



# Charlestown Elementary School Wellhead Protection Area Source Water Assessment Update



*This assessment was prepared by URI Cooperative Extension NEMO Program in collaboration with the RI Department of Health with funding from the Centers for Disease Control and Prevention.*

# SUMMARY



This Source Water Assessment focuses on the wellhead protection area for the Charlestown Elementary School Public Water System. This public water system consists of two drilled wells, one of which is offline, two treatment plants, and two hydro-pneumatic storage tanks. It has one service connection and services a population of approximately 350. The wellhead protection area is 390 acres and located in Charlestown, RI.

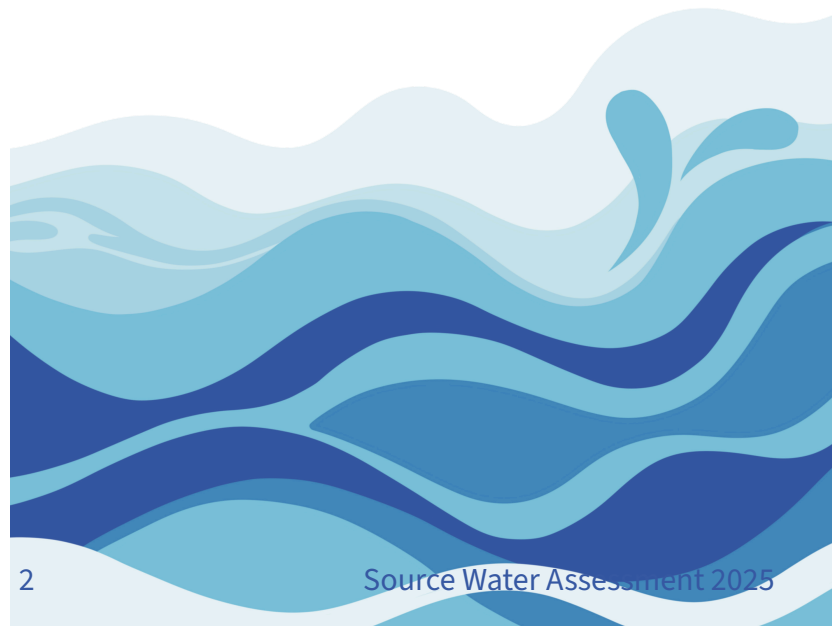
This assessment was originally completed in 2003 for the Charlestown Elementary School and updated in 2025 to identify current pollution risks and provide information for local land use planning and protection of the water supplies.

This 2025 update to previous methodology utilizes the 2020 land use mapping provided by Rhode Island Geographic Information System (RIGIS), water quality monitoring data from 2021 – 2025, the Sanitary Survey completed by the Rhode Island Department of Health in 2024, and the online Environmental Resource Map managed by the Rhode Island Department of Environmental Management.

The land uses for the wellhead protection area are summarized in both a map in the report and in a table in the appendix. Results of the pollution risk assessment are summarized in the Wellhead Protection Area Risk Spreadsheet in the report. Overall, the wellhead protection area was given a score of 35 on a scale of 0 to 100 or greater, indicating that the Charlestown Elementary School is at medium risk.

Please note: the results of any current assessment cannot be compared directly to previous assessments given changes in wellhead delineations over the years, changes in methods for assessing RIGIS land uses, and/or new contaminants now included in the current analysis such as PFAS.

For further information, please contact Gregory Zenion of Chariho Regional School District at 401-364-3260 / [gregory.zenion@chariho.k12.ri.us](mailto:gregory.zenion@chariho.k12.ri.us).



# REPORT CONTENTS



Throughout the report, there are visual summaries of the assessment process, highlights of the results, and practical steps for consumers. They could be used as potential outreach for water consumers by including in the Consumer Confidence Report and placing in common areas.

This report is organized into the following sections:

- **Understanding the Assessment**

This section explains why the assessment was completed, what was evaluated, and how the assessment should be used.

- **Summary Graphic: What is a Source Water Assessment?**

- **Explanation & Determination of Pollution Risk Factors**

This section explains details of the analyses performed in the assessment.

- **Charlestown Elementary School Wellhead Protection Area Risk Spreadsheet**

This section provides the table summarizing the results of all aspects of the assessment. It is the more complete version of the summary graphic that was presented earlier in the Report.

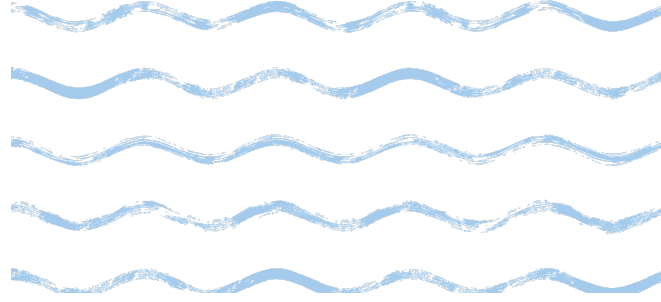
- **Summary Graphic: Charlestown Elementary School Source Water Assessment Risk Rating Results**

- **Summary Graphic: Protect Your Water and Your Health**

- **Appendix: Documentation**

This section provides a summary of the data used in the analyses by risk indicator. It also provides additional information about any contaminants detected in the water.

# UNDERSTANDING THE ASSESSMENT



## **WHY WAS THE ASSESSMENT DONE?**

The Safe Drinking Water Act (SDWA) Amendments of 1996 required states to develop and implement source water assessment programs (SWAPs) to analyze existing and potential threats to the quality of the public drinking water throughout the state. Using these programs, most states have completed source water assessments for every public water system -- from major metropolitan areas to the smallest towns. Even schools, restaurants, and other public facilities that have wells or surface water supplies have been assessed. A source water assessment is a study and report, unique to a water system, that provides basic information about the water used to provide drinking water. States are working with local communities and public water systems to identify protection measures to address potential threats to sources of drinking water. In Rhode Island, the Department of Health's Center for Drinking Water Quality administers the Source Water Assessment Program.

## **WHAT AREA WAS EVALUATED FOR THIS ASSESSMENT?**

The source water protection area, the area evaluated for this assessment, is the critical area surrounding a public water supply well or an intake on a surface source. For a public water supply well, this is the wellhead protection area (WHPA). The WHPA is the estimated area from which groundwater and surface water will flow from under severe pumping conditions. This can also be stated as the maximum estimated area that water withdrawn from the well will ever be drawn from. For most bedrock wells, this area is a volume dependent circle. For wells in sand and gravel this area is generally not a circle, but an irregular shape determined by sedimentary deposits and pumping rate. The source protection area for surface water sources is generally the watershed of the surface waterbody.

## **WILL THE POTENTIAL CONTAMINATION SOURCES IDENTIFIED IN THE SANITARY SURVEY CONTAMINATE MY SOURCE?**

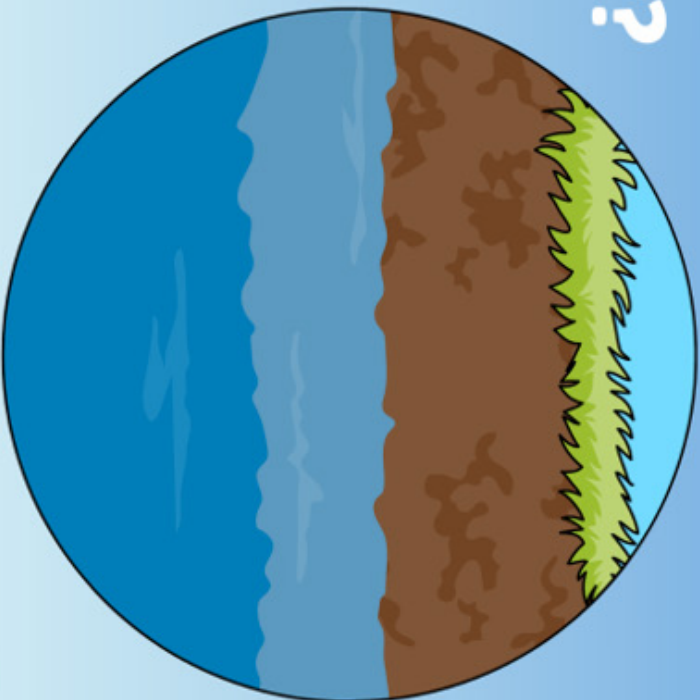
Potential contamination sources identified in sanitary surveys are facilities that typically use, produce, handle or store contaminants of concern, which, if improperly managed, could find their way to a source of public drinking water. It is important to understand that a release may never occur from a potential contamination source, provided it is using good management practices. Many potential contamination sources are regulated at the federal level, the state level, or both, to reduce the risk of a release. There are several methods that water systems can use to manage potential contamination sources. These often involve educational visits and inspections of stored materials.

## **HOW SHOULD THIS ASSESSMENT BE USED?**

This assessment should be used to plan for improved protection of public drinking water sources. Additional information may also be useful such as identification of the 100-year flood plain, tax map information, soils information or high-density development areas. This assessment is a good starting place for planning protection programs. Communities should act now to protect valuable water supply resources; once contamination occurs clean-up is costly and sometimes technically infeasible. Additionally, unprotected watersheds and wellheads can lead to deterioration of water quality that may eventually lead to higher treatment costs.

# What is a Source Water Assessment?

Source waters (including rivers, lakes, streams, and reservoirs) provide water for drinking. Protecting these waters reduces the risk that people will drink contaminated water and also can help ensure the quantity of water supplies.



Assessments were completed by the University of RI Cooperative Extension in collaboration with RI Department of Health and funded by the Centers for Disease Control and Prevention.

**The Safe Drinking Water Act** required states to develop Source Water Assessment Programs. These focus on wellhead protection areas: the land surrounding a well that supplies a public water system. Rhode Island's assessments focus on three major risks:

## 1. Land Uses

What percentage of the wellhead protection area has high-intensity uses such as commercial, industrial, or cropland?



## 2. Pollution Sources

Are there stormwater outfalls, landfills, underground storage tanks, or other sources of pollution within the wellhead protection area?



## 3. Water Quality Testing

Did regular monitoring data show levels of contaminants that would be concerning for human health?



# EXPLANATION AND DETERMINATION OF POLLUTION RISK FACTORS

## Overview

This Source Water Assessment was completed using the *Guide to Updating Source Water Assessments and Protection Plans, Version 3 - 2010 (Guide)*. All risk indicator ratings were obtained from the Guide. A summary of methods as well as calculated risks is presented here.

### Risk Indicator Category 1: High Intensity Land Use

High intensity land use was determined using Rhode Island GIS (RIGIS) land use data (2020 data). Land uses within the WHPA were calculated using ArcGIS Pro 3.5.0 (ESRI). The percentage of high intensity land use in the WHPA under study is then compared to the rating scale for risk indicator 1, High Intensity Land Use.

Risk Indicator	Rating			
	Low (0)	Medium (5)	High (10)	Extreme (25)
1. High Intensity Land Use	<10%	10-24%	25-50%	>50%

### Risk Indicator Category 2: Pollution Sources Within Inner Protective Radius and Per Acre Throughout WHPA

Information on the presence or absence of pollution sources within the inner protective radius of the wells and WHPAs under study were determined using the Rhode Island DEM Environmental Resource Map

Additionally, Sanitary Surveys were obtained through the Rhode Island Department of Health (RIDOH).

The number of pollution sources in the 400' Inner Protective Radius of each well and WHPA Outside of the IPR were compared to the rating scale and ranked for Risk Indicator 2- Pollution Sources Within Inner Protective Radius and Risk Indicator 3 -Per Acre Throughout the WHPA, respectively.

Risk Indicator	Rating			
	Low (0)	Medium (5)	High (10)	Extreme (25)
1. Pollution sources within inner protective radius (400 ft of 200 ft of well)	0	1	2-3	>3
2. Pollution source per acre throughout WHPA, excluding inner protective radius (multiply by 10)	<0.1	0.1-0.5	0.5-1	>1

## Risk Indicator Category 3: Water Quality Testing for Contaminants, Bacteria, and Nitrate-Nitrogen

Laboratory results for samples collected from the wells during regular, required monitoring were obtained from Rhode Island Department of Health (RIDOH) and used to determine risk factors 4, 5 and 6. Only the well with the highest risk rating score within each WHPA is used to report these risk factors.

### Risk Factor - History of contaminant detections within the last five years

This was determined by reviewing all contaminant detections in the laboratory records (excluding bacteria, nitrogen). A risk rating for each contaminant above the detection limit was then assigned based on the Maximum Contaminant Level (MCL). The MCL is based on either Rhode Island or EPA drinking water standards and advisory levels. The highest risk rating observed was used to set the total risk rating for the WHPA.

### Risk Factor - Source water bacteria detections within the last five years

This was determined by viewing all available bacteria data in the laboratory record for all the wells in the WHPA. The number of bacteria sample detections were used to determine the risk rating.

### Risk Factor - Maximum nitrate-nitrogen (N03-N) concentration in the last five years

This was determined by viewing all detections of nitrate-nitrogen in the laboratory record for all the wells in the WHPA.

Risk Indicator	Rating			
	Low (0)	Medium (5)	High (10)	Extreme (25)
4. History of contaminant detections within the last five years	Trace (maximum value is less than 10% of MCL)	Less than 1/2 MCL	Greater than 1/2 MCL	Greater than MCL (violation)
5. Source water bacteria detections within the last 5 years	Less than 5% of samples have detected total coliform in last 5 years	Greater than 5% of samples have detected total coliform	One or more Fecal coliform sample exhibits a detection	One or more Fecal coliform samples is above water quality standards
6. Maximum nitrate-nitrogen (N03-N) concentration in the last 5 years	<0.5 mg/L N03-N	0.5-2 mg/L N03-N	2-5 mg/L N03-N	>5 mg/L N03-N

# CHARLESTOWN ELEMENTARY SCHOOL WELLHEAD PROTECTION AREA ASSESSMENT RESULTS

The table on the next page summarizes the results of the analyses. Note that the colors of the rows in the table correspond to the colors used for the risk indicator categories explained in the previous section.

*Additional information about the wellhead protection area data shown in that table (such as the specific high-intensity land uses noted, the types of pollution sources throughout the wellhead protection area, and the actual water quality monitoring data) can be found in the Appendix.*

## Wellhead Protection Area Risk Spreadsheet

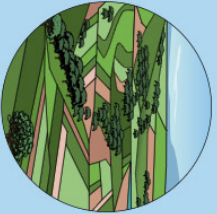
The risk rating table used in this assessment is a screening level tool. Its purpose is to provide a methodology for evaluating risks to the waters people use for drinking and to provide consistency in that analysis across water systems.

Wellhead Protection Area Risk Indicators	Rating Categories				WHPA Data	
	Low (0)	Medium (5)	High (10)	Extreme (25)	Results	Rating
Wellhead Protection Area Land Use						
1. High Intensity Land Use (GIS)	<10%	10%-24%	25%-40%	>40%	10.47%	5
Existing or Potential Pollution Sources						
2. Pollution sources within inner protective radius (400 ft of 200 t of well)	0	1	2-3	>3	1	5
3. Pollution source per acre throughout WHPA, excluding inner protective radius (multiply by 10)	<0.1	0.1-0.5	0.5-1	>1	0.66	10
Water Quality Testing						
4. History of contaminant detections within the last five years	Trace (maximum value is less than 10% of MCL)	Less than 1/2 MCL	Greater than 1/2 MCL	Greater than MCL (violation)	>1/2 MCL	10
5. Source water bacteria detections within the last 5 years	Less than 5% of samples have detected total coliform in last 5 years	Greater than 5% of samples have detected total coliform	One or more Fecal coliform sample exhibits a detection	One or more Fecal coliform samples is above water quality standards	None	0
6. Maximum nitrate-nitrogen (NO3-N) concentration in the last 5 years	<0.5 mg/L NO3-N	0.5-2 mg/L NO3-N	2-5 mg/L NO3-N	>5 mg/L NO3-N	0.88 mg/L	5
<b>Overall Rating: Sum of All Risk Rankings</b>	<b>0-19</b>	<b>20-59</b>	<b>60-100</b>	<b>&gt;100</b>	<b>Medium</b>	<b>35</b>

\*Note that July 2022 Rhode Island adopted H7233 authorizing RIDOH to establish MCLs for PFAS in drinking water and to set interim standards. The interim drinking water standard level of twenty parts per trillion (20 ppt) has been established and is used in this analysis. On or before July 1, 2023, all public water systems in the state (except transient, non-community) shall conduct monitoring for PFAS.

# Charlestown Elementary School Source Water Assessment Risk Rating Results

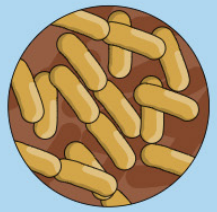
**Overall Risk**  
The overall risk ranking is **MEDIUM**. Water could become contaminated. Protection efforts are important to safeguard water quality.



Land Uses



Pollution Sources



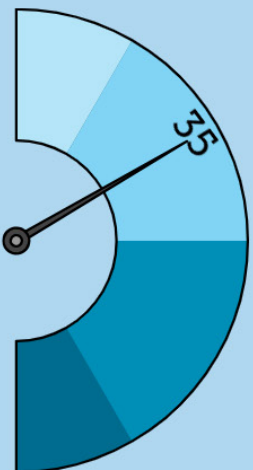
Water Quality Testing

Risk Rating	Land Uses	Pollution Sources	Water Quality Testing
Low			
Medium	5		
High		15	15
Extreme			

Assessments were completed by the University of RI Cooperative Extension in collaboration with RI Department of Health and funded by the Centers for Disease Control and Prevention.

## Info

The risk rating table used in this assessment is a screening level tool. Its purpose is to provide a methodology for evaluating risks to the waters people use for drinking and to provide consistency in that analysis across water systems. The full assessment can be found online at: [web.uri.edu/NEMO/](http://web.uri.edu/NEMO/)



Routine water quality testing revealed medium levels of PFAS and lead. For a list of ways you can protect your water and your health, please visit: [web.uri.edu/NEMO](http://web.uri.edu/NEMO)

# Protect Your Water and Your Health

## If Your Water Has: You Can:

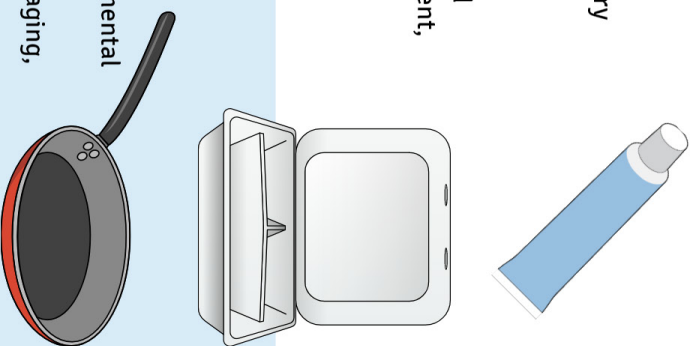
### PFAS

#### Understand more about these chemicals to help you protect your health:

- PFAS are a group of manufactured chemicals that have been used in industry and consumer products since the 1940s.
- A significant concern is that they break down very slowly, so they can accumulate in people and the environment over time.
- Human studies have found associations between some PFAS chemicals and effects on the immune system, the cardiovascular system, human development, and cancer.

#### Limit exposure through drinking water and other sources:

- Ask your water system to describe actions taken to limit PFAS.
- Install water filtration designed to limit PFAS.
- Avoid eating fish from contaminated waterways. RIDOH, Office of Environmental Health Risk can guide you.
- Learn more about consumer products that contain PFAS, such as food packaging, cosmetics, non-stick cookware, and stain-resistant fabrics.
- Visit: [atsdr.cdc.gov/pfas](https://atsdr.cdc.gov/pfas) for more information.



These tips are offered as part of Rhode Island's Source Water Assessment Program. For additional tips about protecting your water and your health, please visit: [web.uri/nemo](http://web.uri/nemo)

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# CHARLESTOWN ELEMENTARY SCHOOL WELLHEAD PROTECTION AREA SOURCE WATER ASSESSMENT UPDATE

## Appendix: Documentation



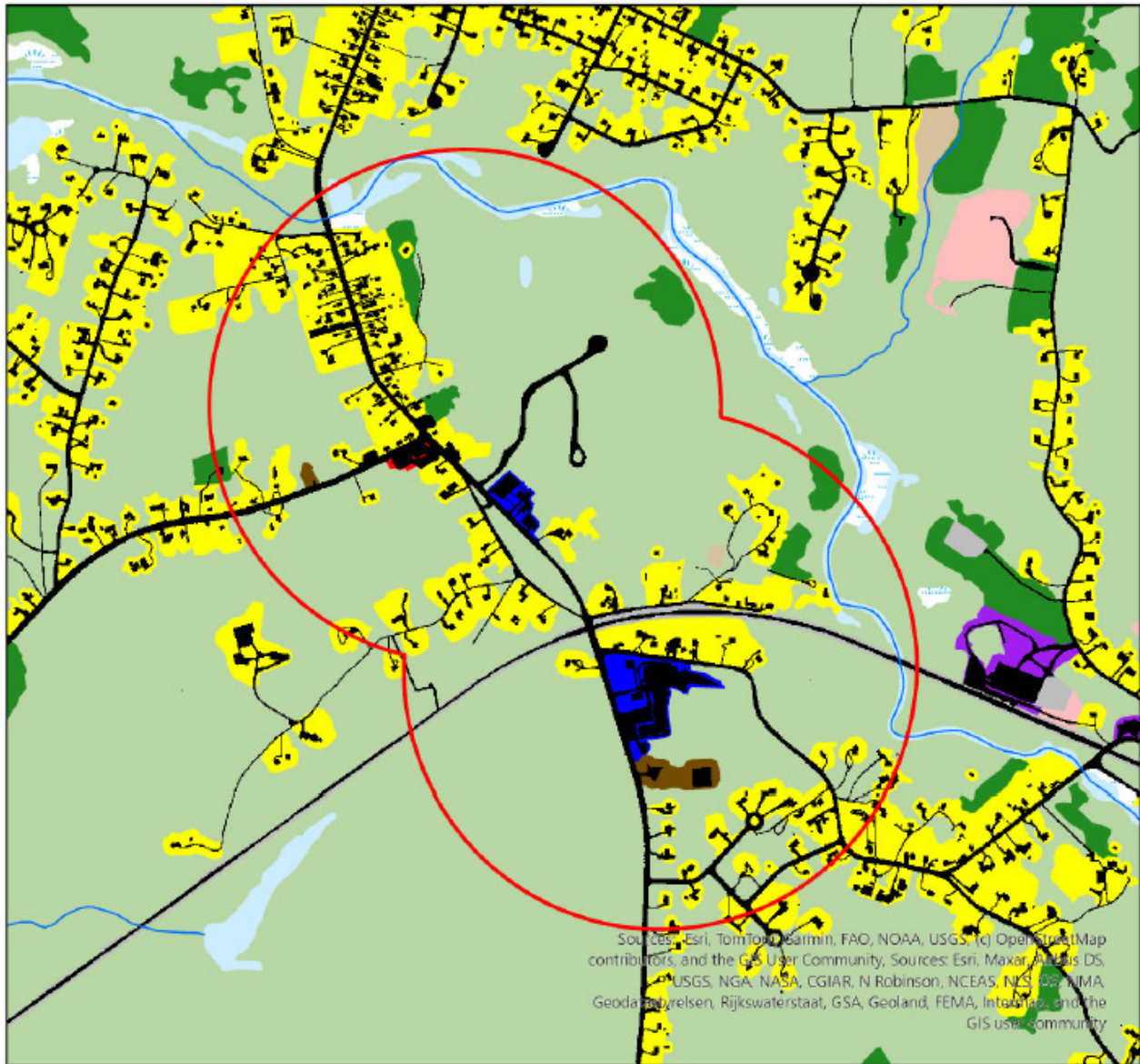
## Land Use Categories (Wellhead Protection Area Risk Indicator Category 1)

Description	Acres	Percent of Total
Medium High Density Residential (1/4 to 1/8 acre lots)	23.13	5.93%
Medium Density Residential (1 to 1/4 acre lots)	31.34	8.04%
Medium Low Density Residential (1 to 2 acre lots)	18.23	4.68%
Low Density Residential (>2 acre lots)	5.77	1.48%
Commercial (sale of products and services)	1.07	0.27%
Railroads (and associated facilities)	5.36	1.37%
Developed Recreation (all recreation)	2.56	0.65%
Vacant Land	0.39	0.10%
Institutional (schools, hospitals, churches, etc.)	8.98	2.30%
Pasture (agricultural not suitable for tillage)	4.66	1.20%
Cropland (tillable)	2.28	0.59%
Idle Agriculture (abandoned fields and orchards)	1.16	0.30%
Brushland (shrub and brush areas, reforestation)	0.33	0.08%
Deciduous Forest (>80% hardwood)	122.72	31.49%
Softwood Forest (>80% softwood)	51.22	13.14%
Mixed Forest	100.74	25.85%
Water	8.53	2.19%
Wetland	1.24	0.32%
<b>Grand Total</b>	<b>389.69</b>	<b>100%</b>
<b>High Intensity</b>	<b>40.81</b>	<b>10.47%</b>

Source: Rhode Island GIS (RIGIS) data (2020)

*High-intensity land uses highlighted*

## Land Use in the Well Protection Area



## Charlestown Elementary School Wellhead Protection Area



## Existing or Potential Pollution Sources (Wellhead Protection Area Risk Indicator Category 2)

Inner Protective Radius = 400' radius around each well	<b>Drilled Well #2 (120ft)</b>		<b>Drilled Well #3 (292ft)</b>	
<b>Regulated Facilities</b>	<b>(400')</b>	<b>Outside IPR</b>	<b>(400')</b>	<b>Outside IPR</b>
CERCLIS	0	0	0	0
Environmental Land Use Restriction	0	0	0	0
EPA Superfund	0	0	0	0
EPCRA Tier II	0	1	0	1
2021 RIDEM Site Investigation and Remediation	0	1	0	1
RIPDES Permits	0	0	0	0
Stormwater Outfall	0	15	0	15
Storage Tank Above Ground (2016)	0	1	0	1
Storage Tank Underground (2023)	1	5	1	5
Storage Tank Underground LUST (2023)	0	1	0	1
Stormwater Multi-Sector General Permit	0	0	0	0
Closed Landfill	0	0	0	0
Dams	0	1	0	1
Stormwater Construction general permit	0	0	0	0
Wastewater Treatment Facility Discharge	0	0	0	0
<b>Total</b>	<b>1</b>	<b>25</b>	<b>1</b>	<b>25</b>
<b>WHPA Acres</b>		<b>389.69</b>		<b>389.69</b>
<b>400' Radius Acres</b>		<b>11.53</b>		<b>11.53</b>
<b>WHPA Acres-Inner Radius</b>		<b>378.16</b>		<b>378.16</b>
<b>Sources/Acre</b>		<b>0.07</b>		<b>0.07</b>
<b>Sources/Acre*10=Rating Score</b>		<b>0.66</b>		<b>0.66</b>

Source: RI Environmental Map, DEM

**As of 5/29/2025**

## Water Quality Monitoring: Detects Only (Wellhead Protection Area Risk Indicator Category 3)

Testing Year	Analyte	Concentration
2021-2025	Lead	8 samples exceeded trace of MCL; 2 samples exceeded 1/2 of MCL
2023-2025	PFAS*: PFOS, PFOA, PFHpA, PFNA	33 total detects

Source: RI Department of Health

\*For more information about PFAS, please visit:

<https://health.ri.gov/environmental-contaminants/pfas-and-polyfluoroalkyl-substances>

Contaminant	Maximum Contaminant Level (MCL)	Potential health effects from long-term exposure above the MCL	Common sources of contaminant in drinking water
Lead	0.010 mg/L	<p>Infants and children: Delays in physical or mental development; children could show light deficits in attention span and learning abilities</p> <p>Adults: Kidney problems; high blood pressure</p>	Corrosion of household plumbing systems; erosion of natural deposits
PFAS	Hazard Index	Low levels of multiple PFAS that individually would not likely result in increased risk of adverse health effects may result in adverse health effects when combined in a mixture. Increased health risks include liver, immune, and thyroid effects. Additionally, developmental and thyroid effects following repeated exposure during pregnancy and/or childhood.	Discharge from manufacturing and industrial chemical facilities, use of certain consumer products, occupational exposures, and certain firefighting activities

Source: National Primary Drinking Water Regulations. (2009). EPA 816-F-09-004