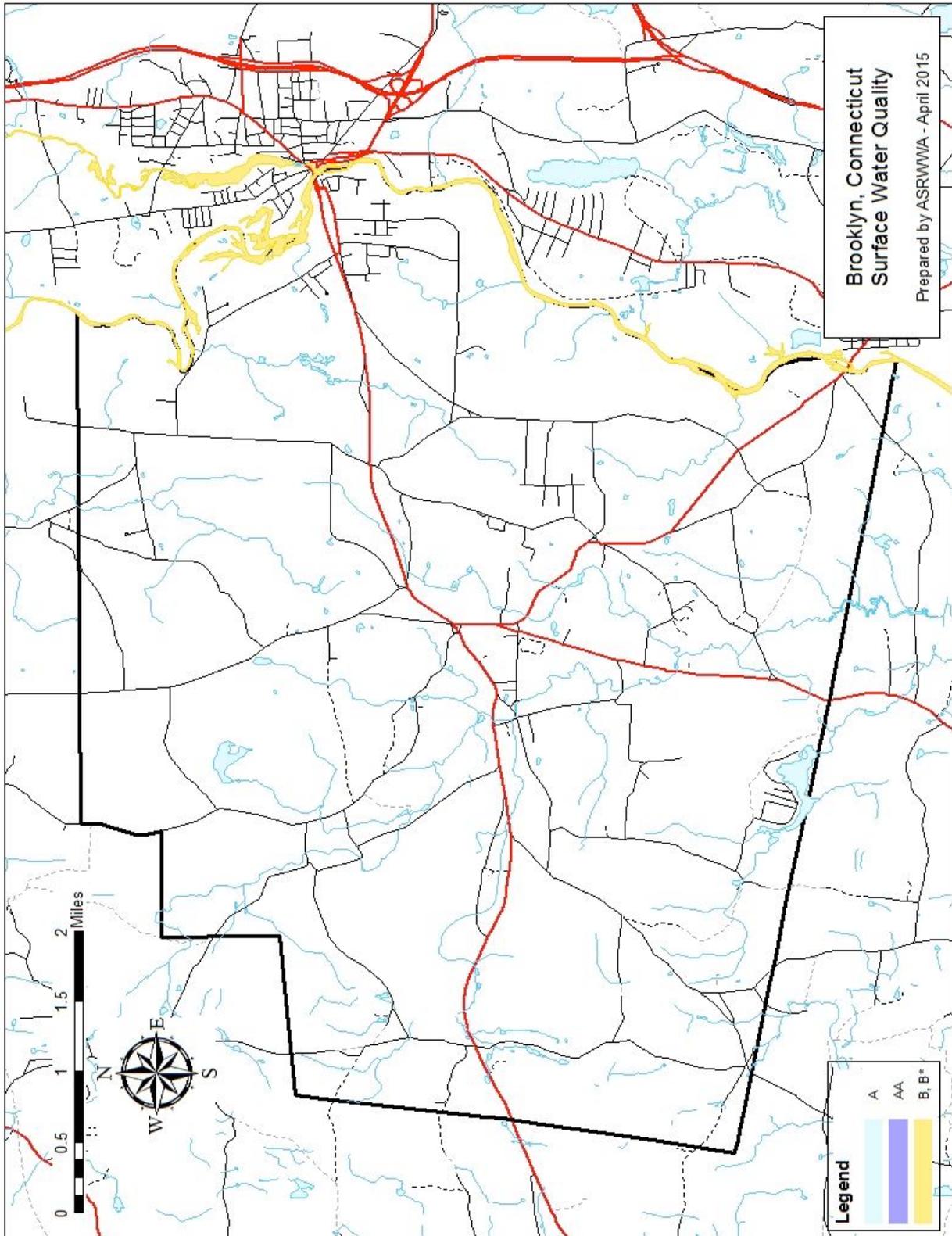


Exhibit IV – Brooklyn Ground Water Quality

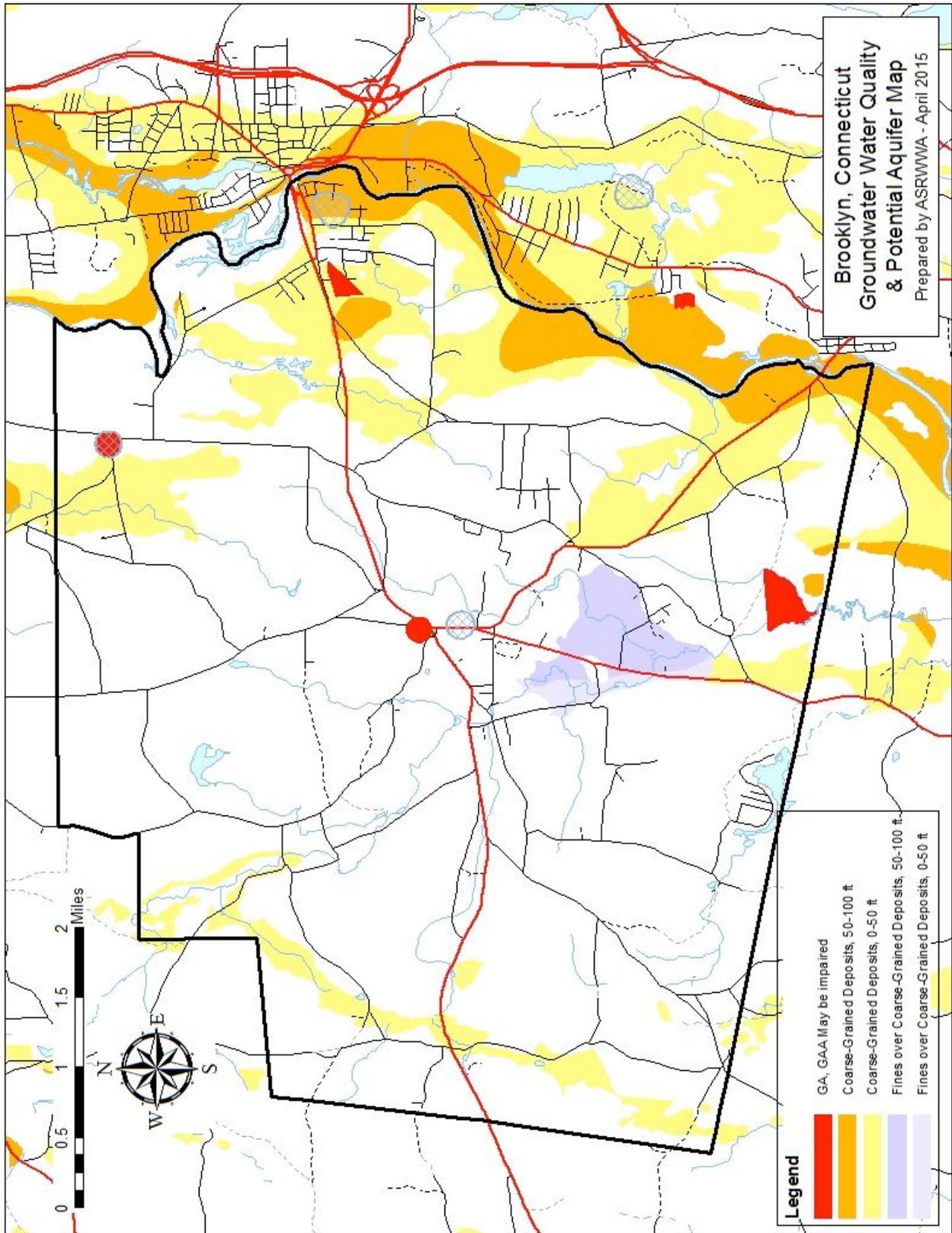


Exhibit V – Brooklyn Source Water Protection Areas

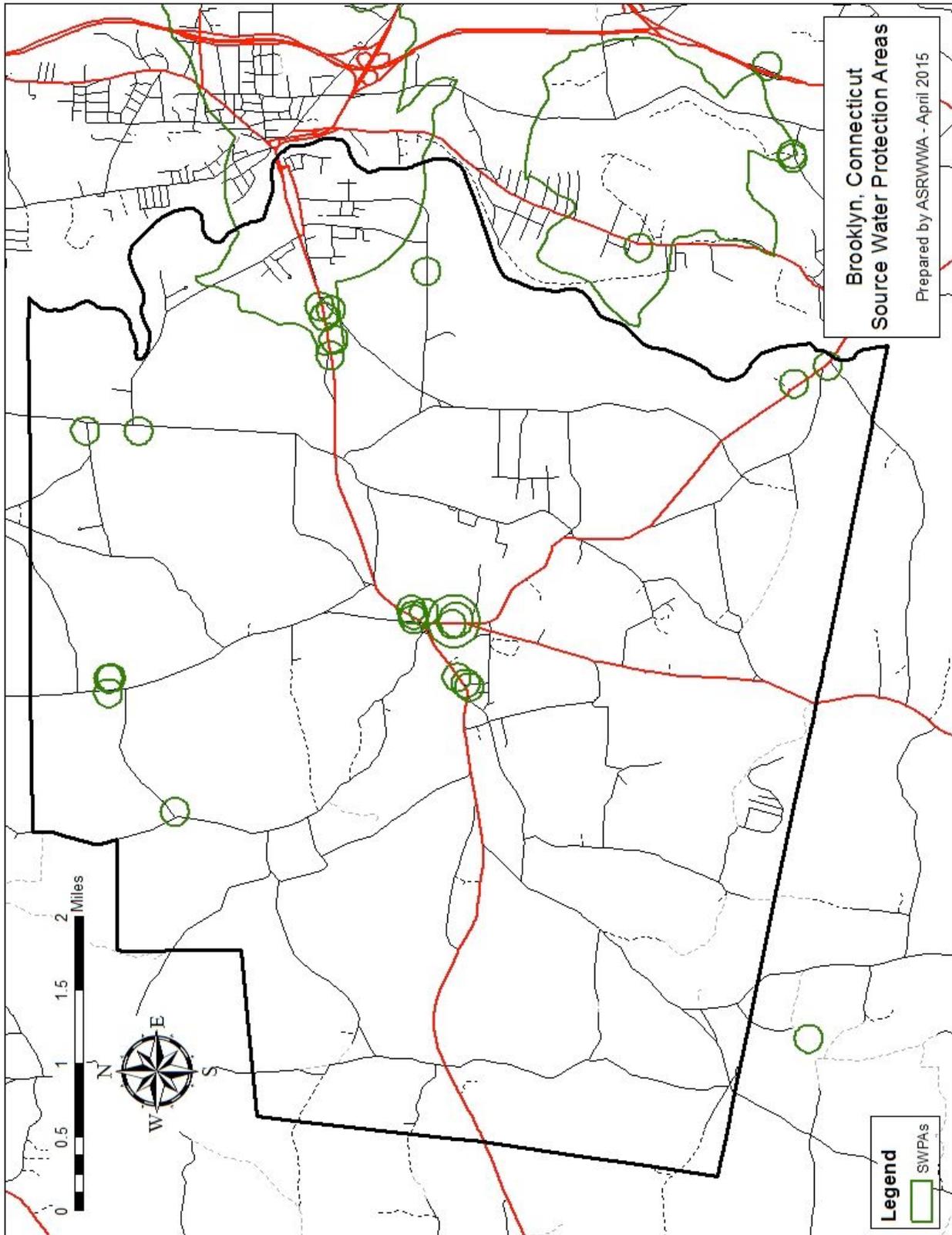
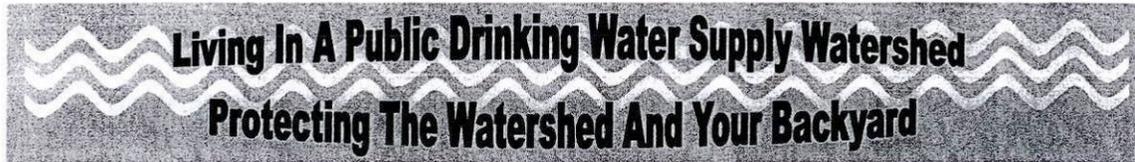


Exhibit VI – Brooklyn Public Water Systems

Prepared by ASRWWA
 BROOKLYN, CONNECTICUT
 PUBLIC WATER SYSTEMS
 July 2015

PWSID	SYSTEM NAME	POP SERVED	SERVICE CONNS	SUSCEP. ABILITY	CONTAM DETECTED	WELL CONDITION	CONTAM RELEASES	POT CON SITES
Community Water Systems								
CT0190051	BROOKLYN MANOR	30	12	Moderate	Nitrate	Good	None	None
CT0190091	GORMAN ROAD APARTMENTS	25	2					
CT0690011	CTWC - CRYSTAL WATER COMPANY	6378	2762	High			1	54
Non-Transient/Non-Community Systems								
CT0199083	OVERLOOK HOLDINGS, LLC	39	3	Low	Nitrate	Good	None	None
CT0199103	LEARNING CLINIC - OVERLOOK	30	1					
CT0199104	LEARNING CLINIC - PONDVIEW	11	1					
CT0199073	BROOKLYN PROPERTIES, LLC	54	1	Moderate	None	Good	None	4
Transient/Non-Community Systems								
CT0190014	AMERICAS BEST VALUE INN	25	1	High	Nitrate	Needs Improvement	None	1
CT0190024	BROOKLYN COUNTRY CLUB/GOLF COURSE	25	1	Low	Nitrate	Average	None	None
CT0190254	BROOKLYN PIZZA RESTAURANT	37	1	High	Nitrate	Needs Improvement	1	1
CT0190264	COZY CORNER RESTAURANT	25	1	Moderate	Nitrate	Needs Improvement	None	None
CT0190284	GOLDEN LAMB RESTAURANT	45	1	Low	None	Unknown	None	None
CT0190064	HANKS RESTAURANT	25	1	Low	None	Needs Improvement	None	1
CT0190074	OUR LADY OF LASALETTE CHURCH	25	1	Moderate	None	Needs Improvement	None	1
CT0190154	SACRED HEART CHURCH (dug well)	25	1	Low	None	Needs Improvement	None	None
CT0190164	SORELS GARAGE	25	1	High	Nitrate	Unknown	None	1
CT0190174	ST. JOHNS LUTHERAN CHURCH	25	1	Moderate	None	Unknown	None	1
CT0690284	THE ICE BOX	25	1					

Exhibit VII – Living in a Public Drinking Water Supply Watershed



Both surface and groundwater sources are vulnerable to potential contamination from non-point source pollution (NPS), which unlike pollution from industrial and sewage treatment plants, comes from widely distributed sources such as highways, large parking areas or land that is prone to erosion. Non-point pollution is caused by rainfall or snowmelt moving over and through the ground. As the runoff travels through a drinking water source area, it picks up and carries away natural and human-made pollutants, which are deposited into lakes, rivers, wetlands, coastal waters, and underground sources of drinking water. Non-point source pollutant categories include:

- **Sediment** from improperly managed construction sites, crop and forestlands, eroding streambanks and urban runoff;
- **Fertilizers, herbicides, and insecticides** from their use on agricultural lands and residential areas;
- **Bacteria and nutrients** from livestock, pet wastes, faulty septic systems and urban runoff;
- **Oil, grease, and toxic chemicals** from spills, releases, urban runoff and impervious surfaces and;
- **Airborne pollutants** from industrial and urban fallout.

Potential sources of non-point pollutants include agriculture and forestry operations, grazing, septic systems, recreational boating, urban and residential runoff, construction, physical changes to stream channels, and habitat degradation. Careless or uninformed household and yard management also contributes to non-point pollution problems. Non-point pollution is widespread because it can occur any time activities disturb the land or water.

The most common non-point pollutants are sediment and nutrients that wash into water bodies from agricultural land, construction sites, small and medium-sized animal feeding operations, and other areas of disturbance, including your backyard. Other common non-point pollutants include pesticides, pathogens (bacteria and viruses), salts, oil, grease, toxic chemicals, and heavy metals. Unsafe drinking water, destroyed habitat, fish kills, and many other severe environmental and human health problems can result from non-point pollutants. When non-point pollution occurs in the watershed of a public drinking water supply it may give rise to a number of conditions that can threaten the quality and quantity of drinking water and impact public health. Proactive pollution prevention of drinking water sources is Connecticut's first line of defense in providing safe drinking water.

The Department of Public Health Drinking Water Division (DWD) recently completed an assessment of all public drinking water sources to identify and inventory potential sources of contamination that could adversely impact drinking water quality and safety. To view assessment reports and learn more about Connecticut's source water assessment program, visit our website at: <http://www.dph.state.ct.us/BRS/Water/SWAP/swap.htm> or contact the Source Water Protection Program in Hartford at (860) 509-7333.

Public drinking water systems, local government and public health officials will be able to use the assessment reports to plan and direct drinking water source protection activities including: protective zoning regulations, land acquisition in critical source water areas, and the implementation of best management practices for the control of non-point pollution and the safe handling, storage and disposal of hazardous materials. **If you live on or near a watershed of a public drinking water supply reservoir you should know where the watershed boundaries are located and follow the watershed protection guidelines listed below.** Sensible backyard housekeeping and maintenance will help protect the watershed and your family's well from unnecessary pollution.

Exhibit VII (Cont'd)**How To Protect The Watershed and Your Family's Well****Control Stormwater Runoff**

- Keep litter, pet wastes, leaves, and debris out of the road and away from storm drains--these outlets drain directly to lake, streams, rivers, wetlands, and Long Island Sound.
- Apply lawn and garden chemicals sparingly and according to directions.
- Dispose of used oil, antifreeze, paints, and other household chemicals properly, not in storm drains or behind the stonewall. Support your Town's efforts to establish a program for collecting household hazardous wastes.
- Clean up spilled brake fluid, oil, grease, antifreeze, and fuel. Do not hose them into the street where they can eventually reach local streams and lakes or contaminate groundwater.
- Control soil erosion on your property by planting ground cover and stabilizing erosion-prone areas.

If You Have a Septic System

- Pump out and inspect your septic system regularly. (Pumping out every three to five years is recommended for a three-bedroom house with a 1,000-gallon tank; smaller tanks should be pumped more often.)
- Do not use septic system additives. There is no scientific evidence that biological or chemical additives aid decomposition in septic tanks; some additives may in fact be detrimental to the septic system or contaminate ground water.
- Do not divert gutters, storm drains or basement pumps into septic systems.
- Avoid or reduce the use of your garbage disposal because they add unnecessary solids to your septic system and can also increase the frequency your tank needs to be pumped.
- Don't use your toilet as a trash can! Excess solids may clog your drainfield and necessitate more frequent pumping or costly repairs.

When You Landscape Or Garden

- Select plants that have low requirements for water, fertilizers, and pesticides.
- Cultivate plants that discourage pests. Minimize grassed areas that require high maintenance.
- Preserve existing trees, and plant trees and shrubs to help prevent erosion and promote infiltration of water into the soil.
- Use landscaping techniques such as grass swales (low areas in the lawn) or porous walkways to increase infiltration and decrease runoff.
- Leave lawn clippings on your lawn so that nutrients in the clippings are recycled and less yard waste goes to landfills.
- If you use a professional lawn care service, select a company that employs trained technicians and follows practices designed to minimize the use of fertilizers and pesticides.
- Compost your yard trimmings. Compost is a valuable soil conditioner that gradually releases nutrients to your lawn and garden. Compost retains moisture in the soil and helps conserve water.
- Spread mulch on bare ground to help prevent erosion and runoff.
- Do not apply pesticides or fertilizers before or during rain due to the strong likelihood of runoff.

If You Have a Farm, Garden or Horses in Your Back Yard

- Manage animal waste to minimize contamination of surface water and ground water.
- Reduce soil erosion by using best management practices to eliminate runoff around the barn and pasture or in your garden.
- Protect drinking water by using less pesticides and fertilizers.
- Dispose of pesticides, containers, and tank wastes in an approved manner.

If You Have Your Property Logged

- Make certain that proper logging and erosion control practices are used by ensuring proper construction, maintenance, and closure of logging roads and skid trails.



Keeping Connecticut Healthy

**Connecticut Department of Public Health
Drinking Water Division**

410 Capitol Avenue – MS# 51WAT
P.O. Box 340308 Hartford, CT 06134
(860) 509-7333

<http://www.dph.state.ct.us/BRS/Water/DWD.htm>

Exhibit VIII – CT Water Company Source Water Assessment

SOURCE WATER ASSESSMENT REPORT
AN EVALUATION OF THE SUSCEPTIBILITY OF PUBLIC DRINKING WATER SOURCES TO POTENTIAL CONTAMINATION

APA 68

Aug-03

**Crystal Water Company of Danielson
 Brooklyn Wellfield**

The State of Connecticut Department of Public Health (DPH) in cooperation with the Department of Environmental Protection (DEP) recently completed an assessment of the Brooklyn Wellfield, which is a source of public drinking water that is maintained and operated by the Crystal Water Company of Danielson. This one-time assessment is part of a nationwide effort mandated by Congress under the Safe Drinking Water Act Amendments of 1996 to evaluate the susceptibility of all public drinking water sources in Connecticut to potential sources of contamination. DPH began working in partnership with the DEP in 1997 to develop Connecticut’s Source Water Assessment Program, which was approved by the U.S. Environmental Protection Agency in 1999. Sources of potential contamination that are of concern to public drinking water supplies here in Connecticut are generally associated with historic waste disposal or commercial, industrial, agricultural and residential properties that store or use hazardous materials like petroleum products, solvents or agricultural chemicals.

The assessment is intended to provide Crystal Water Company of Danielson consumers with information about where their public drinking water comes from, sources of potential contamination that could impact it, and what can be done to help protect it. This assessment will also assist the public water supply system, regional planners, local government, public health officials and state agencies in evaluating the degree to which the Brooklyn Wellfield may be at risk from potential sources of contamination. The assessment can be used to target and implement enhanced source water protection measures such as routine inspections, protective land use regulations, acquisition of critical land, proper septic system maintenance, and public education. General sources of contamination with the potential to impact the Brooklyn Wellfield include properties with underground fuel storage tanks, improperly maintained on-site septic systems, improper waste disposal, or commercial/industrial sites that store or use chemicals or generate hazardous wastes.

Brooklyn Wellfield Source Water Assessment Summary				
<p>STRENGTHS Local aquifer protection regulations partially adopted Public Water System Source Protection Program</p> <p>POTENTIAL RISK FACTORS Potential contaminant sources in source water area Local aquifer protection regulations partially adopted 1 contaminant release point in source water area</p>	Susceptibility Rating			
	Rating	Environmental Sensitivity	Potential Risk Factors	Source Protection Needs
	Low	X		
	Moderate			
	High		X	
<p>Overall Susceptibility Rating: High</p> <p><i>This rating indicates susceptibility to potential sources of contamination that may be in the wellfield source water area and does not necessarily imply poor water quality.</i></p> <p>Detailed information about the specific factors and information used in establishing this rating can be found in Table 1. Information about opportunities to improve protection in the Brooklyn Wellfield source water area is also presented in Table 2.</p>				



Keeping Connecticut Healthy

State of Connecticut Department of Public Health

Drinking Water Division

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Exhibit VIII (Cont'd)

OVERVIEW - The Brooklyn Wellfield is located in an aquifer that is comprised largely of water-bearing sand and gravel deposits. The source water area is delineated by a preliminary Level B aquifer protection mapping area, which encompasses some 1970.1 acres of land in Brooklyn and Killingly. Vacant land and residential properties in the Brooklyn Wellfield source water area presently account for approximately 80.0 percent of the land cover. Commercial development at 12.7 percent and agricultural land use at 7.4 percent, account for the remainder of the land coverage's in the source water area. Information about drinking water quality and treatment is available in the Crystal Water Company of Danielson's annual Consumer Confidence Report.

ASSESSMENT METHODS.

The drinking water source assessment methods used by the Department of Public Health Drinking Water Division to evaluate the susceptibility of public drinking water sources to contamination are based on criteria individually tailored to surface water and groundwater sources. The criteria are keyed to sanitary conditions in the source water area, the presence of potential or historic sources of contamination, existing land use coverage's, and the need for additional source protection measures within the source water area. Source-specific data for community and non-community systems were used to determine whether a particular criterion should be rated as low, moderate or high, relative to the risk of potential contamination at the drinking water source. Further, a ranking system was used to compute an average rank for each community drinking water source based on its environmental sensitivity, potential risk of contamination and source protection needs.

Wellfields rated as having a low, moderate or high susceptibility to potential sources of contamination generally exhibit the characteristics summarized in Table 1.

Table 1 – General Source Water Area Characteristics and Susceptibility Ratings

Susceptibility Rating	General Characteristics of the Source Water Area*
Low	Low density of potential contaminant sources Lower intensity of land development
Moderate	Low to moderate density of potential contaminant sources Moderate intensity of land development
High	Moderate to high density of potential contaminant sources Higher intensity of land development No local aquifer protection regulations Detectable nitrates and/or volatile organic chemicals in the untreated source water during the past three years that are below the maximum contaminant levels allowed by state and federal drinking water regulations

** Note: Not all characteristics may be present for a given susceptibility rating*

Readers of this assessment are encouraged to use the attached glossary to assist in the understanding of the terms and concepts used throughout this report.

Maps representing the location and features of the Brooklyn Wellfield source water area have not been included with this assessment report because of homeland security concerns

BROOKLYN WELLFIELD ASSESSMENT RESULTS.

Based on a combination of current wellfield and source water area conditions, existing potential contaminant sources, and the level of source protection measures currently in place, the source water assessment for this wellfield indicates that it has an overall High risk of contamination from identified potential sources of contamination. It should be noted that this rating does not necessarily imply poor water quality or ongoing violations of the Connecticut Public Health Code. The assessment findings for the Brooklyn Wellfield are summarized in Table 2, which lists current conditions in the wellfield source water area and recommendations or opportunities to enhance protection of this public drinking water source. A listing of potential contaminant source types in the area can be found in Table 3. A summary of source water area features is shown in Table 4.

The assessment of this and other comparable wellfields throughout Connecticut generally finds that adopting recommendations similar to those presented in Table 2 could reduce the susceptibility of most groundwater sources to potential sources of contamination.

Exhibit VIII (Cont'd)

**Table 2 Source Water Assessment Findings and Source Protection Opportunities
Brooklyn Wellfield**

Assessment Category	Conditions Through June 2002	Recommendations and Source Protection Opportunities
<p>Environmental Sensitivity Factors</p> <p>Contaminants Detected in Untreated Source Water</p>	<p>All wells in the Brooklyn Wellfield are sited and constructed in accordance with DPH regulations and the most recent DPH sanitary survey of this wellfield indicates that it is free of deficiencies.</p> <p>Nitrate</p> <p>Except where noted above, any detected contaminants listed are below maximum contaminant levels (MCL) established by the federal government or guidance levels established by the Connecticut Department of Public Health. The presence of these contaminants, in general, indicates that this wellfield is sensitive to human activity.</p> <p>Click here to review EPA's current drinking water standards</p>	<p>Maintain monitoring levels specified in the Connecticut Public Health Code Section 19-13-B102</p> <p>Encourage homeowners to adopt residential best management practices that minimize the use hazardous materials or generation of hazardous waste.</p>
<p>Potential Risk Factors</p>	<p>Potential contaminant sources in source water area</p> <p>1 contaminant release point in source water area</p> <p>More than 30% of land for this source water area is undeveloped, which could present a risk if developed inappropriately.</p> <p>Ten percent or more of the source water area has been developed for commercial or industrial use</p>	<p>Periodically inspect SPCS sites and maintain a water quality monitoring program consistent with the level of potential risk</p> <p>Maintain an adequate level of surveillance around contaminant release point sites to insure that groundwater contamination is not occurring</p> <p>Proactively work with local officials and developers to insure that only low-risk development occurs within the source water area</p> <p>Monitor activities at commercial and industrial facilities to insure that best management practices are being followed</p> <p>Encourage residential property owners to conduct scheduled inspections and maintenance of underground fuel storage tanks and on-site septic systems.</p>
<p>Source Protection Needs Factors</p>	<p>Level B aquifer mapping completed</p> <p>Portions of the 200 foot sanitary radius around wellheads for this wellfield are not owned or controlled by the public water system.</p> <p>Local aquifer protection regulations exist for 63% of source water area</p> <p>Very little or no public/private preserved open space lands are present in the source water area</p>	<p>Complete Level A mapping</p> <p>Where feasible, increase ownership or control of 200 foot sanitary radius around all wellheads for this wellfield</p> <p>Expand coverage of local aquifer protection regulations throughout entire source water area</p> <p>Support and encourage the acquisition of open space land within the source water area</p> <p>Support environmental awareness and education within the community.</p>

Exhibit VIII (Cont'd)

Inventoried significant potential contaminant sources in the Brooklyn Wellfield source water area are listed in Table 3. While these facilities have the potential to cause groundwater contamination, there is no indication that they are doing so at this time.

Table 3 Summary of Significant Potential Contaminant Types in the Brooklyn Wellfield Source Water Area

Category	Subcategory	Number of SPCS Types
Waste Storage, Handling, Disposal	Hazardous Waste Facilities	5
	Solid Waste Facilities	0
	Miscellaneous	0
Bulk Chemical, Petroleum Storage	Underground Storage Tanks	20
	Tank Farms	0
	Warehouses	0
Industrial Manufacturing / Processing	Chemical & Allied Production	1
	Chemical Use Processing	8
	Miscellaneous	1
Commercial Trades and Services	Automotive and Related Services	17
	Chemical Use Services	0
	Miscellaneous	2
Agriculture and Related	Pesticide Storage, Handling or Application	0
Total Number of Contaminant Types		54

Prominent features of the Brooklyn Wellfield source water area are summarized in Table 4.

Table 4 Features of the Brooklyn Wellfield Source Water Area

Number and Type of Public Drinking Water Supply Wells	3 stratified drift wells
Source Water Area Delineation Method ^a	preliminary Level B
DEP Groundwater Classification	GAA - Groundwater used as a public drinking water supply, presumed to be drinkable without treatment
Size of Source Water Area	1970.1 acres
Location of Source Water Area	Brooklyn and Killingly
Predominant Land Use and Land Cover in Source Water Area ^b	
-Urban - Commercial or Industrial	12.7 %
-Urban - Residential	33.1 %
-Agricultural	7.4 %
-Undeveloped Land	46.8 %
Preserved Land In Source Water Area ^d	10.1 acres
Significant Potential Contamination Sources	
-Number of inventoried facilities in source water area	32
-Count of inventoried facilities per square mile	10.40 per sq mile
-Number of contaminant sources within inventoried facilities	54
Number of Contaminant Release Points Inventoried by CTDEP ^c	1

^a Source water delineation method depends on data available for the wellfield

^b Based on statewide data layer of land use and land cover developed by UCONN Dept of Natural Resource Management Engineering and Connecticut DEP satellite imagery.

^c Sites or locations with documented accidental spills, leaks or discharges. While these sources, which are cataloged and tracked by the Connecticut DEP, may fall within a public drinking water supply source water area, they may or may not presently be discharging to the environment or causing contamination of a public drinking water source.

^d Any combination of state forest and parklands and municipally or privately held land designated as open space.

Exhibit IX – Hebron Aquifer Protection District Regulations

SECTION 5.0 DISTRICT USE REGULATIONS

5.8 DISTRICT USE REGULATIONS: AQUIFER PROTECTION DISTRICT (AP)

5.8.1 Statement of Intent

Within this district lies an extensive deposit of coarse grained, stratified drift. The U.S. Geologic Survey notes a portion of this area has a saturated thickness of greater than forty (40) feet, indicative of high water yielding conditions. Creation of this district is deemed essential to protect this significant water supply source for the Town. As ground waters have been shown to be easily, and in many cases, irrevocably contaminated by many common land uses, it is imperative all reasonable controls over land use, waste disposal and material storage be conscientiously exercised.

5.8.2 Establishment of District

The Aquifer Protection District is herein established as an overlay district. The boundaries of this District are those shown on a map entitled, "Aquifer Protection" in Section 2 of these Zoning Regulations. The District includes the entire coarse grained stratified drift deposit with a saturated thickness of greater than forty (40) feet and all land directly upgradient.

Where the bounds of this District are in doubt or dispute, the burden of proof shall be upon the owners of the land in question to show where they should be located. Such proof shall be in the form of a map, prepared by a professional engineer and land surveyor, at a scale of 1 inch to forty feet, with two feet contours, showing the existing district boundary and that proposed.

5.8.3 Permitted Uses

Within this District the requirements of the underlying districts continue to apply, except that notwithstanding the requirements of the underlying district, no uses indicated by an "N" in the following schedule shall be established subsequent to the effective date of these Regulations, nor shall any uses indicated by an "SP" in the following schedule be established subsequent to the effective date of these Regulations without first receiving a special permit subject to the criteria set forth in Section 5.8.4. Single family dwellings are exempt from these aquifer protection regulations.

Exhibit IX (Cont'd)

SECTION 5.0 DISTRICT USE REGULATIONS

Section 5.8 District Use Regulations: Aquifer Protection District (AP) (cont.)

PROHIBITED USES

- N (a) Manufacture, use, storage, transport or disposal of hazardous materials as a principal activity.
- N (b) Sanitary landfill, septage lagoon, waste water treatment facility for municipal or industrial wastes.
- N (c) Road salt storage.
- N (d) Junkyard, salvage yard, truck terminal.
- N (e) Gasoline station, car wash, auto repair or auto body shop.
- SP (f) Excavation, filling or removal of earth materials.

ACCESSORY USES

- N (g) Underground storage of hazardous materials.
- SP (h) Above ground storage of hazardous materials in quantities greater than associated with normal use, other than fuel storage for residential space heating.

5.8.4 Special Permit Criteria

Special permits required under Section 5.8.3 shall be granted only if the Planning and Zoning Commission determines the ground water quality resulting from on-site wastewater disposal or other operations on-site shall not cause degradation of ground waters outside any authorized zone of influence which would result in a condition which renders the ground waters unsuitable for direct human consumption. If existing ground water quality is not now suitable for drinking water purposes, on-site disposal or operations on-site shall cause no further deterioration.

5.8.5 Submittals

In applying for a Special Permit under this Section, the PZC may require, in addition to that required under Section 8, all or some of the following information:

- (a) A complete list of all chemicals, pesticides, fuels or other potentially hazardous materials to be used or stored on the premises in quantities greater than associated with normal household use. Information on the measures proposed to protect all storage containers from vandalism, corrosion, leakage and spillage and for control of spilled materials may also be requested.

Exhibit IX (Cont'd)**SECTION 5.0 DISTRICT USE REGULATIONS****Section 5.8 District Use Regulations: Aquifer Protection District (AP) (cont.)**

- (b) A description of all potentially hazardous wastes to be generated, including provision for storage and disposal measures as described in part (a) above.
- (c) For above ground storage of hazardous materials or waste, evidence of qualified professional supervision of the design and installation of such storage facilities or containers.
- (d) For areas with an impervious surface greater than 30% of total lot areas, a showing of runoff water disposal plans. Dry wells shall be used only where other methods are infeasible and shall be preceded by oil, grease and sediment traps designed to remove contaminants. A schedule for maintenance of such traps may also be required.
- (e) For on-site disposal of sewage in quantities in excess of 2000 gpd, documentation from the wastewater discharge permit granting authority that such system meets all applicable codes and regulations.

Exhibit X – Salem Aquifer Protection Regulations

25B AQUIFER PROTECTION OVERLAY ZONES

25B.1 Statement of Intent

A U.S. Geologic Survey has identified two aquifers in Salem with the potential to produce enough water to supply a public water system. This regulation seeks to protect these aquifers from potential land use pollution sources and to ensure that Salem has access to clean groundwater sources.

25B.2 Establishment of Overlay Zones

This regulation establishes two Aquifer Protection Zones. These overlay zones encompass the aquifers and a 250 foot buffer around each aquifer perimeter. The boundaries of these zones are shown on the map entitled “Town of Salem Zoning Map”. Within these overlay zones the existing land uses of the underlying zones continue to apply. Prohibited land uses and uses allowed by special exception are noted below.

25B.3 Prohibited Land Uses

The following land uses are prohibited within the Aquifer Protection Overlay Zones.

- a) The manufacture, use, storage, transport or disposal of hazardous materials (as defined in Section 25 of these regulations) as a principal activity;
- b) Sanitary landfills, septage lagoons, wastewater treatment facilities for municipal or industrial wastes;
- c) Road salt storage;
- d) Truck terminals;
- e) Gasoline stations, car washes, auto repair and auto body shops;
- f) Underground storage of hazardous materials; and
- g) Any proposed land use deemed by the Commission to pose a potentially serious pollution threat to the aquifers.

25B.4 Special Exception Land Uses

Excavations, as defined in Section 14 of these regulations, may be allowed within the Aquifer Protection Overlay Zones as a Special Exception.

Exhibit XI – Creating Streamside Buffers

WHY is a Vegetative Buffer Garden Important?

Whether natural or planted gardens, vegetated streamside buffers provide shade, stabilize stream banks, slow runoff, help to avoid flooding, and provide food and shelter to wildlife.

In contrast, the common grass lawn provides very little protection to streams. Chemical fertilizers and pesticides can easily wash off a lawn into the stream, degrading water quality. Stormwater runs off grass at a greater volume and a faster rate than from areas with trees and shrubs. Lawn grasses do not have the root structure to stabilize stream banks against the erosion and scour that can lead to stream bank failure.

The benefits will reach beyond your backyard stream—your buffer garden will help preserve and protect water resources downstream too!



Benefits of Streamside Vegetation

Shade: Tall trees and shrubs provide the shade streams need. Exposure to sunlight increases water temperatures and encourages algal growth, leading to oxygen depletion. High temperatures and low oxygen levels threaten the health and survival of many fish and aquatic species.

Bank Stabilization: Shrub and tree roots prevent erosion by holding the stream bank together and by absorbing and deflecting the energy of moving water. Removing vegetation can lead to significant stream bank failure and mass bank loss, especially during heavy rains, flooding and ice flows.

Runoff Renovation: Vegetative buffers slow the flow and reduce the volume of runoff. They also filter pollutants such as sediments, nutrients, oils, metals, trash and debris. These pollutants might otherwise be carried into the stream and beyond.

Food and Shelter: Vegetation next to the stream provides the food and shelter needed by many aquatic and terrestrial wildlife species. A well vegetated buffer also provides the travel corridor required by many species to safely move about and maintain population levels.

Care and Maintenance of Your Buffer Garden

As with any garden, once you have planted you will need to keep it well watered and weeded for the first 2 to 3 years. If you use mulch you will need to renew it until your plants are big enough to shade out the weeds. Although many native plants require little care, if you choose you can prune shrubs and trees, and cut back or divide grasses and perennials. Alternatively, you can let your buffer garden go wild. And remember, *as you enrich your garden, your garden will nurture you!*

Native Plants for Buffer Gardens

There are many beautiful native plants that will thrive in a streamside buffer garden. Below are just some of the trees, shrubs and perennials that you might choose from.

TREES

- Black Willow*
- Red Maple*
- River Birch
- Sweetgum

SHRUBS

- American Cranberrybush
- Black Chokeberry*
- Blackhaw Viburnum
- Buttonbush*
- Common Elderberry*
- Highbush Blueberry
- Inkberry
- Madroasweet*
- Northern Arrowwood
- Pussy Willow*
- Red-Osier Dogwood*
- Sandbarberry
- Silky Dogwood*
- Spiralshrub

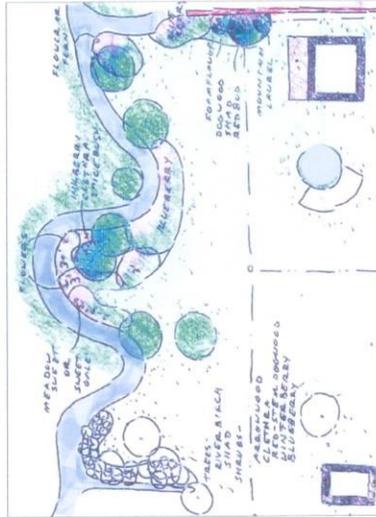
- Summersweet
- Sweetgum
- Winterberry
- Witchhazel

PERENNIALS

- Blue Flag Iris
- Boneset
- Cardinal Flower
- Great Blue Lobelia
- Monkey Flower
- Joe-Pye Weed
- Turtlehead

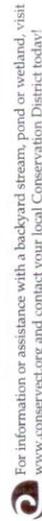
*good for bank stabilization

EXAMPLE BUFFER GARDEN DESIGN



SEARCHABLE PLANT DATABASES ONLINE

- University of Connecticut: www.hort.uconn.edu/plants/
- Connecticut Botanical Society: www.ct-botanical-society.org/index.html
- USDA Natural Resources Conservation Service: plants.usda.gov/index.html
- CT Invasive Plants Working Group: www.hort.uconn.edu/cipwg/



For information or assistance with a backyard stream, pond or wetland, visit www.conservet.org and contact your local Conservation District today!

This publication was developed by:

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This guide was made possible with a generous grant from The Rockfall Foundation and funds provided by CT River Coastal Conservation District.



April 2008

BUFFER RESOURCES ONLINE

"Where Water Meets Land," CT NRCS riparian buffer guide ([link to pdf](http://link.to.pdf))
www.ct.nrcs.usda.gov/plants.html

CT River Joint Commission fact sheets
www.ctriver.org/riparianbuffers.htm

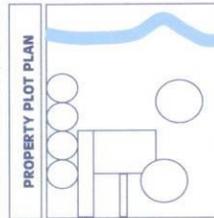
Candlewood Lake buffer guidelines (pdf)
www.conservet.org/southwest/
 NPS_resources/candlewoodbuffer.pdf

Exhibit XI (Cont'd)

HOW TO CREATE A STREAMSIDE BUFFER GARDEN

Size Up Your Streamside Buffer Garden

To design your buffer garden start with a property plot plan. A plot plan is usually available at town hall, or you can create one by measuring the distances between your house, driveway, garage, etc. and the stream. On the plot plan roughly sketch how much lawn you need for family activities and draw in existing trees and landscaping. The remaining yard area adjacent to the stream, is your potential buffer garden.

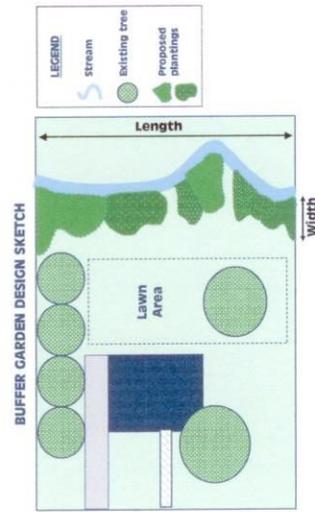


To determine the best size for your buffer garden consider the length you have available alongside the stream, as well as the width available on one or both sides of the stream.

LENGTH is important. Wildlife travel along streamside corridors seeking food and shelter. Try to create a buffer garden along the entire stream length on your property. Paths through the buffer garden can provide access and views of the stream.

WIDTH is also important. The wider the buffer, the more effectively it will intercept and filter runoff, stabilize the soil to prevent erosion, and support wildlife. Conservationists recommend at least a 35-foot wide buffer, but a narrower buffer is better than no buffer at all.

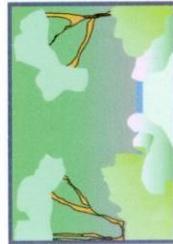
If you have limited time or a limited budget start small. Plant as much buffer garden next to the stream as possible, and in subsequent years you can add plantings to lengthen, or widen, your buffer garden.



Vegetative buffers help stabilize stream banks, prevent erosion, slow runoff, and provide food and shelter for a wide array of wildlife. Buffers can also be backyard gardens that are inviting places to stroll while enjoying views of the stream they protect. It is fun and relatively easy to create a streamside buffer garden. Follow the three simple steps below, and start a buffer garden that you—and your stream—will enjoy!

Design for Everyday Beauty and Pleasure

If you are like most people, you have access to a stream because you enjoy the sight and sound of the water on your property. Your buffer garden should preserve and enhance this relationship with the stream. It should also include plants with shapes, blooms, colors and fragrances that are pleasing to you as well as the local birds, bees, and butterflies.



SKETCH A DESIGN on your plot plan showing your planting areas and where you want to put trees, shrubs, flowers, meadow grasses and ferns. Also sketch in walking paths and views of the stream. A good way to preserve views of the stream is to put shorter plants along the paths and taller plants at the outer "frame" of view.

Before deciding what to plant consider the environmental conditions in the buffer garden. You will need an idea of the soil moisture and light regime. Note how wet or dry the planting area is, and how sunny or shady it is. Also note areas that are seasonally wet or flooded.

Now you can choose plants that are right for your garden. Refer to any one of the excellent websites referenced on the other side, or peruse a good garden book. Consider species native to southern New England first. They are adapted to our climate and are tolerant of the local soils and pests. Native plants also attract native wildlife, and can be essential to native bird and butterfly survival.

Diversify your buffer garden by choosing a variety of trees, shrubs, grasses and flowering perennials. A mixture of plant heights and colors will add visual interest, and different plant types work together to better protect the stream. Tree and shrub roots grow deeply, preventing undermining of stream banks, while perennials and meadow grasses intercept runoff and help keep surface soil from eroding. And of course, flowering and fruit-bearing plants help feed a wide variety of wildlife species throughout the year.

Implement Your Design

Using your design sketch, mark out the planting areas either by eye or with a measuring tape. Stakes, flags, flagging tape or temporary spray paint can help you demarcate planting areas and visualize your buffer garden.



TO PREPARE FOR PLANTING you will need to clear any weeds or other vegetation and turn the soil. You may also choose to lay down a layer of mulch before you plant, although it can be added afterwards.

If you are planting an area that is lawn you can use a sod-stripper or rototiller, or you can use a smothering technique. To smother, lay a thick layer of newspapers (up to 12 sheets!) on the grass and cover with 4-6" of mulch. Grass can also be smothered by covering it completely with black plastic or cardboard until it turns brown and dies (this takes some time).



Also make sure to look for, and remove, any non-native invasive plants since they can overrun your new garden (to learn more about invasives go to www.hort.uconn.edu/cipwg/).

Now you are ready to plant!

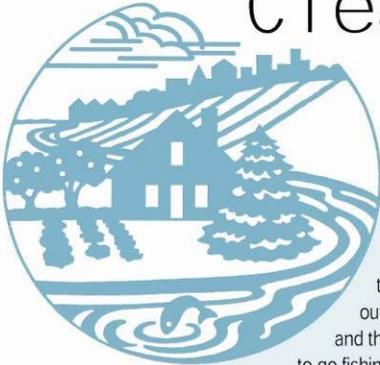
Generally, each plant species has a preferred soil acidity and soil fertility. Ask a professional at the garden center or nursery where you purchase your plants for planting information and plant care recommendations. And remember, leave enough space between the plants so they have room to grow to their full mature size!



Exhibit XII

Clean Waters

Starting in Your Home and Yard



Clean Waters is a collaboration of the Connecticut Sea Grant Extension Program and the University of Connecticut Cooperative Extension System's NEMO Project, educating individuals about the impacts of everyday activities on water quality and simple techniques that help protect water resources from the home well to Long Island Sound.

What's the Big Deal About Water Quality?

It used to be that no one really thought much about water. It came out of the faucet, went down the drain and that was the end of that. If you wanted to go fishing or swimming, you went to the local stream, swimming hole or maybe even took a trip down to Long Island Sound. Nothing to worry about – there's clean water to spare, right?

There are plenty of reasons to worry about water and water quality. We expect to have crystal-clear, pure water for drinking, food production, and recreation AT THE SAME TIME we use our waters for waste disposal. The old slogan, "the solution to pollution is dilution" typified the feeling that anything dumped down a drain, into a river or even into the ocean was going to disappear without a trace. We now know that NO aquatic system, even an ocean, can absorb unlimited human pollution. Just ask someone with a contaminated well, clambers in a town where shellfishing is prohibited due to pollution, residents of a town where a water conservation emergency has been declared, or sailors who find rafts of plastic trash in the middle of the ocean. They'll tell you that water, both in terms of quantity and quality, is not to be taken for granted.

The need to prevent water pollution has been recognized for years. The federal and state Clean Water Acts were passed in the early 1970's specifically to clean up discharges from industry and sewage treatment plants. We now know the problem is much more complicated than simply ordering a plant to stop discharging pollutants. Factories and sewage treatment plants are two examples of "point source pollution", where pollution enters the water from a specific source. All other types of water pollution are lumped together in a category called "nonpoint source pollution" or "polluted runoff." These pollutants fall from the sky, wash from the land during rain storms, travel across the state in streams and rivers, and even get dumped into storm drains or directly into the water by the thousands of individuals who don't realize that what they are doing causes water pollution. The Environmental Protection Agency now considers nonpoint source pollution the NUMBER ONE threat to water quality in the United States.

Through our everyday activities, we all cause water pollution without realizing it. The exhaust and oil from driving cars, materials washed down drains or flushed down the toilet, pet wastes, fertilizers and pesticides used in yards, all contribute to water pollution. Making simple changes in our everyday activities can help reduce some types of pollution. For example, conserving water both saves money and helps septic systems or the local sewage treatment plant remove pollutants more effectively. Choosing non-toxic alternatives for household cleaning products reduces water pollution, cleaning bills, and our exposure to hazardous materials. Rethinking landscaping and gardening practices reduces the need for pesticides, fertilizer, and irrigation, thus reducing the potential for contaminating local waters.

These are just a few examples of personal efforts that protect water quality. There are many written materials available, including this fact sheet series, with information on different ways to help prevent water pollution. Please take some time and find out how you can help protect our most important natural resource - clean water.

WHAT POLLUTES WATER?

There are six major types of pollutants that affect water quality. Some are primarily a human problem, but others can damage the entire ecosystem.

Sediment: Dirt and sand are natural substances that become pollutants when they end up in the water in excessive quantities. Sediment changes the shape of streambeds, smothers feeding and nursery areas of aquatic animals, and carries other pollutants into the water. Erosion from poorly managed construction sites, agricultural fields, or suburban gardens are major sources of sediment pollution. Another major source is road sand applied to improve winter driving conditions.

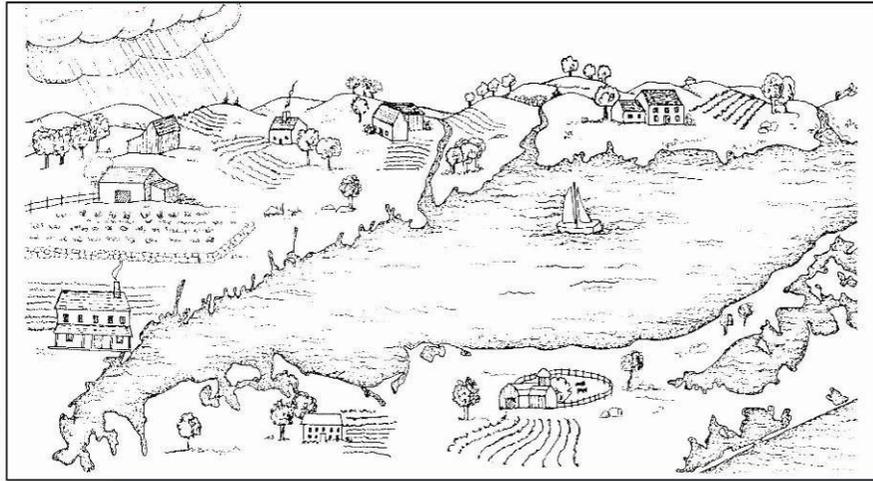
Debris: Non-degradable trash, mostly plastic, when carelessly disposed of, will often end up in a

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Susan Stone



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nearby water body. Humans find it ugly, as well as hazardous when it entangles boat propellers. Aquatic animals can also become entangled, or mistake plastic for food, and strangle or starve.

Pathogens: Pathogens are the bacteria and viruses that cause disease. They generally come from fecal material from humans and their pets, or from wild animals and birds. When the potential concentration of pathogens in the water exceeds certain limits, areas must be closed to shellfishing or swimming in order to prevent infections or disease outbreaks. Major sources of pathogens include: failing septic systems, leaky sewer lines, and concentrations of animal waste from pets, farm animals or wildlife.

Toxic Contaminants: Many of the tens of thousands of chemicals in use today are harmful to both humans and aquatic organisms. Some of these chemicals can be passed through the food chain and concentrate in top predators (like humans). Extremely small concentrations of some toxic materials in the water can kill the eggs and larvae of many animals. Sources of toxic contaminants range from the exhaust and fluids that come from automobiles to the cleaning and disinfectant products used in homes to the pesticides used in yards, farms and parks.

Nutrients: Materials that are necessary for plant growth, primarily forms of nitrogen or phosphorus, are known as nutrients. When too many nutrients end up in an aquatic system, they alter the natural

plant community and can cause massive plant growth known as algal "blooms" which deplete oxygen concentrations in the water. Excess nitrates in drinking water have been linked to human health problems, including heart conditions and birth defects.

Thermal Pollution: During summer months, thermal pollution can make the water in critical aquatic habitats too warm for sensitive native plants and animals to survive, as well as allowing the spread of non-native species. Overheated water can result from the removal of vegetation that shaded the stream, runoff from hot roofs and parking lots, or the collection of water in shallow unshaded ponds.

Written by –
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CT Sea Grant Extension Program

Other Fact Sheets in this Series:
Managing Your Hazardous Household Chemicals
Caring for Your Septic System
Conservation Landscaping for Water Quality
Integrated Pest Management for the Homeowner
Animal Waste and Water Quality
Backyard Biodiversity: Selecting Plants for Habitat and Water Conservation
Environmentally Friendly Lawn Care
Seasonal Yard Care Tips
Boating for a Better Environment
Household Water Conservation

For more information contact: Connecticut Sea Grant,
1084 Shennecossett Rd. Groton, CT 06340
www.seagrants.uconn.edu

Exhibit XIII

Clean Waters

Starting in Your Home and Yard



Managing Your Household Chemicals

Your Home Contains Hazardous Chemicals

Clean Waters is a collaboration of the Connecticut Sea Grant Extension Program and the University of Connecticut Cooperative Extension System's NEMO Project, educating individuals about the impacts of everyday activities on water quality and simple techniques that help protect water resources from the home well to Long Island Sound.

Household products are potentially hazardous if they pose risks to people, animals or the environment. Many of the chemicals that are used in everyday activities can be poisonous when they enter aquatic systems (lakes, ponds, streams or estuaries such as Long Island Sound) and can also contaminate area drinking water supplies. The U.S. Environmental Protection Agency estimates that the average household in America generates 20 pounds of hazardous household wastes annually. The typical home also stores 100 pounds of hazardous wastes.

How Do You Know if a Product is Hazardous?

Hazardous chemicals fit into one of the following categories:

- CORROSIVE – able to eat through other materials;
 - FLAMMABLE – can ignite or burn readily;
 - REACTIVE – will undergo rapid chemical change such as bubbling or explosion if improperly used;
 - TOXIC – poisonous, can cause severe illness or death if inhaled or swallowed.
- Many household products have cautionary labeling. The purpose of cautionary labeling is to alert consumers to potential human health hazards resulting from improper use. The Federal Hazardous Substance Act requires household cleaning products to be labeled by manufacturers as follows:
- CAUTION or WARNING – Risk is minor; permanent damage not likely to result with first aid treatment
 - DANGER – Risk is substantial; typical for flam-

mable, corrosive or toxic products
 POISON – Extremely risky; a severe hazard; (uncommon on household products).

Cautionary labeling does not apply to environmental hazards resulting from improper use. Some products with no or low-level cautionary labeling may cause significantly more harm to the environment than they would to human health.

Protect Yourself, Your Family, Your Community

You can prevent human health and environmental problems, and save some time and money by making wise choices in the purchase and use of hazardous household products.

At the Store:

- Read labels thoroughly.
- Select products with the least cautionary labeling.
- Compare products.
- Seek the least hazardous products to accomplish the job.
- Products mixed with water are better for the environment.
- Select the right products.
- Buy products with safety closures.
- Choose products with environmental friendly packaging (i.e., recyclable symbols).
- Look for concentrates, which use less packaging.
- Purchase the smallest amounts needed.

At home:

- Follow directions on products.
- Consider using all-purpose products to accomplish multiple tasks.
- Discover safe, tested, alternative products that may also save you money.
- Store cleaning chemicals safely in locked cabinets in the kitchen, garage and hobby areas, away from children, the sun, heat, and ignitable sources.

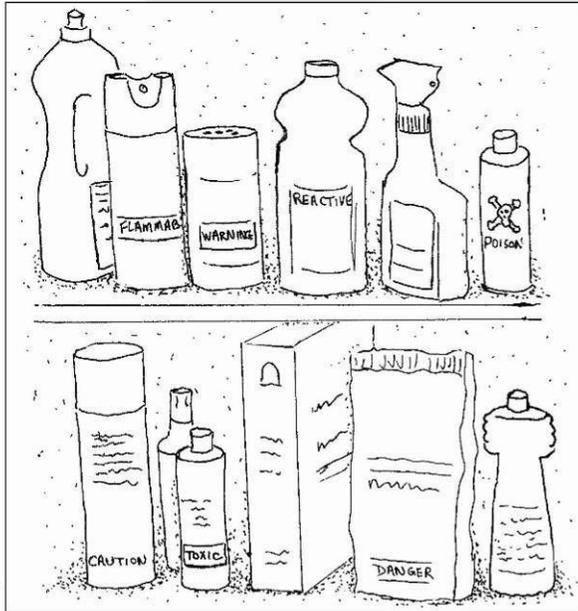
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Exhibit XIII (Cont'd)



Judy Ricketts-White

- Store pressurized containers away from heat sources and moisture to prevent explosion and rusting.
- Use products in well-ventilated areas.
- Store products only in original containers.
- Dispose of containers when empty; don't reuse.
- Do not mix commercial chemicals.
- Use appropriate landscaping techniques to reduce chemical applications.
- Do not use septic system additives. Some may actually damage your system.
- Wear protective clothing – long pants, long sleeved shirts, gloves, goggles, closed shoes and hats (in some cases) as recommended on the label.
- Dispose of cleaning rags in a safe manner to avoid spontaneous combustion.
- Keep fire extinguishers handy throughout your home. (Check with your fire department for recommended type.)
- Do not burn or bury leftover oil, chemicals, paints, pesticides or containers.
- Do not pour leftover products down storm drains or on the ground.
- Do not wash chemicals down impervious

- surfaces (paved driveways and sidewalks).
- Never pour chemicals down the sink or storm drain.
- Do not apply pesticides on windy days.

If chemical spills do occur, clean up with an absorbent material like kitty litter or sawdust to avoid dispersion.

You can reduce the amount of cleaners used by following some practical household tips:

- Clean up messes when they occur. Stronger cleaning products may be required to remove stains once they set.
- Use water or a dampened cloth whenever possible to polish or eliminate spills.
- Reduce mildew in bathrooms by installing an exhaust fan. Squeegee shower walls after bathing.
- Pour fat/grease in metal containers, not down the drain.
- Wipe up oven spills promptly after cooking.
- Vacuum rugs frequently to reduce the necessity of shampooing.
- Regularly bathe pets and comb with a flea comb.

In Your Community:

- Follow your community recycling guidelines.
- Share unused products with others (in a clearly labeled container).
- Participate in community hazardous chemical collection days.
- Think about how your actions could affect others.
- Be a neighborhood advocate for safe home management and product practices.

Make Your Own Non/Low Toxic Household Cleaners

By making your own cleaning products, you can: promote a healthy environment, reduce chemicals going to landfills or incinerators, save money, eliminate cluttered cabinets, and easily prepare the right amount of cleaner for any job.

Exhibit XIII (Cont'd)

Follow these safety tips when making and using homemade cleaners:

- Ventilate the area.
- Wear gloves.
- Wear protective clothing and shoes.
- Avoid contact with skin and eyes.
- Store cleaners in labeled, non-food containers.
- Lock cleaners in a cabinet out of children's reach.
- Rinse surfaces thoroughly with water before applying a different product.
- Do not mix different products.
- Keep products away from heat, cigarettes, and flammable sources.
- Keep the telephone number of the nearest poison control center handy.
- Dispose of empty containers by following recycling instructions in your community.

Cleaning Supply List

These items can be purchased at most super-markets and discount or hardware stores.

Products	Supplies
Baking Soda	Aluminum Foil
Chlorine Bleach*	Bucket
Lemon Oil	Cleaning Cloths
Mineral Oil	Gloves
Salt	Measuring Cups
Soap Flakes	Measuring Spoons
White Vinegar	Non-food Containers
Whiting**	

* Chlorine bleach compounds are toxic to aquatic organisms in **very** low concentrations but are **less** toxic than many other cleaning products. Consider using chlorine as a cleaning agent only when necessary for heavy cleaning jobs.

**Whiting (calcium carbonate) is available at hardware and paint stores.

Air Fresheners

- Open windows
- Circulate air with a fan or air conditioner
- Place cut lemons or baking soda in a dish
- Boil cinnamon and cloves in water

All Purpose Cleaners

- Mix 1/4 cup baking soda and 1 quart warm water. Wipe surface with sponge, then dry.
- **Soap Jelly** can be made by adding 1 cup of shaved soap flakes or leftover soap pieces to 1 quart of boiling water. Stir until dissolved. Pour into jar and let cool. Mix with water as needed.

Aluminum Cleaners

- Soak in a solution of 1/4 cup white vinegar to 1 quart water; boil if necessary.
- Soak in a solution of 2 teaspoons cream of tartar in 1 quart of water; boil if necessary.

Bathroom Cleaners

- Mix 1/2 cup chlorine bleach and 1 cup water. Spray on tile to remove mildew. Let stand for ten minutes. Rinse with water.
- Mix 1/4 cup baking soda and 1 quart water. Wash with sponge, wipe dry.
- Remove tub stains by scrubbing with a paste of cream of tartar and hydrogen peroxide.
- Remove copper stains (green) by using salt and vinegar or salt and lemon juice.
- Remove lime deposits with vinegar.

Brass and Copper Cleaner

- Mix 2 tablespoons salt, 1 tablespoon lemon juice and 1 tablespoon vinegar. Rub with sponge and let dry. Rinse with hot water, then dry with soft cloth.

Chrome Cleaner

- Mix 1/4 cup baking soda with enough water to make a paste. Rub on, rinse with water, then dry.
- Apply whiting on a damp cloth.

Disinfectants

- Mix 1/4 cup bleach to 1 quart water
- Mix 1/2 cup borax to 1 gallon hot water.

Drain Cleaners

- Use drain traps.
- Pour boiling water down the drain.
- Use a plunger or plumber's snake.
- Mix 1/2 cup baking soda, 1/2 cup vinegar and 1/2 cup boiling water. Pour into drain. Let stand.

Exhibit XIII (Cont'd)

Floor Wax Remover

- Mix 3/4 cup dry detergent, 1 gallon hot water and 1/3 cup ammonia. Spread solution on a small area and let stand a few minutes. Scrub to remove wax. Rinse floor thoroughly. Let dry.

Furniture Polish

- Mix 1 teaspoon lemon oil and 1 pint mineral oil. Spray on furniture; wipe clean with soft cloth.
- Mix 1/4 cup linseed oil, 1/4 cup vinegar and 1/2 cup lemon juice. Rub into wood with soft cloth.

Household Insecticides (For Plants)

- Mix 1/2 teaspoon shaved soap flakes and 1 quart water. Wash leaves with soap solution, rinse with water. Large plants can be rinsed in the shower. (Do not use on plants located in low light.)

Household Pests

- Contact the UConn Home and Garden Center (toll free) @ 1-877-486-6271.

Marble

- Mix 1 tablespoon baking soda and 1 quart water. Wash with sponge, wipe dry.

Mothballs

- Store clean clothing in airtight chests or containers.

Oven Cleaner

- Make a paste of equal parts of salt, baking soda and water. Apply to walls of oven. Let stand for five minutes, wipe clean with a damp cloth. (Use a brush on heavy spills). Do not allow baking soda to touch wiring or heating elements.

Paint Brushes

- Place hardened paintbrushes in a bowl of hot vinegar for ten minutes. Rinse thoroughly.

Painted Surfaces

- Dust and vacuum surface before applying liquid solutions. Use a well-wrung cloth dipped in the cleaning solution. Starting from the baseboard, work upwards toward the ceiling to prevent streaking. Clean small areas at a time. Rinse with water, then dry.

- Mix 1/4 cup soap jelly (see **all-purpose cleaners**) and 1 gallon hot water. Wash walls with cloth dipped in this mixture.
- Mix four parts whiting to one part soap jelly to clean heavily soiled areas. Rub carefully on soiled areas. Rinse with water and let dry.

Refrigerator

- Mix 1/2 cup bleach and 1 gallon water. Wash refrigerator interior, wipe dry.

Silver Cleaners

- Line an aluminum pan with a piece of aluminum foil.
- Mix 1 teaspoon baking soda, 1 teaspoon salt and 1 quart hot water. Add silver and boil for three minutes. Remove silver, wash with detergent, rinse and dry. (Do not use on silver jewelry).

Toilet Bowl Cleaner

- Add 1/2 cup bleach to toilet. Let stand for a half-hour. Scrub bowl with brush and flush.

Upholstery Shampoo

- Mix 2 teaspoons mild detergent, 1 teaspoon water softener and 1 pint warm water. Whip into a foam with electric beater. Vacuum furniture. Test foam for color fastness in an inconspicuous area. Apply foam gently with a sponge or soft brush in a circular motion. Rub until foam disappears. Do not saturate fabric. Dry rapidly with fans.

Whiting

- Sprinkle whiting on surface. Rub with soft damp cloth to polish chrome or porcelain and remove metal marks on stoneware.

Window Cleaner

- Add 2 tablespoons vinegar to 1 quart warm water. Spray on windows and wipe dry.

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The Connecticut Sea Grant College Program, based at the University of Connecticut, is part of a national network of university-based programs sponsoring coastal and marine-related research, outreach and education.



Exhibit XIV

Clean Waters

Starting in Your Home and Yard



Animal Waste and Water Quality

Clean Waters is a collaboration of the Connecticut Sea Grant Extension Program and the University of Connecticut Cooperative Extension System's NEMO Project, educating individuals about the impacts of everyday activities on water quality and simple techniques that help protect water resources from the home well to Long Island Sound.

It's first thing in the morning and the dog wants to go out right NOW, the cats are standing by their litter box waiting for some fresh kitty litter, and your toddler is demanding a trip to the park to feed the ducks. While none of these activities may sound like a major threat to the environment, animal waste is one of the many little sources of pollution that can add up to big problems for water quality and may cause human health problems as well. While most people connect animal waste problems to agriculture, studies have shown that pets, waterfowl and other urban wildlife waste can cause significant water pollution problems.

Animal waste contains several types of pollutants that contribute to water quality problems: nutrients, pathogens and a naturally toxic material, ammonia. When animal waste ends up in a lake, stream, or Long Island Sound, it decomposes, using up oxygen and releasing its pollutant load. During summer months when the water is warm, the combination of low oxygen levels and ammonia can kill fish and other aquatic organisms. The nutrients cause excessive growth of aquatic weeds and algae. When these conditions make the water murky green and smelly, or when the surface of the water is completely covered with a thick mat of vegetation, the area becomes unattractive or unusable for swimming, boating or fishing.

Pathogens, the disease-causing bacteria and viruses associated with animal waste, can also make water unsafe for human use. If pathogens or the indicator bacteria associated with animal waste are found during water testing, shellfish beds may be closed to harvest, beaches may be closed to swimming and drinking water supplies may require expensive filtration or disinfection.

Fortunately, there are some simple practices everyone can do to help prevent pollution by keep-

ing animal waste out of the water. While it may seem easier to ignore the problem of animal waste, remember that you are protecting not only the environment but also your own health.

Keeping Animal Waste Out of the Water

1. Pick up after your pet. Preventing water pollution can be as simple as remembering to take along a plastic bag or pooper scooper when you walk your dog. For both "quality of life" and public health reasons, many communities actually have laws requiring anyone taking their animal off of their property to immediately clean up the waste after the pet relieves itself. Your choices once you have picked up the waste include:

- Flush it down the toilet so the septic system or sewage treatment plant will treat it in the same manner as human waste.

- Put it in the trash. This is less effective, as waste that ends up in a landfill may still cause pollution problems. Putting animal waste in the trash is actually against the law in some communities.

- Bury it in your yard. The microorganisms in the soil will break down the waste and release the nutrients to nearby plants. Make sure the hole is at least five inches deep and located away from vegetable gardens, children's play areas, or any lake, stream, wetland, well or ditch. CAUTION: Don't bury waste in your compost pile. The pile does not get hot



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Exhibit XIV (Cont'd)



Judy Ricketts-White

enough to kill the pathogens and using the compost could cause illness.

• Install an underground pet waste digester. These function like small septic tanks. Before buying one, check for local laws that

may restrict their use or location.

2. Keep your yard clean. While there are no laws requiring you to clean up animal waste on your own property, there are good reasons to be careful where you leave it to decay. Some diseases can be transmitted from pet waste to humans through soil contact. Children who play outside and adults that garden are most at risk for infection, so cleaning up waste from play and garden areas is especially important. Washing hands with anti-bacterial soap and water after working or playing in the dirt is the best protection from disease.

Some of the more common waste-borne diseases and their symptoms are the following. *Campylobacteriosis* causes diarrhea in humans. *Salmonellosis* has symptoms including fever, headache, vomiting and diarrhea. *Toxocariasis* is a roundworm that may cause a rash, fever, and cough or vision loss. *Toxoplasmosis*, a protozoan parasite that can cause severe birth defects if a woman becomes infected during pregnancy, is the reason pregnant women are told to avoid handling used kitty litter. This parasite can also cause problems for people with weak immune systems. Symptoms include headache, muscle aches and lymph node enlargement.

3. Don't feed waterfowl. While one of the pleasures of a trip to the park has always been taking stale bread to feed the ducks, the environmental and health impacts of this activity for both humans and birds can be serious. While ducks, geese and swans all love bread, it lacks in the nutrients and roughage of their natural diet. Feeding these birds bread is similar to feeding a small child a diet of candy and soda; they may love it, but it

does them no good and may cause long-term health problems.

Feeding waterfowl also tends to cause the birds to concentrate in numbers higher than can be supported by the natural food supplies. This can cause problems in the winter months when fewer people come to the park or shore with food. There have been cases along the Connecticut shoreline where swans were so used to being fed at a particular location that they remained in the area long after the feeding stopped, became too weak to fly someplace with a better food supply, and eventually died of starvation. These large flocks of birds also create large quantities of waste and the serious water pollution problems described earlier in this fact sheet.

4. Dispose of kitty litter properly. When cleaning out the litter box, a two-step approach is most effective. Cat waste may be scooped out and flushed down the toilet, and the used litter should be bagged, sealed and placed in the trash. Dumping the entire contents of the litter box down your toilet will cause plumbing problems and prematurely fill up your septic tank or sewer system with indigestible material, but sending untreated cat waste to the landfill can cause pollution problems.

While it may not seem like a big deal if one more dog, cat or bird "contributes" some waste to the neighborhood environment, think about how many animals there are out there. Animal waste may not be the biggest or most toxic pollutant going into your local waters, but it is one of those little problems that, when all the pieces are added together, leads to serious environmental and health problems. So please think twice about your pet's bathroom habits and do your part to help keep our waters and environment clean.

Reference: J.A. Hill and C.D. Johnson. *Pet Waste and Water Quality*. Wisconsin Nonpoint Source Water Pollution Abatement Program. January 1992.

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Fact Sheet #6

Exhibit XV



Starting in Your Home and Yard

Lawn Care the Environmentally-Friendly Way

Clean Waters is a collaboration of the Connecticut Sea Grant Extension Program and the University of Connecticut Cooperative Extension System's NEMO Project, educating individuals about the impacts of everyday activities on water quality and simple techniques that help protect water resources from the home well to Long Island Sound.

Americans devote an amazing amount of time and money to cultivating the "perfect" lawn. Literally BILLIONS of dollars are spent each year to re-seed, irrigate, and de-thatch lawns. Tons of water, lime, fertilizers and pesticides are applied, with potentially serious environmental and human health consequences, in order to create an expanse of green without the biodiversity or ecological structure of the plant community it replaces. While lawns have roles in the home landscape, including covering septic fields and serving as play areas, they do not have to be meticulously managed to be healthy and look good. Understanding a lawn's environmental needs and tailoring lawn care practices to suit local conditions allows for a dense, healthy, environmentally friendly lawn with less work and expense.

one yard. Conditions that can affect turfgrass growth include shade, excessively well-drained or poorly-drained soils, low pH or acid soils, low nutrient availability, high salt concentrations, and heavy foot, play, or animal traffic. The major reason for lawn failure is the improper match of selected grass species to site conditions. An evaluation of the lawn area before selecting a grass seed mix or sod type can go a long way toward preventing lawn problems.

KNOW YOUR GRASSES

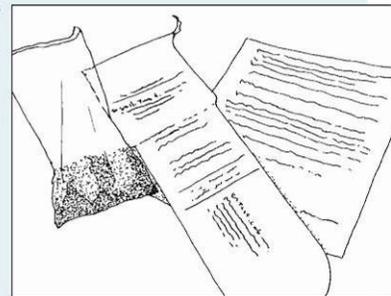
Cool-weather turfgrasses flourish in the spring and fall and some can spread by growing lateral stems across and below the soil surface. These grasses, including bluegrasses, fescues, ryegrasses and bentgrasses are not native to New England but have adapted to this environment through three hundred years of natural selection. These grasses still grow best with cool temperatures and adequate moisture and tend to go dormant or semi-dormant during hot, dry weather.

New England's native grasses include both cool-weather grasses and warm-weather grasses, which "green up" later in the spring and grow as a slowly expanding bunch or clump. Zoysia grass, a non-native, warm weather grass, grows best in hot temperatures, providing a green summer lawn, but it browns out early in the fall and is VERY slow to "green up" in the spring.

Different grass species have varying tolerances to the range of growing conditions found even within

KNOW YOUR SOIL

A soil test is one of the most important steps in maintaining a healthy lawn. Soil pH, organic matter and fertility (or nutrient availability) all affect grass growth. Proper soil pH (6.2 to 6.5) enhances the ability of grass to use available nutrients, tolerate drought, and resist diseases. Most soils in New England are more acidic (lower pH) than is optimal for grass, so soil pH is adjusted by applying limestone, in powder or pelletized form.



Limestone can be applied, at a rate of no more than 50 pounds per 1,000 square feet, at any time the ground is not frozen.

Organic matter in the soil helps the soil hold water and provides some nutrients. If soil is low in organic matter, compost can be spread in a very thin layer over the surface or tilled in to gradually increase the organic content. Leaving grass



Fact Sheet

June 2000



Exhibit XV (Cont'd)

ALL GRASSES ARE NOT CREATED EQUAL							
	Shade Tolerance	Drought Tolerance	Wet Soil Tolerance	Low pH Acid Soil Tolerance	Low Fertility Tolerance	Salt Tolerance	Traffic Wear Tolerance
Fine Leaf Fescues	XX	XX	☹	X	XX	☹	☹
Roughstalk Bluegrass (M)	XX	☹	XX				☹
Supina Bluegrass (M)	XX	☹					XX
Tall Fescue	X	XX	XX	XX	X	XX	XX
Zoysia grass	X	XX	X	X	X	X	XX
Kentucky Bluegrass	☹	X	X	☹	☹	☹	X
Canada Bluegrass (C)		XX					
Redtop (C)		XX	XX				
Perennial Rye Grass	☹	X	X	☹	☹	X	X

Key XX = Excellent (M) = moist conditions required
 X = Good (C) = for conservation or erosion control areas
 ☹ = Poor

Fact Sheet #8

clippings on the lawn after mowing also adds organic matter to the soil.

Lawn health can be affected by soil compaction, as when heavy equipment is driven over the lawn area. Compacted soils prevent water infiltration and deep root growth. Soil coring or aeration helps correct this problem by loosening soils. Spring or Fall is the best time to address compaction. Check for soil compaction by cutting both ends off a large can – like a coffee can. Pound one end at least two inches into the ground. Fill the can with water and measure the water height, then time how long it takes for the water to filter into the ground. A minimum infiltration rate for Connecticut soils would be 0.5 to 1 inch per hour. Anything slower would indicate the soils are probably compacted. [Example calculation: If a full can has 5 inches of water and the water takes 12 hours to completely empty from can, the infiltration rate is 5/12 or 0.42 inches per hour.]

KNOW YOUR FERTILITY

Before adding ANY fertilizer to the lawn, consider all the "free" sources of nutrients. Rainfall provides about one-half pound of nitrogen per 1,000 square feet every year. Lesser amounts of phosphorus and sulfur also come with the rain. Lawns that have clover in their plant mix require less nitrogen since the clover "fixes" nitrogen and makes it available to the surrounding plants. Leaving the grass clippings on the lawn after mowing is the best kind of fertilizer.

Research at the University of Connecticut shows that recycling clippings in place reduces the need for supplemental fertilizer applications by 50 to 100 per cent!

If you must fertilize, avoid over-fertilization by following soil test recommendations. Choose a fertilizer formulation that most closely matches what the soil lacks. Slow-release fertilizers improve the chances

Exhibit XV (Cont'd)

that nutrients will remain in the root zone until the grass can use them. For additional water quality protection, use organic fertilizers if possible. Organic formulas combine the benefits of slow nutrient release with the addition of organic matter to the soil. Organic fertilizers may also help reduce some turf disease problems.

Turf type will determine the annual amount of fertilizer required for a healthy lawn. Never apply more than one pound of nitrogen per 1,000 square feet at one time. To determine what is one pound of nitrogen, divide the first number on the fertilizer bag into 100. The result is the amount (in pounds) of fertilizer that should be applied to 1,000 square feet of lawn. Fine and tall fescue-type lawns require only one (September) or two (May and September) applications per year. Bluegrass lawns generally require three applications. Recommended application times coincide with three holidays: Memorial Day, Labor Day and Columbus Day.

To ensure best plant use of fertilizers and to reduce potential water quality problems, New England lawns should never be fertilized before April 1 or after October 15. Always check the weather and avoid applying fertilizer before heavy rainstorms or during long, dry spells.

KNOW YOUR WATERING SCHEDULE

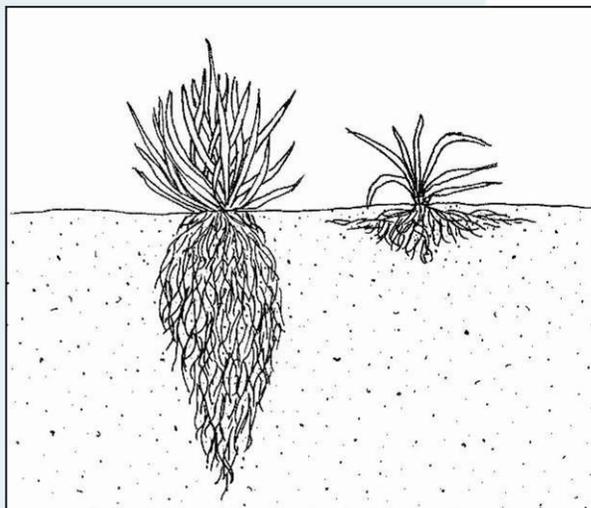
Most lawns require about one inch of water per week, either from natural rainfall or irrigation. Some homeowners like to water their lawn for a few minutes several times a week, but this practice actually weakens the grass by discouraging deep root growth. To promote deep root growth and drought resistance, use a rain gauge to keep track of rainfall. If Mother Nature has not provided an inch of rain in a week, then apply an inch of water. Measure watering levels by placing a tuna fish or other shallow can under the sprinkler system. Don't apply water faster than the ground can soak it up. If water runs off the lawn, slow down the watering.

During prolonged dry spells, it is better to let the lawn go dormant than to stress the grass by watering and forcing it to grow. Stressed grass is susceptible to pest and disease problems. Fine fescues and turf-type tall fescues are the more drought-tolerant of the common lawn grasses. Bluegrasses,

ryegrasses and bentgrasses may require supplemental water to survive drought conditions.

KNOW YOUR PESTS

The best tool for pest management is to plant grass varieties suitable for the site's growing conditions, and then to avoid stressing them with poor lawn care practices. Weeds have a hard time invading a dense, healthy lawn. When establishing a new lawn or overseeding an old one, take advantage of a natural pest control by looking for "endophyte-enhanced" seed vari-



Judy Ricketts-White

eties. Certain fescues and ryegrasses contain a fungus that produces compounds that reduce certain insect and disease problems. As these varieties also tend to be more drought-tolerant, water and pesticide use can be reduced at the same time.

Scout your lawn for pest problems frequently; catching a problem early makes it easier to correct. If you find a problem, take time to determine:

- What is causing the problem?
- What is the potential for damage?
- What is the best approach to solve the problem?

Correct identification of pest problems is CRITICAL. It does no good to spray grub control pesticides on brown spots in your lawn if they were actually caused by a fungus or dog urine.

Reduce your use of, and exposure to, pesticides by only treating the problem area. Avoid the use of

Exhibit XV (Cont'd)

combination fertilizer-pesticide products, which force you to treat your entire lawn. You should also avoid applying pesticides according to a calendar UNLESS you have had a problem for several years and a pesticide is the ONLY means of control. When pesticide use is necessary, ALWAYS READ THE ENTIRE LABEL! Products should be chosen and treatments timed to be most effective in dealing with the pest and least likely to damage natural controls or be carried to other parts of the environment.

KNOW YOUR LAWN MOWER

How a lawn is mowed can help or hurt lawn health. Even the choice of lawn mower and its maintenance can make a difference. Gas-powered lawn mowers produce the same amount of air pollution in one hour as driving a car for 350 miles. Consider electric power or reel-type push mowers if you have small lawn areas to manage. Keep the mower blade sharp so grass blades are cut cleanly, reducing moisture loss and limiting disease spread. A mulching blade cuts grass clippings into very small pieces so they can be left on the lawn without clumping.

Always try to mow when the grass is dry to prevent spreading disease problems. Mow the lawn to the recommended height for the grass variety but never less than two inches. Grass plants have a hard time recovering from mowing if they have little blade left with which to photosynthesize. Reduce plant stress by never removing more than one-third of the blade at a time. Recommended mowing heights are:

- Tall fescues: 2.5 - 3 inches
- Perennial ryegrass/fine fescues: 2 - 3 inches
- Kentucky bluegrass: 2.5 inches
- Zoysia grass: 1 inch (an exception)

UNDERSTAND THATCH

Thatch is a dense layer of dead grass stems and roots that develops between the soil surface and the green grass blades. Contrary to popular belief, grass clippings do NOT contribute to thatch problems. Heavy thatch reduces water infiltration into the soil.

Some grasses (fine fescues, Kentucky bluegrass) are prone to thatch problems; others (tall fescues, perennial ryegrass) are not. Serious thatch problems are usually a sign of poor lawn care practices, such as

over-fertilization and improper mowing. De-thatching, best done in the fall, is recommended for lawns with more than one inch of thatch build-up. Top-dressing the lawn with a thin layer of good topsoil will also help control thatch.

ADDITIONAL RESOURCES

There are lots of excellent fact sheets available from The University of Connecticut Cooperative Extension System that cover lawn and pest problems in great detail. Call the University's Home and Garden Education Center, toll-free, at 877-486-6271 or check out the website at <<http://www.lib.uconn.edu/canr/HomeGard/>> (case-sensitive).

Written by –

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Associate Professor of Agronomy,
Department of Plant Science
University of Connecticut



The Connecticut Sea Grant College Program, based at the University of Connecticut, is part of a national network of university-based programs sponsoring coastal and marine-related research, outreach and education.



Fact Sheet #8

For more information contact: Connecticut Sea Grant,
1084 Shennecossett Rd., Groton, CT 06340
www.seagrants.uconn.edu

Exhibit XVI

Clean Waters

Starting in Your Home and Yard



Conserving Water at Home

Clean Waters is a collaboration of the Connecticut Sea Grant Extension Program and the University of Connecticut Cooperative Extension System's NEMO Project, educating individuals about the impacts of everyday activities on water quality and simple techniques that help protect water resources from the home well to Long Island Sound.

Water is a precious natural resource that benefits all living things. It provides nourishment for people, animals and plants, and serves as the living environment for aquatic life. Maintaining a safe and adequate water supply is everyone's responsibility. The daily actions of individuals and communities directly impact water supplies. By making sensible choices, people can preserve and protect household water.

Water conservation has personal and economic impacts. Especially during drought conditions, homeowners can extend their water supply by practicing conservation year round. An extended water supply provides an added measure of safety, protects lawns and gardens, and enables people to enjoy modern conveniences which often are taken for granted, such as a consistent water supply and plumbing that operates as designed. Water consuming appliances may not produce the expected results during drought conditions (e.g., laundry may appear discolored).

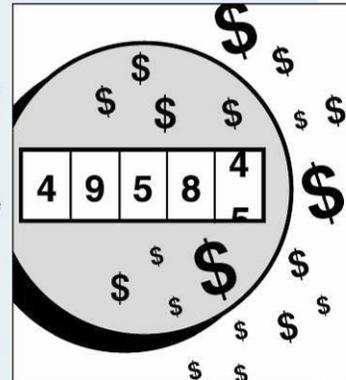
Municipal customers save money on water, sewer, energy and potential tax bills by practicing conservation. Municipalities that consume substantial amounts of water typically increase taxes in order to construct sewage treatment plants that can adequately handle the volume and lessen the load on existing systems. It is preferable for communities to improve water treatment technology, rather than build additional treatment plants. Both municipal and household sewage treatment systems require water in order to function. As water consumption increases, costs increase. For homeowners on private septic systems, the tank must be pumped more frequently with increased water use. As septic systems experience greater stress, they are likely to require replacement more frequently, costing thousands of dollars.

DEVELOP WATER SAVING HABITS

Modify your household water usage patterns by involving every person in your home. Children can get really excited if you make it a game and are a source of inspiration for the entire family!

In the bathroom...

- Shorten shower time (use a minute timer) and install low-flow-showerheads (that deliver 1.5 gallons of water per minute) with shut-off valves (for turning water off temporarily while soaping or shampooing) and aerators (screens that introduce bubbles, producing a feeling of greater water pressure). These devices are easily installed and very cost effective.
- Run hot water very briefly before getting in the shower. When taking a bath, close the stopper from the start and then let the water rise in temperature in the bathtub.
- Install low-flow faucet fixtures and repair leaks promptly. A leaky faucet can result in a daily loss of fifteen gallons of water. Encourage family members to turn faucets off tightly when not in use; turn the water on and off while brushing your teeth or partially fill the basin while shaving to save up to ten gallons of water daily. Continuously running water is very wasteful.
- Toilets are the major water consumers in most homes. Consider replacing older toilets with ultra-low-

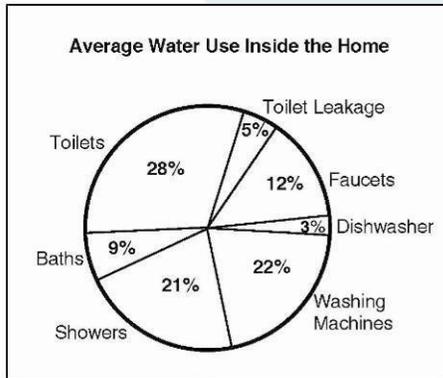


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Fact Sheet

June 2000

Exhibit XVI (Cont'd)



flush (ULF) models. Traditional toilets use about 3.5 to 7 gallons of water per flush, depending upon their age. ULF models use about 1.6 gallons per flush and are characterized by efficient bowl and discharge designs, compatible with existing plumbing fixtures.

If toilet replacement is not feasible, be sure to check all household toilets for leaks by placing three drops of food coloring

inside the tank. If the food coloring appears in the bowl without flushing, a leak is present. The trip mechanism may not be attached properly; or the flushball/flapper may be old and distorted in shape or may not be making the right contact with the ball seat and needs to be replaced. If the valve is not shutting off, the float ball may either need to be adjusted or repaired/replaced if defective. Occasionally, the ball seat may be the source of the problem that can be solved by cleaning, repairing or replacing the seat.

Installing a dual flush mechanism on an existing toilet is another option until the toilet can be replaced. With this mechanism the user can choose between two different water settings.

- Remind family members to dispose of kitty litter, tissues, paper towels, cigarettes and other litter in wastebaskets...not the toilet!

In the kitchen...

- Run the sink for the minimum amount of time necessary to clean dishes, food, pots and pans and other items. Soak dishes in a dishpan, if necessary. Rinse all vegetables at once. Avoid running water continuously when performing kitchen tasks!
- Replace faucets with water-saving devices and check valves for leaks.
- Use the minimum amount of detergent (low-sudsing) to avoid excessive rinsing of dishes and countertops.
- Apply elbow grease and a sponge or scrubber to clean sinks. Do not use lots of water to remove debris from sinks.
- Store a pitcher of cold water in the refrigerator so

you will avoid running water until it gets cold.

- Research has shown that automatic dishwashers use less water than hand dishwashing. Measure detergent, select water and energy conserving cycles, run only full loads and avoid excessive pre-rinsing.
- Boil only as much water as you need in a tea kettle or covered pot (with a lid) and turn it off as soon as it boils to reduce evaporation and waste.
- Dispose of vegetable scraps in a compost pile; the garbage disposal wastes water.

In the laundry...

- Sort clothing, pretreat stains, select the load size which corresponds to the quantity of clothing you are washing, measure detergent, and use the recommended water temperature.
- When purchasing a washing machine, consider new front-loading models that consume only 30 percent of the water of traditional top-loading models.

In the household...

- Inspect your water meter for leaks by reading the meter (number) at night (after family members have stopped using water). The next morning, before anyone uses water, check the number on the meter again. If the number has changed, there is a leak in the system. Assuming leaks in household faucets/appliances have already been corrected, have the piping system inspected to determine the source.
- It is preferable to select household cleaners that do not require rinsing with water. For cleaners requiring hydration, measure and make the minimum amount needed.

Written by –

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Cooperative Extension System

For more Information contact: The Home and Garden Center, Ratcliffe Hicks Building, Rm 4, 1380 Storrs Rd., U-115, University of Connecticut, Storrs, CT 06269-4115, toll free number (1-877-486-6271).

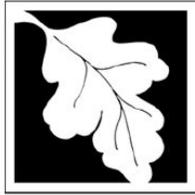
or Connecticut Sea Grant, 1084 Shennecossett Rd., Groton, CT 06340 www.seagrants.uconn.edu



The Connecticut Sea Grant College Program, based at the University of Connecticut, is part of a national network of university-based programs sponsoring coastal and marine-related research, outreach and education.



Exhibit XVII



Massachusetts
Department
of
ENVIRONMENTAL
PROTECTION

f a c t s h e e t

Tips For Maintaining Your Home Heating System:
Prevent Heating Oil Leaks and Spills

Cleaning up oil leaks from home heating systems can be very expensive. The average cost can range between \$20,000 and \$50,000, with some cleanups costing significantly more. Here are some ways to save money, help prevent leaks and spills, and protect the environment.

For all heating oil systems:

- Annually:
 - Inspect for leaks. Look at the tank, fuel delivery line, valves, piping, and fittings.
 - Have your oil company:
 - Clean the furnace and repair or replace damaged parts. A well-maintained furnace means lower fuel bills and cleaner emissions.
 - Install an oil **safety valve** or replace the fuel delivery line with one encased in a **protective sleeve**. These are inexpensive upgrades. Contact the fire department to determine if a permit is required for this work.
 - Each fall, inspect the vent pipe to ensure that it is free of obstructions and that an audible signal (whistle) is on the vent. Oil company personnel listen for the whistle to help avoid overfills, a common source of spills.
- At least every 10 years, have the oil tank cleaned out. Over time, water (from condensation) and sludge can cause corrosion resulting in leaks.
- When appropriate:
 - Remove abandoned fill and vent pipes immediately.
 - Clearly mark the location of the tank's fill pipe.
 - Consider upgrading to a modern, fuel-efficient furnace.

Typical Above-Ground Home Heating Oil System

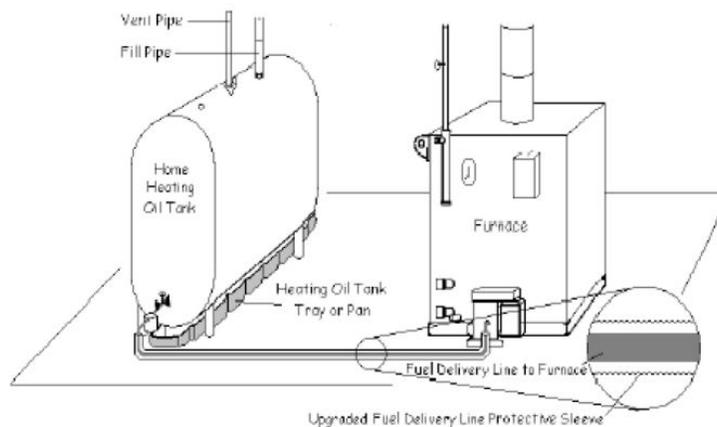


Exhibit XVII (Cont'd)

Massachusetts Department of
Environmental Protection
One Winter Street
Boston, MA 02108-4746

Commonwealth of Massachusetts
Mitt Romney, Governor
Kerry Healey, Lt. Governor

Executive Office of
Environmental Affairs
Ellen Roy Herzfelder, Secretary

Department of
Environmental Protection
Robert W. Gollidge, Jr.,
Commissioner

Produced by the
Bureau of Waste Site Cleanup,
1/02/rev. 5/04.
Printed on recycled paper

This information is available in
alternate format by calling our ADA
Coordinator at
(617) 292-5565.



- Determine if the underground storage tank is made of steel (common) or fiberglass (rare). Most steel underground storage tanks will last approximately 10 to 20 years. If the tank is older than that or the age is unknown, replace it with an above-ground storage tank. Locate your new tank under a shelter, or inside a basement or garage, to prevent rust, corrosion, or damage.

For outdoor above-ground tanks:

- Ask your oil company to inspect the stability of the above-ground tank. A full 275-gallon tank weighs more than 2,000 pounds! They have metal legs and should sit on a concrete pad. If the legs become loose or the pad cracks, the tank can fall over and rupture.
- Replace an outdoor above-ground storage tank that has been uncovered for 10 years or longer. These tanks rust from the inside out, so cleaning or painting the outside does not usually prolong their life.
- Protect the tank from the weather, such as falling snow and ice, and prevent ruptures by tree limbs.

For indoor above-ground tanks:

- Inspect indoor above-ground storage tanks for signs of pitting and corrosion, particularly at the bottom of the tank. Tanks primarily rust from the inside out, so if signs of aging are present, replace the tank. Indoor tanks do not last more than about 30 years, and often their lifespan is much shorter.
- Consider placing a plastic heating oil tray or pan under the tank. This makes it easier to keep the tank area clean and help identify and contain small leaks.

If your oil company offers to perform a "tightness test," ask if this could cause a problem. Generally, these tests should NOT be performed on older residential heating oil systems. Because of the pressure used during a tightness test, older equipment can fail, causing a leak or spill. If you have a tank, fuel delivery line, valves, piping, and fittings on which it is inadvisable to perform a tightness test because of age or condition, then it is probably better to replace the equipment that is causing the concern.

Visit our web site: <http://mass.gov/dep/cleanup/laws/facts.htm> to review related documents, including "Heating Oil Delivery Lines" (<http://www.mass.gov/dep/cleanup/deline.pdf>).

If you suspect an oil leak or spill, **immediately** contact your oil company and fire department for assistance. Leaks or spills of 10 gallons or more must be reported to DEP within 2 hours. To report a leak or spill, call DEP (within 2 hours) and the fire department.

DEP's 24-hour statewide emergency response number is 888-304-1133.