

**Source Water Protection Plan
for the Town of Charlestown, Rhode Island**



Developed by: Charlestown Source Water Steering Committee

Prepared by: Atlantic States Rural Water and Wastewater Association

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for the
Town of Charlestown, Rhode Island

November 2010

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Charlestown Source Water Steering Committee

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Introduction

The purpose of the Charlestown Source Water Protection Plan is to reduce or eliminate potential and existing risks to the drinking water quality of the public water systems in Charlestown. The management plan included here outlines specific actions available to the community to protect the wellhead protection areas located in the town.

The plan was prepared by the Atlantic States Rural Water and Wastewater Association, in cooperation with the National Rural Water Association. Program funding was provided by the Source Water Protection Program of the Environmental Protection Agency (EPA). The purpose of the program is to provide technical assistance to rural and small communities for the development and implementation of Source Water Protection Plans.

Source Water Protection Plans written as part of this program build on the Source Water Assessment Program of the Rhode Island Department of Health (RI HEALTH), which was completed approximately ten years ago. This program determined the susceptibility of the public water systems in Rhode Island to potential contaminant sources.

In the case of Charlestown, *source water* refers to the groundwater in and around the multiple wells in town which are part of public water systems. Groundwater can be threatened in a variety of manners, as shown in Figure 1. Potential contaminants include nitrates, pathogens, fuels, solvents, herbicides, pesticides, and metals.

Proactively addressing the issue of source water protection helps to protect public health, decrease treatment costs, reduce the chances of water quality violations, and ensure the continued viability of aquifers for drinking water purposes.

The Town of Charlestown was chosen for participation in this program not only because of the number of public water systems and identified risks, but also because of its history of forward-looking protection of source water quality and its willingness to expand on these efforts.

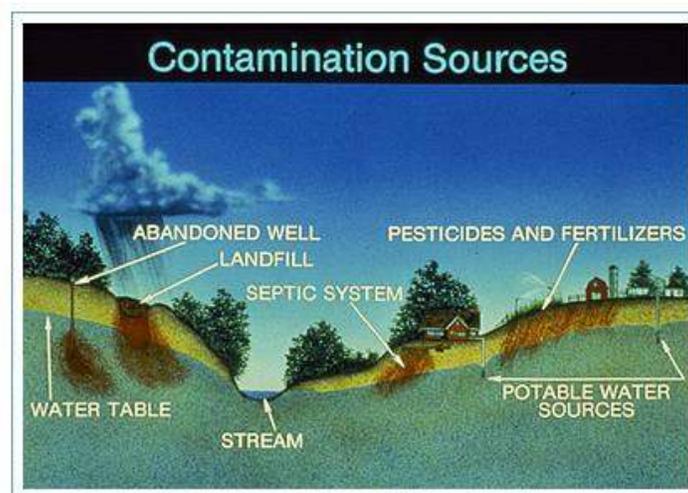


Figure 1. Examples of potential contamination sources.

Source: http://www.epa.gov/ne/eco/drinkwater/pc_sourcewater_assessment.html

Local Source Water Protection Steering Committee

The following people comprise the Charlestown Source Water Protection Steering Committee. They have helped to gather and review the information contained in this plan. This committee, which may change to include additional or different members, will meet once a year to review and update the plan and to assess its progress.

Steering Committee

Matt Dowling – Town of Charlestown – Onsite Wastewater Manager/Environmental Scientist
Steve McCandless – Town of Charlestown – GIS Specialist
Ashley Hahn-Morris – Town of Charlestown – Town Planner
Ruth Platner – Town of Charlestown – Planning Commission Chair
Elizabeth Myre – Atlantic States Rural Water and Wastewater Association

Charlestown, Rhode Island

Background

The following overview is from the Town of Charlestown's website (www.charlestownri.org):

“The Town of Charlestown, incorporated on August 22, 1738, is a seaside community located in the southwest portion of Rhode Island. It encompasses thirty-six square miles of land, six miles of inland water and approximately six miles of coastline along Block Island Sound. The Town is a physically diverse community with flourishing beach colonies, unique village centers, and large tracts of open space. The Town is a perennial vacation and tourist location offering exceptional swimming, camping and fishing opportunities. Consequently, between the months of May to September the Town's population swells to more than twenty thousand, including seasonal inhabitants ... Charlestown's year round population, according to the year 2000 census, has increased to 7,581 year round residents.”

The Narragansett Indian Tribe Settlement Land is located in Charlestown. Additional well-known places in town include three of Rhode Island's salt ponds (Quonochontaug, Ninigret, and Green Hill), several state parks and beaches, and the Frosty Drew Observatory.

Water in Charlestown

Water takes many forms in Charlestown, from the groundwater located in and around the 67 public water systems and over 4,000 private wells, to the fresh water of the freshwater ponds and rivers, to the saltwater of the salt ponds and coastal waters off of the many beaches.

All drinking water systems in Charlestown, whether public or private, are dependent on groundwater. As written in the Charlestown Wellhead and Groundwater Protection Plan (1997), “Groundwater is one of Charlestown's most important natural resources because it is irreplaceable. The health and economic welfare of the Town is directly related to this resource.”

As the document goes on to say, “Charlestown ... has the highest percentage of land area [designated] as Wellhead Protection Areas in the State.” Wellhead protection areas (WHPAs) are the land areas from which groundwater will flow to a well under pumping conditions. The Rhode Island Department of Environmental Management (RI DEM) defines a WHPA as “the critical portion of a three-dimensional zone surrounding a public well or wellfield through which water will move toward and reach such well or wellfield.” A statewide map of WHPAs is included as Appendix A.

All of the risks to groundwater quality affecting public water systems also affect private wells. Residents (and small business owners) with private wells have equally strong reasons to educate themselves on water quality issues and to work to reduce contamination risks.

There are no surface water bodies approved for use as sources by public water supplies in Charlestown. However, surface water plays a significant role in recharging the groundwater aquifer systems, and is an important economic and recreational resource for the town’s residents.

This Source Water Protection Plan focuses on protecting the quality of the source water currently in use by public water systems. The actions suggested in the Management Plan can help to protect existing and future uses of all of Charlestown’s precious water resources.

Source Water Inventory and WHPAs

Definitions

RI DEM provides the following definitions relating to public water systems:

“A public well is a well that supplies water to a “public water system”. All public water systems in RI are regulated by the Department of Health to ensure that the water quality meets drinking water standards. A public water system provides drinking water to 15 or more service connections or regularly serves an average of at least 25 individuals daily at least 60 days of the year. There are three categories of public water systems as described below.

- 1) *“Community System” – serves year-round residents; at least 15 service connections or at least 25 residents. Examples of wells serving community systems (community wells) include municipal wells, nursing home wells and mobile home park wells. All other public water systems are “non-community” systems.*
- 2) *“Non-Transient Non-Community Systems” – a non-community system that regularly serves at least 25 of the same persons (non residents) over 6 months of the year. Wells serving schools and places of employment are non-transient non-community wells.*
- 3) *“Transient Non-Community System” – a non-community system that does not regularly serve the same persons; but does serve at least 25 people at least 60 days of the year. Restaurants and hotels are typical examples of such non-community systems.”*

Public water supplies have the three above-mentioned categories to account for the frequency of use of the water by the general public served by the system. The number of potential contaminants tested and the frequency of testing increase with the frequency of use by the consumers of the water.

Charlestown has 67 public drinking water systems, comprised of 84 active wells located within the town. The following tables do not include the public wells located on the Narragansett Indian Tribe Settlement Land.

Community Systems

PWSID	System Name	# of Active Wells
RI1000035	CASTLE ROCK CONDOMINIUMS	3
RI1559513	SHADY HARBOR FIRE DISTRICT	4
RI1647511	QUONOHONTAUG EAST BEACH WATER ASSOC	2
RI1647512	CENTRAL BEACH FIRE DISTRICT	2
RI1647529	SHANNOCK WATER DISTRICT	1 (located in Charlestown)
RI2674924	BORDER HILL MOBILE HOME PARK LIC. #36	1
RI2674925	INDIAN CEDAR MOBILE HOME PARK	2
RI2674928	NINIGRET REALTY	1

Non-Transient Non-Community Systems

PWSID	System Name	# of Active Wells
RI1592026	KENYON INDUSTRIES, INC.	3
RI1647525	CHARLESTOWN ELEMENTARY SCHOOL	2
RI1900027	CHARLESTOWN MUNICIPAL OFFICES	1
RI2980229	ST. ANDREW LUTHERAN CHURCH	1
RI2980019	TOWN OF CHARLESTOWN SENIOR CITIZENS	1
RI2980197	WEST LOOK, INC. DEVELOPMENT/DBA CHARLESTOWN	1

Transient Non-Community Systems

PWSID	System Name	# of Active Wells
RI1000005	BURLINGAME RESERVATION – MAIN CAMP – LEGIONT	4
RI1559520	EAST BEACH LANDING CONDOMINIUM	1
RI1647520	SONQUIPAUG ASSOCIATION, INC.	1
RI1647523	BURLINGAME PARK-PROSSER BEACH/PICNIC AREA	1
RI1900057	US FISH AND WILDLIFE SERVICE VISITOR CTR	1
RI2000034	THE WINDSWEPT INN	1

RI2000035	SURF SIDE MOTOR INN	1
RI2000038	DOWNEY WEAVER POST #34 AMERICAN LEGION	1
RI2000040	PASTORE LEISURE CENTER (LADD SCHOOL CAMP)	1
RI2519415	BLUE SHUTTERS	1
RI2519416	NORDIC LODGE	2
RI2519419	WILLOWS MOTOR LODGE - WELL #1	1
RI2519420	OLD WILCOX TAVERN, INC.	1
RI2519421	THE HITCHING POST, INC.	1
RI2519422	CHARLESTOWN COMMONS (FORMERLY JOHN PAUL)	1
RI2674911	CAMP WATCHAUG	1
RI2674912	PHIL & ANNS SUNSET MOTEL, INC.	1
RI2674913	SEAVIEW MOTOR COURT	2
RI2674916	PRAMUKH HOSPITALITY LLC DBA KRYSTAL PENG	1
RI2674917	FANTASTIC UMBRELLA FACTORY	1
RI2674921	MEADOW BROOK INN, LTD.	1
RI2674926	YMCA OUTDOOR CENTER	1
RI2674930	GENERAL STANTON INN	1
RI2980005	TROPIC FROST	1
RI2980017	CHURCH OF THE HOLY SPIRIT	1
RI2980018	NINIGRET INN	1
RI2980039	ALBACO, L.L.C. (A.K.A. SHORELINE PLAZA)	1
RI2980056	THE COVE	1
RI2980068	CHARLESTOWN VILLAGE, LLC/SIMPLE PLEASURES	1
RI2980069	THE CORNER DELI	1
RI2980082	GENTLEMAN FARMER, INC. (CHARLESTOWN)	1
RI2980094	KINGSTON PIZZA OF NARRAGANSETT, INC.	1
RI2980108	OCEAN PHARMACY CHARLESTOWN	1
RI2980120	SHELTER COVE MARINA. LLC	1
RI2980141	SOUTH SHORE MENTAL HEALTH CENTER, INC.	1
RI2980174	NINIGRET PARK-TENNIS COURT	1
RI2980175	NINIGRET PARK- LITTLE NINI POND	1
RI2980176	FROSTY DREW NATURE CENTER - NINIGRET PARK	1
RI2980204	WILLOWS MOTOR LODGE - WELL #2	2
RI2980205	WILLOWS MOTOR LODGE - TENNIS VILLA HOUSE	1
RI2980218	TIM HORTONS - NEW ENGLAND INC STORE 9959	1
RI2980222	CUMBERLAND FARMS STORE #1262 CHARLESTOWN	1
RI2980263	MICHAELS TEXACO STATION	1
RI2980267	ST. JAMES CHAPEL, STABLES	1

RI2980285	RIPPYS LIQUOR & MARKETPLACE	1
RI2980308	K & S PIZZA	1
RI2980309	CAROUSEL MARKETPLACE	1
RI2980317	COUNTRY FOOD MART, LLC	1
RI2980336	ARROWHEAD DENTAL ASSOCIATES, INC.	1
RI2980357	GALAPAGOS COLLECTION INC	1
RI2980364	DR. THOMAS BRIGADA - DENTIST	1
RI2980416	CHARLESTOWN MINI-SUPER, INC.	1
RI2980421	CHARLESTOWN POLICE STATION	1

Figure 2 is the same map as Appendix A, but zoomed in to focus on Charlestown.



Figure 2. Wellhead Protection Areas and GAA groundwater zones in Charlestown. Red circles indicate the WHPAs for Community systems, while blue circles indicate Non-Community systems. Source: Groundwater Classification, Wellhead Protection Areas and Drinking Water Reservoir Watersheds for Rhode Island (RI DEM).

Green areas in Figure 2 are areas of Class GAA groundwater. This is defined in RI DEM's "A Summary of Rhode Island Groundwater Classification and Groundwater Standards (Sept. 2009)":

"Groundwater classified GAA are those groundwater resources that are known or presumed to be suitable for drinking water use without treatment and are located in one of the three areas described below. Groundwater classified GAA underlies approximately 21% of the state. Groundwater classified GAA includes the following:

- *The state's major stratified drift aquifers that are capable of serving as a significant source for a public water supply ("groundwater reservoirs") and the critical portion of their recharge area as delineated by DEM;*
- *The wellhead protection area for each public water system community water supply well. Community water supply wells are those that serve resident populations and have at least 15 service connections or serve at least 25 individuals, e.g., municipal wells and wells serving nursing homes, condominiums, mobile home parks, etc.; and*
- *Groundwater dependent areas that are physically isolated from reasonable alternative water supplies and where the existing groundwater warrants the highest level of protection. At present, only Block Island has been designated as meeting this criterion"*

RI HEALTH Source Water Assessments

Approximately ten years ago, RI HEALTH completed a state-wide survey of public drinking water supplies under the Source Water Assessment Program. 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 Rhode Island and communicate the results to the public.

The following excerpts were common to several of the Source Water Assessments of Charlestown's Community public water systems:

- *Several roads are located near the well, increasing the risks for hazardous material spills and road salt contamination.*
- *Commercial and residential developments are clustered near the well.*
- *Since well is close to a recreational area, pet waste could introduce contaminants to the well.*
- *Nitrate levels in groundwater are higher than background levels, which may indicate contribution from human activity.*
- *No violations of the standards for regulated contaminants (excluding bacteria and nitrates) have been identified. However, there have been detections of greater than half the levels considered acceptable by US EPA. This indicates the need for continued monitoring and may indicate the need for future management and/or treatment. (To rephrase this, although the detected levels of certain contaminants are considered safe, the fact that they are present at all means that it is important to continue monitoring.)*

The following table of Charlestown’s Community systems contains additional data from the Source Water Assessments:

PWSID	System Name	Susceptibility to Contamination According to SWA	Nitrate Levels in Groundwater (Sample Summary from 5 years before SWA)	Population Served
RI1000035	CASTLE ROCK CONDOMINIUMS	Moderate	Higher than background levels	292 people/day
RI1559513	SHADY HARBOR FIRE DISTRICT	Moderate	Consistently low	162 people/day
RI1647511	QUONOCONTAUG EAST BEACH WATER ASSOC	Moderate	Higher than background levels	300 people/day in summer 30 people/day year-round
RI1647512	CENTRAL BEACH FIRE DISTRICT	Moderate	Higher than background levels	700 people/day
RI1647529	SHANNOCK WATER DISTRICT	District recently created. No SWA available.		
RI2674924	BORDER HILL MOBILE HOME PARK LIC. #36	Moderate	Somewhat higher than background levels	150 people/day in summer 75 people/day year-round
RI2674925	INDIAN CEDAR MOBILE HOME PARK	Low	Somewhat higher than background levels	140 people/day
RI2674928	NINIGRET REALTY	Moderate	Consistently low	100 people/day

The Charlestown Wellhead and Groundwater Protection Plan echoes the need for source water protection:

“[T]he levels detected for nitrate in the Central Beach Fire District and sodium in the Indian Cedar Mobile Home Park and in the Shady Harbor Fire District indicate a need for more protective efforts within the wellheads to keep these levels from rising.”

Existing Source Water Protection Measures

In 1997, the authors of the Charlestown Wellhead and Groundwater Protection Plan wrote:

“Charlestown has been working in the forefront of wellhead protection since developing its Comprehensive Plan in 1990. The Comprehensive Plan was adopted by the Town Council on January 13, 1992. This Plan was adopted to comply with the 1988 Rhode Island Comprehensive Planning and Land Use Regulation Act. The Plan includes a statement of goals and policies, an inventory of existing conditions within seven elements, an analysis of issues and needs, and recommendations. The Land Use and Natural Resource Element contains a section on the Town’s groundwater resources and a review of the impacts of the Town’s existing zoning and land uses on groundwater. The major finding of the Plan was that the existing zoning and other

land use controls adopted as a result of the 1984 Comprehensive Plan were generally appropriate for protecting the Town's groundwater. Recommendations were made to adopt several overlay districts with natural resource protection standards and to make other changes in the existing zoning on permitted uses and prohibited uses to additionally protect groundwater... Another recommendation of the Comprehensive Plan related to groundwater protection was a recommendation to adopt a wastewater management district."

Several factors work in favor of preserving source water quality in Charlestown:

- The town has a Groundwater Protection District zoning overlay.
- The town's Onsite Wastewater Management Program, discussed in detail in a later section, has made major strides since its creation in 1993 towards protecting source water quality.
- Workshops for private well owners, conducted by the University of Rhode Island's Cooperative Extension, educate the public about groundwater and provide opportunities for water quality testing.
- Citizen groups, including the Salt Pond Coalition and the Wood-Pawcatuck Watershed Association, initiate projects that protect the town's water resources, provide environmental monitoring, and keep water quality issues in the public eye.
- Many properties in town are part of land trusts, have conservation easements, or are otherwise protected from development. Limiting development not only limits potential sources of contamination, but also protects water quality by decreasing impervious surfaces.
- The town's GIS office works closely with the town's Wastewater Management Office to monitor Onsite Wastewater Treatment Systems and other threats to water quality.

Potential Threats

Transportation Routes

Charlestown has a large network of both town- and state-maintained roads, as well as the Amtrak Railroad that passes through town. Appendix B is a map of transportation routes located throughout Charlestown.

Roadways are a potential source of contamination due to the risk of petroleum leaks from vehicles, as well as the possibility of an accident involving a truck shipping bulk materials such as home heating oil. The application of road salts can cause elevated levels of sodium and chlorides. Some residents in Charlestown have reported having to wrap the base of their trees near state-maintained roads to protect them from heavy salt applications.

Waste Management

There are three landfills located in Charlestown. The first is the former Kenyon Piece Landfill on Sand Plain Road. There was an EPA drum removal project at this location, and a comprehensive site assessment is currently being done. The second landfill is located at Narrow Lane. It is capped and no longer monitored. The third landfill, at Sand Hill, is capped and monitored. A transfer station is located near this landfill.

Closed landfills and waste transfer stations remain as potential sources of leachate to the underlying groundwater aquifer systems and adjacent stormwater runoff receptors. However, environmental remediation activities and site engineering improvements have helped to reduce the risk and severity of environmental impacts at these sites.

CERCLIS: Comprehensive Environmental Response, Compensation, and Liability Information System

The Town of Charlestown contains four Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS, a.k.a. Superfund) sites. These are located at the Former Kenyon Piece Landfill (a drum removal project), the Ninigret National Wildlife Reserve, Ninigret Park (Lots 45-1, 45-2), and United Nuclear Corp.

More information can be found on the EPA's Superfund site:

<http://www.epa.gov/enviro/html/cerclis/index.html>.

Appendix C is a map of all CERCLIS and LUST (discussed in the following section) sites in Charlestown.

Leaking Underground Storage Tanks (LUSTs)

RI DEM data lists 14 LUST sites in Charlestown dating from 1988 to 2007. Most are listed as inactive.

The Charlestown Wellhead and Groundwater Protection Plan states:

“According to the EPA, leaking USTs are the Nation’s single largest source of groundwater contamination. The larger USTs are regulated by EPA and the DEM, but residential fuel storage tanks are not. Since the DEM does not regulate these tanks, local regulatory controls are essential. A local ordinance to regulate such tanks can include the registration of existing tanks, the prohibition of new underground storage tanks, and provisions may be included for replacing existing standard tanks with new approved technology and safeguards.”

Leaking heating oil tanks pose a serious risk to groundwater quality. Heating oil tanks are susceptible to leakage from failure and overfilling. Over time, water from condensation and sludge from impurities in the oil can cause corrosion, leading to leaks. The legs of above-ground tanks can also break, causing tanks to topple and spill. Routine inspection and proper maintenance of heating oil tanks costs money and is rarely requested or performed by residents.

Industrial and Commercial Activities

Eighteen businesses in town are listed by EPA as hazardous waste handlers. These include many businesses that one wouldn't necessarily think of as producing hazardous waste, including auto repair shops, dentists, veterinarians, equipment repair shops, welders, and paint stores.

Kenyon Industries, the only large industrial facility in town, has a state-issued RIPDES permit to release its treated wastewater into the Pawcatuck River on the border of Charlestown and Richmond.

Stormwater

Stormwater runoff can transport pollutants over the ground and into the interconnected system of surface water and groundwater. Substances found in stormwater runoff include oil and grease, chemicals, nutrients, bacteria, and salt. The greater the amount of impervious surface, the more runoff will be produced.

Crops and Livestock

Charlestown has a variety of agricultural activities spread throughout the town, including beef cattle, organic vegetable production, horse farms, a composting facility, and even a worm farm.

The effects of agriculture on water quality depend on the practices used. When not managed properly, agriculture can introduce large amounts of nutrients (e.g. phosphorous and nitrogen), along with bacteria from animal waste, into an area's waters. Examples of practices which can mitigate negative effects include crop nutrient management, conservation buffers, irrigation water management, erosion and sediment control, and proper animal feeding operations management.

Salt-Water Intrusion

Figure 3 shows the way in which fresh groundwater and the saltwater of the ocean interact near the coast. The closer one is to the coast, the shallower the level at which salt water is reached.

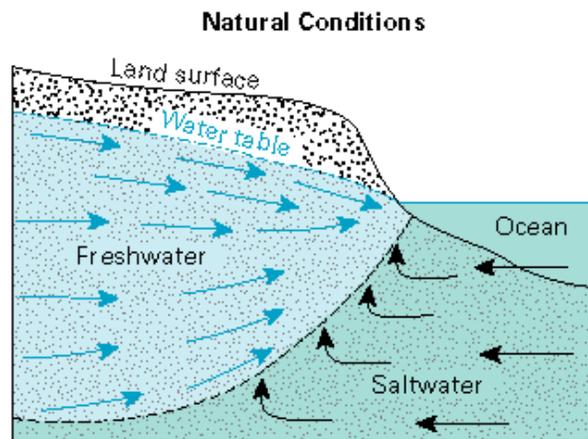


Figure 3. Freshwater/Salt Water interface in coastal area, natural conditions.

Source: <http://pubs.usgs.gov/gip/gw/quality.html>

Any groundwater pumping near a coastal area will affect this pattern, drawing salt water up towards the well (Figure 4). The higher the pumping rate, the more likely it is that the groundwater aquifer is at risk of salt-water contamination.

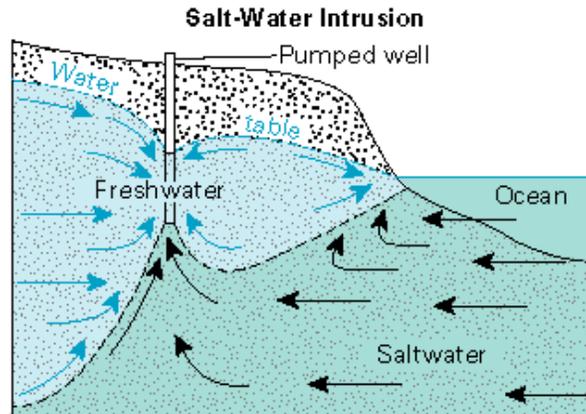


Figure 4. Freshwater/Salt Water interface in coastal area, pumping conditions.

Source: <http://pubs.usgs.gov/gip/gw/quality.html>

Because of this, conservation is a critical component in fighting salt-water intrusion in the public water systems along the coast. However, challenges to conservation include leaks; unattended, non-winterized homes where a leak would not be immediately noticed if a pipe burst; and excessive outdoor water use.

Lawn Care

Residential landscape care and maintenance often involve the use of fertilizers, herbicides, and pesticides. Most of these products are highly soluble in water and can be transported through groundwater to wells.

Onsite Wastewater Treatment Systems (OWTSs)

Because Charlestown does not have sewerage areas, all developed properties have OWTSs. The Town of Charlestown's Wastewater Management Commission was created in 1993. In 1994, the Wastewater Management Ordinance was enacted, creating a Wastewater Management District. The wastewater management program was first pumpout-based, but in 1998 a revision of the Wastewater Management Ordinance changed it to an inspection-based system.

In 1999, an Onsite Wastewater Management Plan was written in order to allow the town to qualify for the Community Septic System Loan Program (CSSLP), which provides low-interest loans to homeowners for septic system repair and replacement. Since 1999, \$983,294 has been loaned through the CSSLP program, out of \$1,220,044 requested (as of July 2010).

The Onsite Wastewater Management Plan had the following to say about the importance of properly managing OWTs:

“The impacts of septic system density and of older and failing septic systems on both surface and groundwater quality have been well documented. Fecal coliform when present in water is indicative of other health threatening pathogens. Levels in excess of 15 (most probable number) MPN/100ml are unsafe for shellfishing and levels greater than 50MPN/100ml are unsafe for bodily contact.

Excessive levels of nitrogen in drinking water are known to interfere with the normal functioning of hemoglobin in infants, causing blue baby syndrome. The EPA safe drinking water standard for nitrate in groundwater is 10 ppm. When levels in groundwater approach 5ppm, however, there are often associated spikes of 10 ppm. High nitrogen in groundwater may also indicate the presence of other contaminants.

Nitrogen is also a problem in the coastal ponds, where excessive levels cause eutrophication and stagnation. Symptoms of eutrophication include: reduced biodiversity, loss of eel grass habitat, a shift from filter-feeding to deposit feeding organisms, increase in low oxygen events resulting in the depletion of fish and shellfish, increase seaweed biomass and loss of aesthetic quality and recreational use.”

Another revision of the Wastewater Management Ordinance in May of 2004 initiated Charlestown’s Cesspool Phaseout program. It required the removal of all cesspools in town by May of 2009.

Through the EPA-funded Block Island/Green Hill Pond Project, Charlestown was able to hire a part-time (and later full-time) Onsite Wastewater Manager in the mid 2000’s. Around the same time, the town began tracking septic systems town-wide through the use of software by Carmony Systems, also called Rhode Island Wastewater Information Systems (RIWIS). This software allows service providers to log on and submit an entry when they have done maintenance on an OWTs.

Beginning on January 1, 2008, due to revisions of the RI DEM standards, any OWTs needing repair or replacement in the South Shore Salt Pond Critical Resource Area was required to be replaced with a denitrification system. (This denitrification requirement applied to new systems as well.) Before that date, denitrification systems had only been required within 200 feet of a coastal feature, or in areas that met the Coastal Resources Management Council’s density requirements.

The interaction of the town’s cesspool phaseout program and the new RI DEM denitrification requirements, if both had continued unchanged, would have caused many homeowners to need to quickly replace their cesspools with denitrification systems, which cost significantly more than traditional septic systems.

In March 2009, Charlestown revised its cesspool phaseout program to create a system of five zones. Beginning with the zone of the highest priority, one zone would be phased out per year for the following

five years. The deadline for the phaseout of cesspools in Zone 1 just passed in May 2010, and letters of violation were sent to those homeowners who had not yet replaced their cesspool.

Since 2008, the funds available through the CSSLP program have not been able to meet the demand. (The funds for 2010 have not yet been made available to the town due to complications arising from restrictions placed on federal funds.) This is mostly due to the increase in the number of systems which have been required to be denitrification systems instead of conventional septic systems.

Currently, septic systems in Charlestown must be inspected every three to five years, with pumpouts based on inspections (but no less frequently than every six years).

Appendix D is the current state of OWTs in Charlestown. The following key explains the meanings of the different color plots: red – cesspools, pink – privies, orange – sub-standard, dark green – Innovative/Alternative (including denitrification), medium green – septic tank, blue – unknown system type.

Management Plan

A source water protection workshop was held on April 27, 2010 at the Charlestown Town Hall. Participants included representatives of Community public water systems, Town Council and Planning Commission members, the town's Onsite Wastewater Manager, and representatives from EPA Region 1 and RI HEALTH. After being presented with a brief overview of source water protection in general and the specific concerns of Charlestown, attendees brainstormed possible approaches to reducing risk. This is included as Appendix E.

After further developing and prioritizing these ideas along with additional possibilities that emerged after the workshop, the following list of source water protection activities was developed.

Charlestown Planning Commission – Review of 21 Actions

As written in the Charlestown Wellhead and Groundwater Protection Plan:

“For Charlestown effective protection of drinking water must not be left just to the State and Federal governments. The greatest impact on groundwater quality comes from decisions by the Town Council, Planning Commission, and Zoning Board. There are many options available to control future land uses which may threaten groundwater quality and protect existing drinking water supplies.”

When the above-mentioned plan was published in 1997, it included a list of 21 recommended Protection Actions. These were “developed by various Town, State, and Federal Officials, Town Citizens, well owners, and coordinated by the Planning Commission.”

Much progress has been made on groundwater protection in the intervening years. A review of these 21 Protection Actions by the Planning Commission would allow the town to see whether there are still relevant recommendations which have not yet been implemented.

[During the preparation of this Source Water Protection Plan, the Planning Commission conducted this review. The results are attached as Appendix F.]

Charlestown Planning Commission – Update Groundwater Protection Overlay Zone Ordinance

The following changes or additions to the Charlestown Groundwater Protection District zoning overlay can be considered by the Planning Commission as they are updating the zoning ordinances. The steering committee would like to thank Lorraine Joubert of the University of Rhode Island's Non-Point Education for Municipal Officials (NEMO) program for her suggestions on this subject.

- Update the definition of hazardous material to include petroleum products. A possible change to the definition is shown in blue:
 - o Any material defined as a "hazardous substance" by § 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. 9605) as amended. Hazardous materials shall **also** include any hazardous waste, as well as any of the following materials: acetone, ethanol, ethylene oxide, methanol, methylene chloride, and perchloroethylene, **and petroleum products. The enumeration of the above materials is not intended in any way to minimize the list of materials defined in the aforesaid section.**
- Prohibit the use of "clean fill," which may include asphalt and other building wastes.
- Establish setbacks to private wells from OWTs. This would allow the town to review new construction or OWT alterations where a DEM variance from 100 ft was requested. It would also apply to existing homes on substandard lots where setbacks are less than 100 ft so that any OWT repair or alteration would come under town review.
- Review the list of prohibited uses to ensure they are current. (RI HEALTH regulations for public water supplies has list of high risk uses for comparison.)
- Consider a requirement for hydrologic/nutrient loading analysis from major land development projects and commercial/industrial development, with the goal of maintaining pre-development groundwater recharge and stormwater runoff volumes. This would help to prevent increases in pollutant loading, maintain dilution of wastewater effluent discharged to groundwater, and protect natural treatment processes such as microbial denitrification in hydric soils. Consider setting maximum nitrogen standard for groundwater recharge areas and coastal areas.
- For OWTs discharging high-flow or high-strength waste, require the applicant to demonstrate that the selected technology can adequately treat the wastewater. Require an operation and maintenance plan and a detailed plan for monitoring wastewater effluent, describing what parameters will be monitored, sampling locations, and frequency. Data should be reported to

town using RIWIS, with narrative by system owner describing compliance with performance standards and how the results are being used to improve operation and maintenance. Consider issuing an operating permit with a fee to cover the cost of oversight by town staff or consultant, with annual renewal based on compliance review.

- Establish maximum density for development projects and prohibit density bonuses. (This is currently required in the North Kingstown groundwater overlay zone.)
- Require the use of a properly designed, installed, and monitored public well(s) where more than twenty-five people are served and property is under common ownership.
- Set limits for impervious cover, either as a separate standard or by updating lot building coverage to include impervious surfaces. This would help to maintain recharge volume and dilution, and prevent stormwater pollution. Exclude wetlands, hydric soils and other unsuitable areas from the calculation of percent impervious cover.
- Establish standards to limit site disturbance with new construction. Limit lawn size based on total area or percentage of lot.
- Create a process for review and approval of activities in the protection zone.

Charlestown GIS Office/Planning Commission – Review Shape of Groundwater Protection Overlay Zone

The overlay zone is meant to cover all WHPAs and areas of GAA groundwater. However, the area covered by the WHPAs occasionally changes, as public wells are added or deleted, pumping rates change, and new hydrogeological studies are completed. The GIS Specialist, working with the Planning Commission, can review the area covered by the zone to see if it is still adequate.

Currently, Charlestown does not have a regular trigger for reviewing the shape of its Groundwater Protection Overlay District to ensure that it still covers all WHPAs and GAA areas. An automatic review could be tied, for example, to the publication by RI DEM of an updated WHPA map such as that shown in Appendix A.

Town of Charlestown – Include the Onsite Wastewater Manager Position in the Town Charter

The Onsite Wastewater Management Program, including the position of Onsite Wastewater Manager, exists due to an ordinance. Because ordinances can be changed or removed, this means that the program could also be ended.

Figure 5 shows the progress that has been made since the beginning of 2008 due to the close collaboration of the Wastewater Management Commission, the Onsite Wastewater Manager, and the GIS Specialist. The number of systems of unknown type has decreased by 95%, the number of known cesspools has decreased by 47%, and the number of potential cesspools (unknown systems + known

cesspools) has decreased by 79%. In the same period, the number of I/A systems has increased by 42%, highlighting the need for continued oversight.

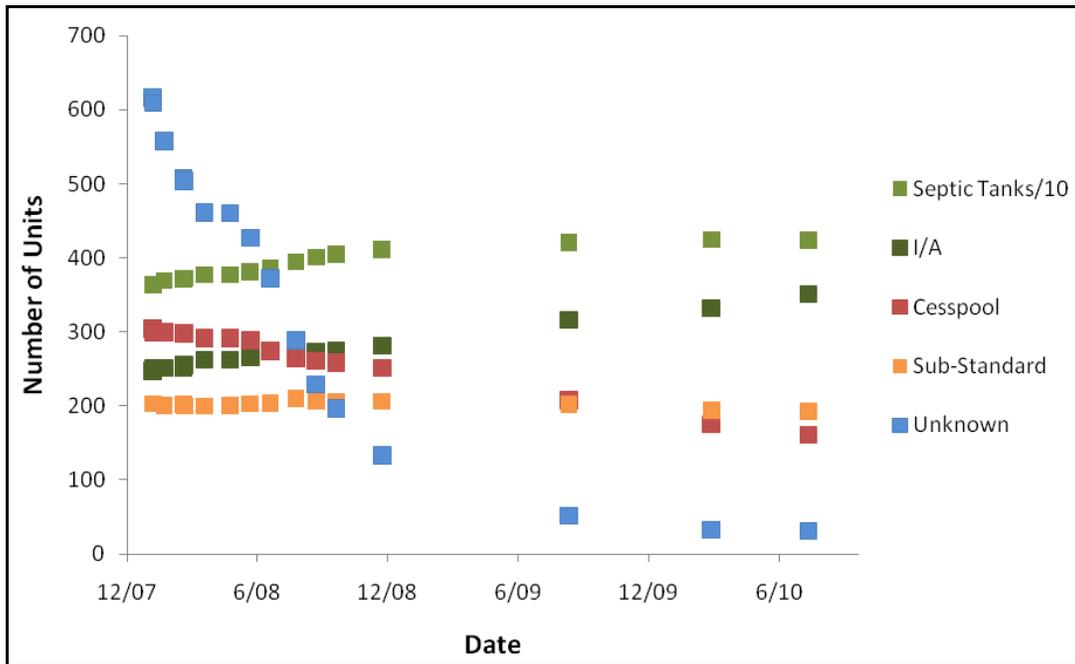


Figure 5. The changes in OWTS system type over the past 2.5 years, as tracked by RIWIS. The number of conventional septic tanks, which has changed from 3629 to 4242 over this period, was divided by 10 so that it could be shown on the same graph as the other types of systems.

Putting the Onsite Wastewater Manager position into the town charter would ensure that this work is able to continue.

Charlestown Wastewater Management Office – Track Maintenance Contracts for Innovative/Alternative (I/A) Septic Systems within RIWIS

The Onsite Wastewater Manager is interested in more closely tracking the maintenance contracts of I/A septic systems. This will ensure that homeowners comply with state requirements to maintain a current contract, and will allow the Office to remind those no longer in compliance to renew their contracts.

Most maintenance contracts received by the Charlestown Wastewater Management Office exist in paper format only, and are not entered into the record of the corresponding property on RIWIS. Even in paper form, the Wastewater Management Office currently has fewer than 100 contracts on file for the over 300 Innovative/Alternative systems in Charlestown. Two reasons for this are inconsistent reporting of initial contracts, and the fact that the town is only copied on initial contracts, not on renewals.

A three step process can be followed to update the database:

- 1) The information from all existing I/A maintenance contracts can be entered into RIWIS. [This was completed during the preparation of this plan.]
- 2) Service providers can be notified that:
 - a. The Wastewater Management Office should be copied on all new or renewed contracts.
 - b. The Wastewater Management Office should be notified of any contract cancellations.
 - c. As part of a one-time push to update records, copies of all current, active contracts should be sent to the Wastewater Management Office.
- 3) After receiving this information from registered service providers in Charlestown, the Wastewater Management Office can notify all homeowners with Innovative/Alternative systems for whom no service contract is on file.

Public Water System Owners – Consolidate Non-Community Systems along Routes 1 and 1A

Currently, a large number of Non-Community public water systems exist along Routes 1 and 1A, the area of town which has many businesses. The RI HEALTH Office of Drinking Water Quality is interested in seeing these systems consolidate into fewer systems which serve several businesses at a time.

A commercial water and fire district would benefit those involved by eliminating costs for individual source testing, sharing the costs of water system engineering design and infrastructure improvements, and producing a likely reduction in commercial fire insurance rates. Residential properties and commercial properties in the water and fire district whose sources of water did not meet the definition of public water supply could be added as paying customers to the water system. A water and fire district would assure that private well owners had an alternate source of drinking water with adequate water quality to meet new requirements for purchase and sale agreements.

RI HEALTH-DWQ envisions a water system with several existing, approved public water sources available for backup supplies (because redundancy is a highly desired quality in a water system), and professional management of a modernized infrastructure. This would assure a more uniform compliance record for many businesses who are currently struggling to meet the increasingly stringent requirements for public water supplies.

The Town of Charlestown would not have to take ownership of the commercial water and fire district. It could be owned and operated by an association of businesses governed by their own by-laws.

Charlestown GIS Office – Expand Water Quality Data Collection to Detect Trouble Spots Early

The Charlestown Wellhead and Groundwater Protection Plan states:

“Water quality monitoring is another method of a non regulatory approach to groundwater protection. Water quality monitoring can be used to detect early warning signs and over the long term can be used as a measure of successfulness of a groundwater protection program... A groundwater monitoring program around community wells near high-risk sources of contamination shared by individual well owners could detect potential pollutants before they infiltrate the well.”

Charlestown’s GIS Specialist has created a geo-referenced database of water quality results from private well tests. One its purposes is to detect nitrate hotspots and see if these correspond with the locations of cesspools. The more data that can be collected, the clearer a picture can be developed of the true state of Charlestown’s waters.

The water quality results can be expanded in the following ways:

- Include surface water quality data from URI’s watershed watch, which has been tracking water quality since 1993. [These records were obtained during the course of the preparation of this report.]
- Develop ways to more systematically collect private well water quality results and encourage additional testing.
- Add the RI HEALTH water quality results from public drinking water systems.

Charlestown Source Water Steering Committee – Conduct an Educational Campaign

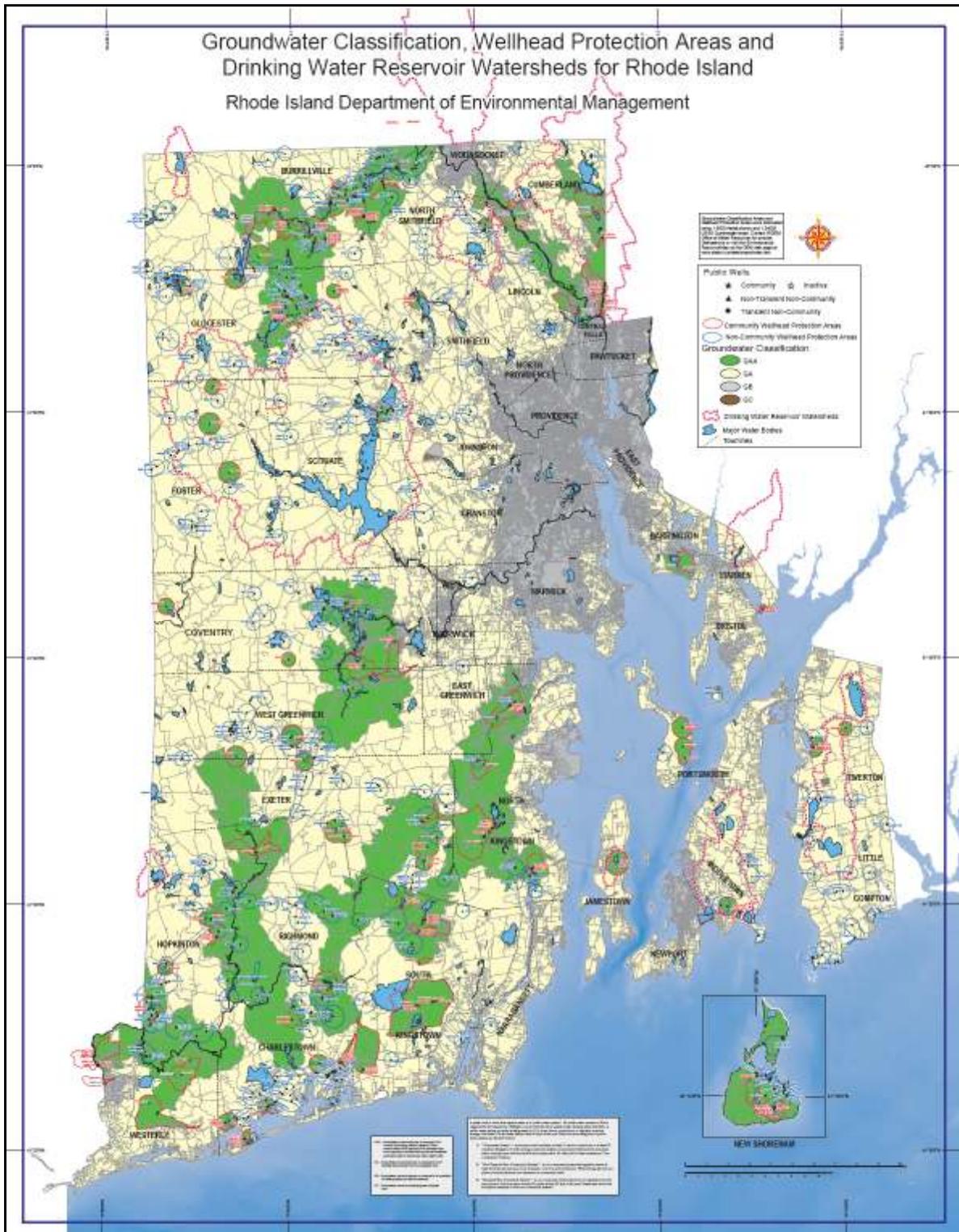
An educational campaign including all of the threats to water quality detailed in this plan can be conducted for Charlestown residents. As a participant of the Source Water Workshop suggested, an efficient way to conduct an educational campaign, particularly relating to public water systems, would be to work with the homeowner associations in town.

Appendix G is a brochure prepared by the Massachusetts Department of Environmental Protection about precautions that should be taken with home heating oil tanks.

Contingency Plan

All Community systems in Charlestown have been provided with contingency plan templates by Atlantic States Rural Water and Wastewater Association, and assistance has been offered should these systems be interested in developing plans.

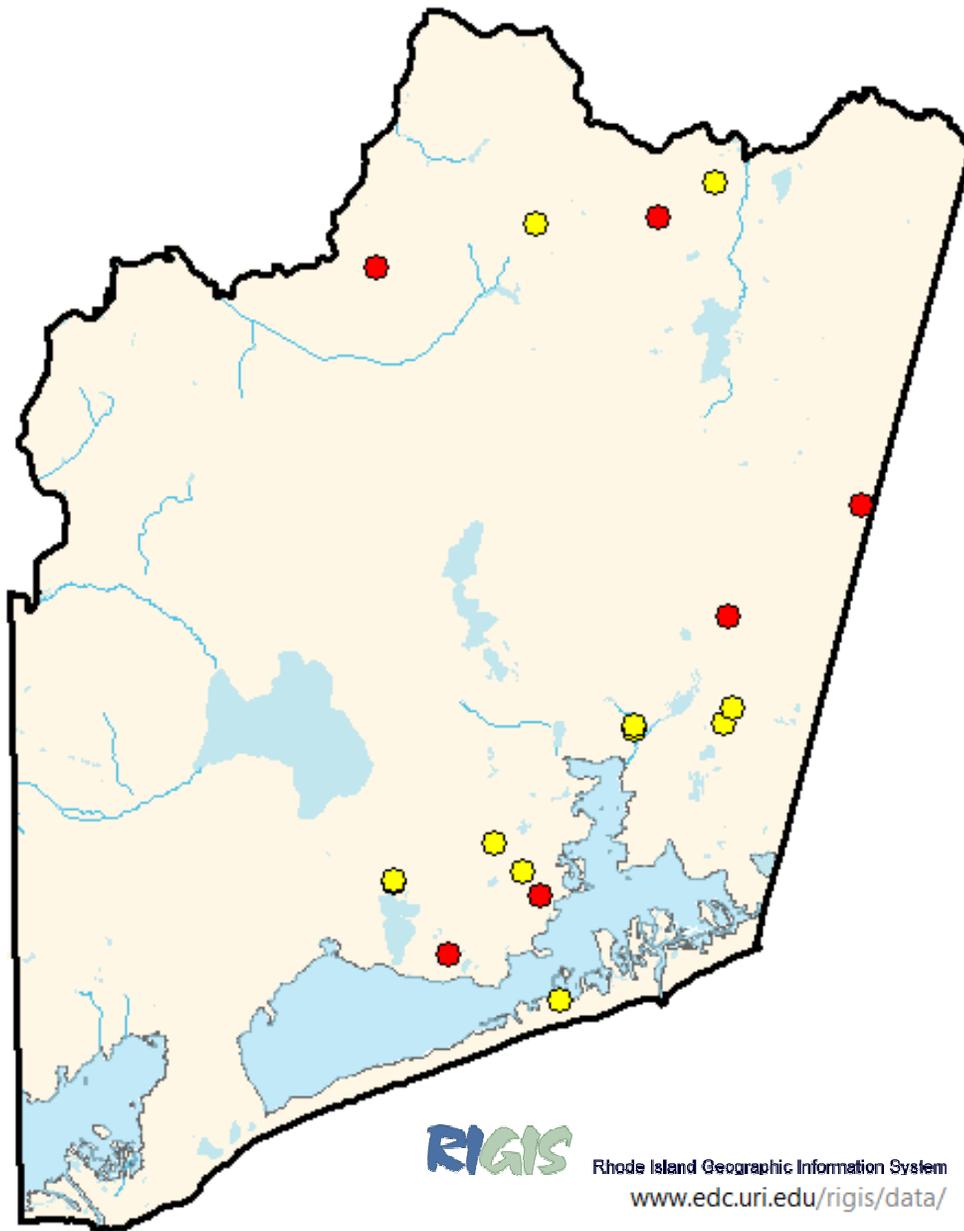
Appendix A: RI DEM Wellhead Protection Areas



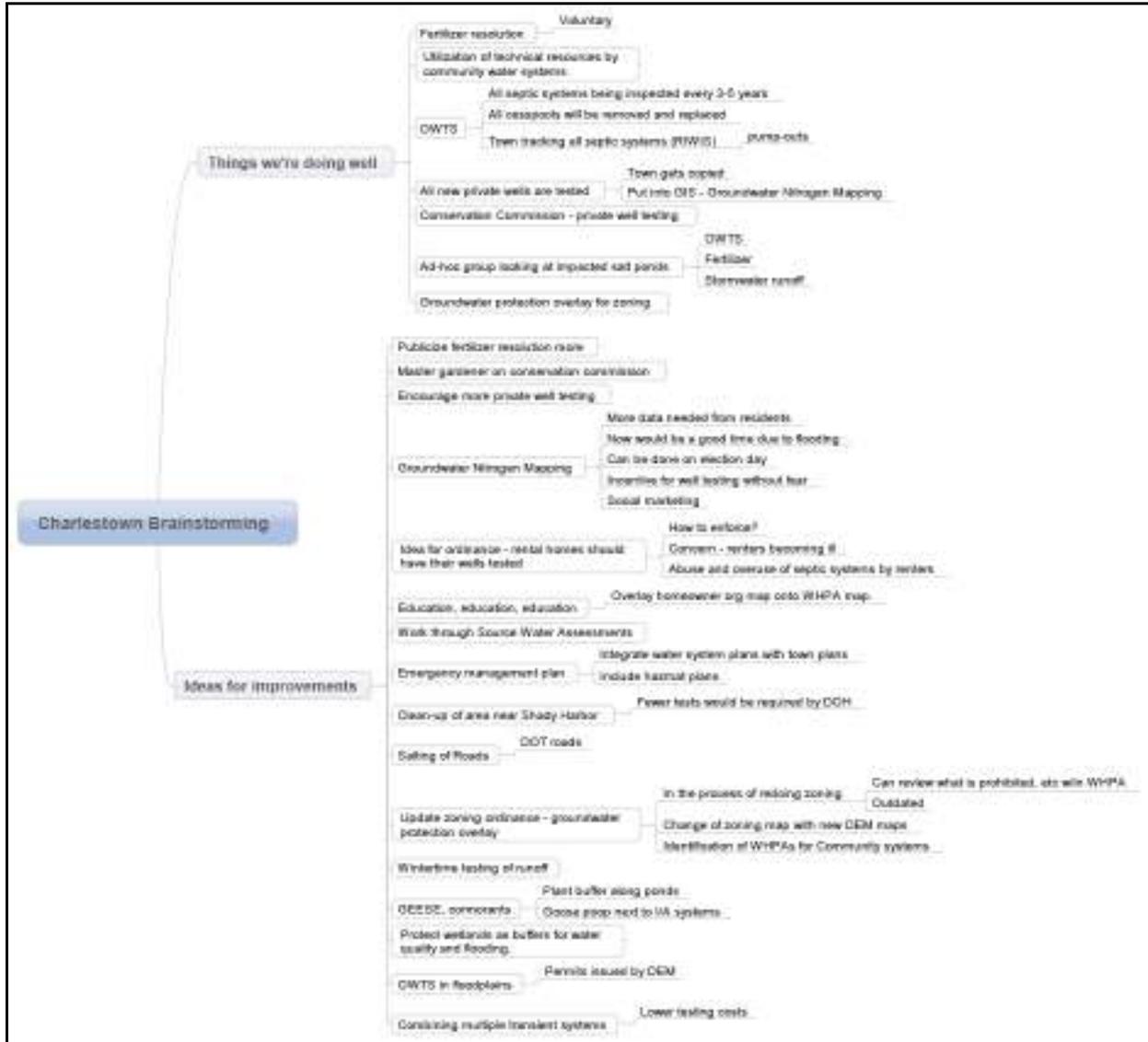
Appendix B: Transportation Routes in Charlestown



Appendix C: CERCLIS (red) and LUST (yellow) sites in Charlestown



Appendix E: Source Water Workshop – Brainstorming Session



Appendix F: Recommendations from “Charlestown Wellhead and Groundwater Protection Plan (1997)”

Protection Action #1: Amend the Zoning Ordinance and Map to protect groundwater in aquifer recharge areas and WHPA’s by creating a Groundwater Protection Overlay District. Blend with existing WHPA inventory by using GIS software. Use in conjunction with Protection Actions #2 to #6.

Update: A Groundwater Protection Overlay District is now on the Zoning Map and in the Zoning Ordinance: **§218-46 Groundwater Protection District**. The purposes of the Groundwater Protection (GWP) District are to protect, preserve, and maintain the quality and supply of the groundwater resources upon which the town depends for its present and future water supply.

Protection Action #2: Amend the Zoning Ordinance to protect groundwater and all parts of Town by reviewing the Prohibited Use Section. Identify those uses which are known to impact groundwater and prohibit high threats within WHPAs and recharge areas. Use in conjunction with Protection Actions #1 to #6.

Update: The groundwater protection section in the zoning ordinance contains a list of uses which are prohibited in the groundwater protection overlay district. These are found in **§218-46 C. Prohibited Uses**.

Protection Action #3: Amend the Zoning Ordinance to protect groundwater in all parts of Town by reviewing the Use Table. Identify those uses that are considered medium risks and specify specific site conditions which must be met through the Special Use Permit Process throughout Town. Use in conjunction with Protection Actions #1 to #6.

Update: This is done, but the use tables are not complete. When the Traditional Village District was added, the uses were not specified. This needs to be corrected. The Uses could also be updated.

Protection Action #4: Amend the Zoning Ordinance and the Subdivision Regulations to reinforce the use of Cluster Residential Subdivisions to protect groundwater and WHPAS’s. Review the existing cluster requirements and add considerations for WHPA’s and groundwater recharge area within the required open space. Use in conjunction with Protection Actions #1 to #5 and #8 to #11.

Update: Cluster is now mandatory, but groundwater recharge area is not currently required to be protected by placing it in the areas designated for open space. This could be addressed in the current re-write of the subdivision regulations.

Protection Action #5: Amend the Zoning Ordinance and the Subdivision Regulations to require performance standards to protect groundwater townwide. Consider incorporating a Nitrate Loading model into the Subdivision Regulations. Use in conjunction with Protections Actions #1 to #5 and #8 to #11.

Update: This has not been done, but it is being worked on with Horsley Witten. The ordinance needs to have more scientific language and a basis in scientific studies.

Protection Action #6: Amend the Zoning Ordinance to add specific design and operating standards for nonresidential uses that must be met prior to site plan approval. Add language within the Site Plan Review Section to require an applicant to identify all hazardous materials planned to be used and a materials management and storage plan. Use in conjunction with Protection Actions #1 to #5, #14 and #15.

Update: This has been done.

Protection Action #7: Consider the adoption of growth management methods to control the rate, amount, location, timing, and type of development in order to protect groundwater and WHPA's townwide. Various methods could be studied for incorporation into a stand-alone growth management ordinance. Update build-out analysis in Comprehensive Plan and use GIS to map developed and undeveloped lands within WHPAs.

Update: Growth management has been adopted, but it is based on school capacity, not groundwater protection. The cap is never reached. The Planning Commission is interested in adding groundwater to growth management.

Protection Action #8: Amend the Subdivision Regulations to add specific design and construction standards for groundwater protection in new subdivisions. Consider standards for the placement of catch basins with WHPA's and near residential wells as well as stormwater drainage standards for water quality protection. Use in conjunction with Protection Actions #9 to #11.

Update: This has not been done, but is being worked on as part of the Subdivision Regulation re-write which will include Low Impact Development (LID).

Protection Action #9: Amend the Zoning Ordinance and the Subdivision Regulations to include BMPs to protect groundwater and WHPAs. Include review of groundwater protection and BMP's within site plan and subdivision review checklists. Use in conjunction with Protection Actions #1 to #6 and #8 to #11.

Update: This has not been done, but is being worked on as part of the Subdivision Regulation re-write which will include Low Impact Development (LID).

Protection Action #10: Amend the Subdivision Regulations to require environmental impact assessments for development proposed in WHPAs and groundwater recharge areas. Consider where hydrogeological studies may be useful for high water withdrawal uses. Use in conjunction with Protection Actions #8 to #11.

Update: This has been done. (Different thresholds in the subdivision regulations trigger an environmental impact assessment.)

Protection Action #11: Amend the Subdivision Regulations to direct the inclusion of WHPA in required land for open space or recreation uses. Use in conjunction with Protection Actions #8 to #10.

Update: This has not been done.

Protection Action #12: Research and consider an ordinance to register existing residential USTs of substantial USTs in WHPAs. Prohibit the installation of new residential USTs and require replacement. Inventory the number existing and create database to track age and condition. Provide education on maintaining an existing UST.

Update: The ordinance to register existing residential USTs has not been done, but no new USTs are allowed in new subdivisions, new commercial development, or in any other development.

Protection Action #13: Research and consider an ordinance to establish minimum setback distances from wetlands for all types of development, including septic systems.

Update: The town has established a minimum setback distance from wetlands for leach fields. Other types of development (e.g. buildings) are covered by state laws.

Protection Action #14: Research and consider an ordinance to control the storage and use of toxic and hazardous materials within WHPA's and aquifer protection areas and require the registration of any facility using such. Use in conjunction with Protection Action #15.

Update: This has not been done, but the Planning Commission is interested in looking at it.

Protection Action #15: Provide education on the proper use, storage, and disposal of household hazardous materials. Disperse information on DEM's "Eco-Depot" and coordinate local collection days with DEM.

Update: The town's Department of Public Works does Eco-Depot. However, the educational component of this protection action is not being done. A relevant brochure would be helpful.

Protection Action #16: Continue existing programs for public education and develop new methods of outreach on the use of pesticides and fertilizers, recycling waste motor oil, and water conservation.

Update: This has not been done. The Town Planner is interested in including educational brochures, Powerpoint presentations, etc. on the town website, on the conservation commission or planning page.

Protection Action #17: Develop a reduced road salt program for use on local and state roads within WHPAs. Place roadside informational signs identifying WHPA areas on State and local roads and low salt usage.

Update: This has not been done.

Protection Action #18: Develop a non-regulatory water quality monitoring program for wells within WHPAs near high risk sources that utilizes the existing volunteer monitoring program.

Update: This has been not done.

Protection Action #19: Continue to fund and provide support to the work program of the Wastewater Management Commission. Continue to utilize existing Town staff to provide technical and clerical support to the Commission.

Update: This has been done.

Protection Action #20: Continue to work with RI DEM on further refinement of Castlerock WHPA and others.

Update: WHPAs have been updated by RI DEM on a regular basis.

Protection Action #21: Support local environmental groups and coordinate with adjacent Towns, DEM, the Narragansett Indian Tribe, and EPA on regional groundwater and WHPA issues that cross Town boundaries.

Update: This has not been done.

Appendix G: Home Heating Oil Fact Sheet – MA DEP



Massachusetts
Department
of
ENVIRONMENTAL
PROTECTION

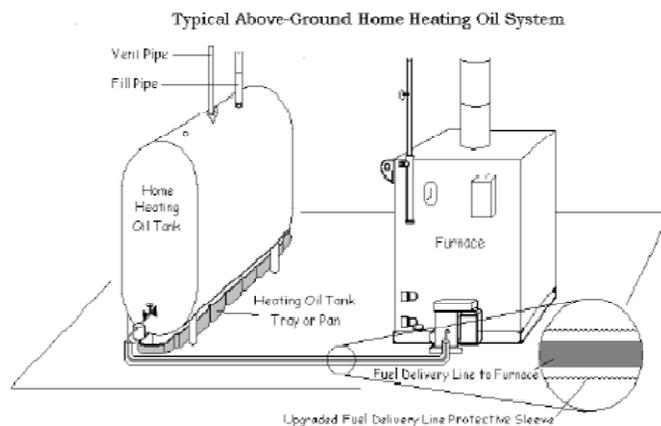
fact sheet

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.



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.