



Spring Brook

Watershed Description

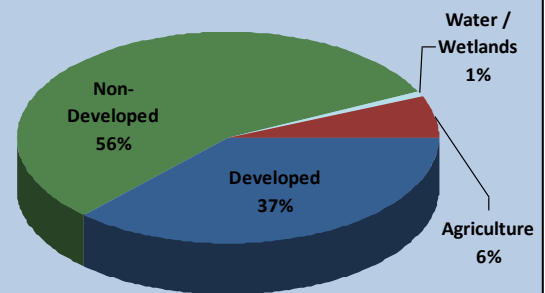
This **TMDL** applies to Spring Brook (RI0008039R-41), a 2.4-mile long stream segment located in Westerly, RI (Figure 1). The Spring Brook watershed is presented in Figures 2 with land use types indicated.

The headwaters of Spring Brook are located northeast of the intersection of Boom Bridge Road and Potter Hill Road in Westerly. The stream travels east along Spring Brook Road. Two tributaries enter the Spring Brook in the vicinity of Spring Brook Road. Spring Brook crosses under White Rock Road just north of the Gingerella Sports Complex and enters the Pawcatuck River just downstream of Bridge Road.

The Spring Brook watershed covers 0.83 square miles. Non-developed areas occupy a majority portion (56%) of the watershed. Developed uses cover approximately 37% and agricultural land uses occupy another 6%. Wetlands and other surface waters account for less than 1% the watershed's land area.

Assessment Unit Facts *(RI0008039R-41)*

- **Towns:** Westerly
- **Impaired Segment Length:** 2.41 miles
- **Classification:** Class B
- **Direct Watershed:** 0.83 mi² (531 acres)
- **Impervious Cover:** 14%
- **Watershed Planning Area:** Pawcatuck – Pawcatuck (#23)



Watershed Land Uses

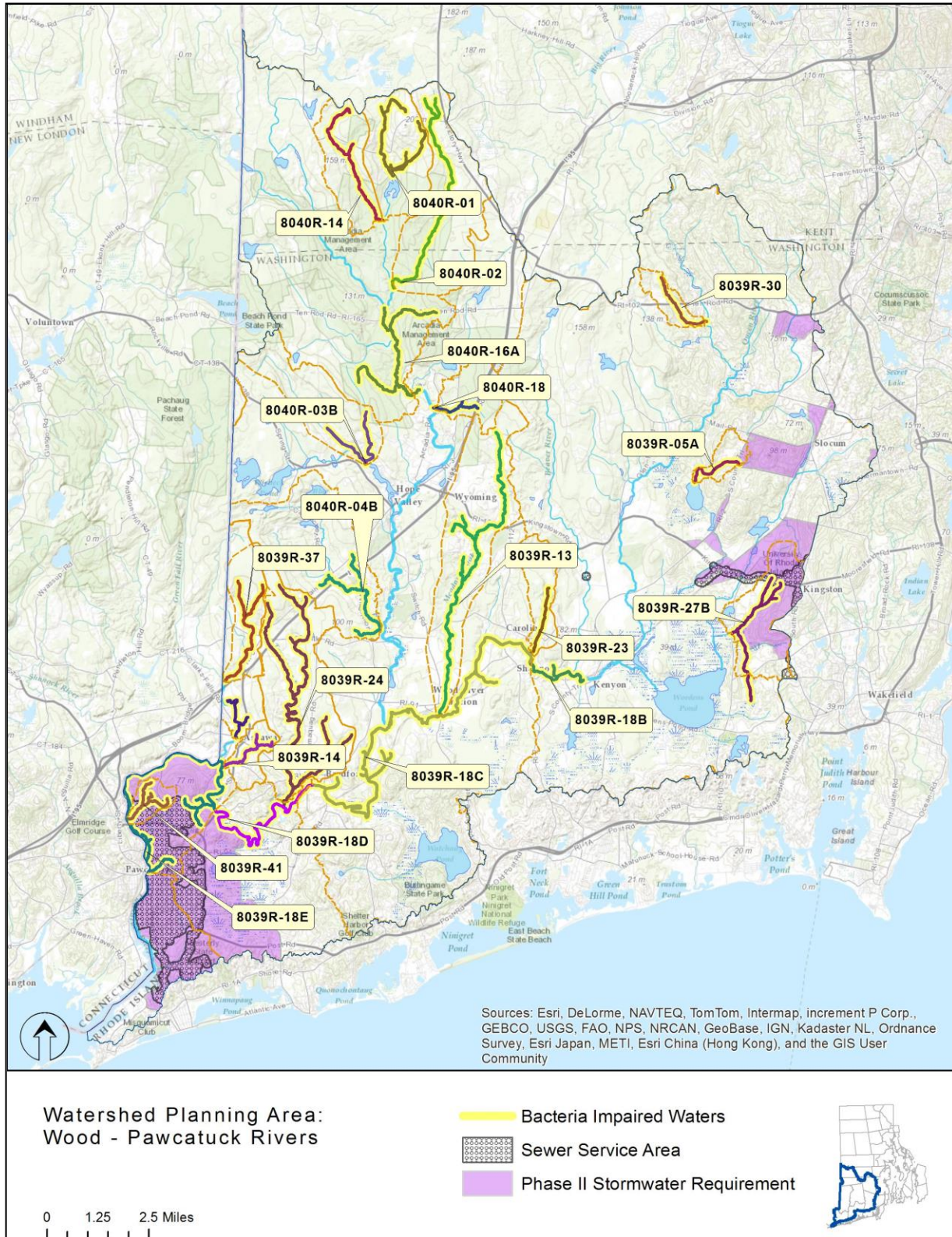


Figure 1: Map of the Wood-Pawcatuck Watershed Planning Area with impaired segments addressed by the Statewide Bacteria TMDL, sewered areas, and stormwater regulated zones.



Spring Brook # 8039R-41



- | | | |
|---------------------------|---------------------------------------|------------------------------------|
| WQ Sampling | Agriculture | Low Density Residential |
| MS4 Outfall | Beach, Barren, Sandy, Quarry | Medium to High Density Residential |
| RIDOT Stormwater Outfalls | Brush, Utility Corridors | Transportation |
| Septic NOI/NOV | Cemeteries, Developed Recreation | Water |
| WWTF | Commercial, Industrial, Institutional | Wetland |
| Bacteria Impaired Waters | Forest | |
| Impervious Surface | | |



Figure 2: Map of the Spring Brook watershed with impaired segments, sampling locations, and land cover indicated. Note that Station CT8 is located on the main stem of the Pawcatuck River.

Why is a TMDL Needed?

Spring Brook is a Class B freshwater stream, and its applicable designated uses are primary and secondary contact recreation and fish and wildlife habitat (RIDEM, 2010c). In 2011, water samples were collected from two sampling locations (Figures 2) along Spring Brook at Boom Bridge Road and Springbrook Road. Samples were collected by both the RIDEM TMDL and Ambient River Monitoring Program (ARM) and were analyzed for indicator bacteria, enterococci. The water quality

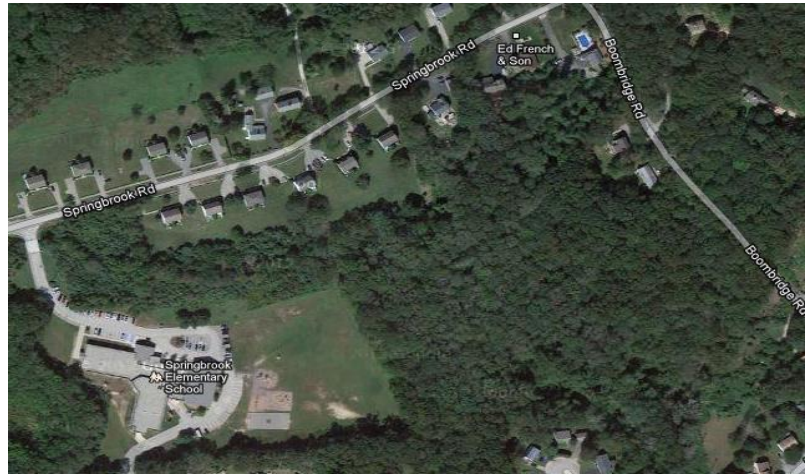


Figure 4: Partial aerial view of the Spring Brook watershed. (Source: Google Maps)

data are described in the Data Report for this study (RIDEM, 2013). The water quality criteria for enterococci, along with the bacteria sampling results are presented in Table 1. The geometric mean was calculated for both stations and exceeded water quality criteria for enterococci.

To aid in identifying possible bacteria sources, the geometric mean was also calculated for each station for wet-weather and dry-weather conditions, where appropriate. Wet and dry weather geometric mean values exceeded the water quality criteria for enterococci at both stations. Wet-weather values were higher than dry-weather values at the station where wet weather geometric mean could be calculated. The upstream station, SB01 at Boom Bridge Road has higher bacteria concentrations than the downstream station located at Springbrook Road.

Due to the elevated bacteria measurements presented in Table 1, Spring Brook does not meet Rhode Island's bacteria water quality standards, is identified as impaired, though has not yet been added to the state's 303(d) list. The Clean Water Act requires that all 303(d) listed waters undergo a TMDL assessment that describes the impairments and identifies the measures needed to restore water quality. The goal is for all waterbodies to comply with state water quality standards.

Potential Bacteria Sources

There are several potential sources of bacteria in the Spring Brook watershed including malfunctioning onsite wastewater treatment systems, agricultural activities, waterfowl and wildlife waste, illicit discharge, and stormwater runoff from developed areas.

Onsite Wastewater Treatment Systems

The Spring Brook watershed is mostly sewerred, but also relies on onsite wastewater treatment systems (OWTS), such as septic systems and cesspools. Houses without access to sewer lines in this watershed are primarily located along Boom Bridge Road. In its Wastewater Facilities Plan (1999), Westerly recommended this road for sewer construction. Failing OWTS can be significant sources of bacteria by allowing improperly treated waste to reach surface waters (RI HEALTH, 2003). If systems are improperly sized, malfunctioning, or in soils poorly suited for septic waste disposal, microorganisms such as bacteria, can easily enter surface water (USEPA, 2002).

Illicit Discharges

Illicit discharges, or any discharge to a municipal separate storm sewer system (MS4) that is not composed entirely of stormwater, may also be contributing bacteria to Spring Brook. As shown in Figure 2, multiple MS4 outfalls discharge into the brook.

Agricultural Activities

The Spring Brook watershed has some agricultural operations. Comprising 6% of the land cover in this sub-watershed, agricultural operations are an important economic activity and landscape feature in the state's rural areas. However, agricultural runoff may contain multiple pollutants, including bacteria. Agricultural practices such as allowing livestock to graze near streams, crossing livestock through waterbodies, spreading manure as fertilizer, and improper disposal of manure can contribute to bacterial contamination.

Wildlife and Waterfowl Waste

Approximately 55% of the Spring Brook watershed is undeveloped. Wildlife, including waterfowl, may be a significant bacteria source to surface waters. With the construction of roads and drainage systems, these wastes may no longer be retained on the landscape, but instead may be conveyed via stormwater infrastructure to the nearest surface water. As such these physical land alterations can exacerbate the impact of these natural sources on water quality. The impaired segment of the Spring Brook flows

through the woodland and wetland areas. Waste from wildlife and waterfowl that frequent these areas may be contributing bacteria to Spring Brook.

Developed Area Stormwater Runoff

Approximately 37% of the Spring Brook watershed is developed. The Spring Brook watershed has an impervious cover of approximately 14%. Impervious cover is defined as land surface areas, such as roofs and roads that force water to run off land surfaces, rather than infiltrating into the soil. Impervious cover provides a useful metric for the potential for adverse stormwater impacts. As discussed in Section 6.3 of the Core TMDL Document, as a general rule, impaired streams with watersheds having higher than 10% impervious cover are assumed to be affected by stormwater runoff.

Westerly has identified and mapped stormwater outfalls in the Spring Brook watershed. As shown in Figures 2, multiple Westerly outfalls are found in the watershed.

Existing Local Management and Recommended Next Steps

Additional bacteria data collection would be beneficial to support identification of sources of potentially harmful bacteria in the Spring Brook watershed. These activities could potentially include sampling at several different locations and under different weather conditions (e.g., wet and dry). Field reconnaissance surveys focused on stream buffers, stormwater runoff, and other source identification may also be beneficial.

Based on existing ordinances and previous investigations, the following steps are recommended to support water quality goals.

Onsite Wastewater Management

Some residents of the Spring Brook watershed rely on OWTS (septic systems or cesspools). Westerly has an approved Onsite Wastewater Management Plan. These plans provide a framework for managing the OWTS. RIDEM recommends that all communities create an inventory of onsite systems through mandatory inspections. Inspections help encourage proper maintenance and identify failed and sub-standard systems. Policies that govern the eventual replacement of sub-standard OWTS within a reasonable time frame should be adopted. The Rhode Island Wastewater Information System (RIWIS) can help develop an initial inventory of OWTS and can track voluntary inspection and pumping programs (RIDEM, 2010c).

Rhode Island's Community Septic System Loan Program (CSSLP) allows towns to assist citizens with the replacement of older and failing systems through low-interest loans. While portions of the Town of Westerly would be eligible for CSSLP once Westerly has applied for funding, houses along roads in this watershed, including Boom Bridge Road are not eligible for CSSLP because Westerly has identified these areas as needing sewers (RIDEM, 2011a). It is recommended that the town develop a program to assist citizens with the replacement of older and failing systems or connect properties that have been identified as priorities for sewer construction to the sewage collection system.

Agricultural Activities

If not already in place, agricultural producers should work with the RIDEM Division of Agriculture and the U.S. Department of Agriculture Natural Resources Conservation Service (NRCS) to develop conservation plans for their farming activities within the watershed. NRCS and the RIDEM Division of Agriculture should ensure that all agricultural operations within the watershed have sufficient stream buffers, have fencing to restrict access of livestock and horses to streams and wetlands, and have animal waste handling, disposal, and other appropriate BMPs in place.

Wildlife and Waterfowl Waste

Westerly should develop education and outreach programs to highlight the importance of picking up after dogs and other pets and not feeding waterfowl. Animal waste should be disposed of away from any waterway or stormwater system. The town should work with volunteers to map locations where animal waste is a significant and a chronic problem. The town should also evaluate strategies to reduce the impact of animal waste on water quality. This may include installing signage, providing pet waste receptacles or pet waste digester systems in high-use areas, enacting ordinances requiring clean-up of pet waste, and targeting educational and outreach programs in problem areas.

The Town and residents can take several measures to minimize the impacts of wildlife and waterfowl to Spring Brook. They can allow tall, coarse vegetation to grow in areas along the shores of the Pawcatuck River that are frequented by waterfowl and wildlife. Waterfowl, especially grazers like geese, prefer easy access to the water. Maintaining an uncut vegetated buffer along the shore will make the habitat less desirable to geese and encourage migration. With few exceptions, Part XIV, Section 14.13 of Rhode Island's Hunting Regulations prohibits feeding wild waterfowl at any time in the state of Rhode Island. Educational programs should emphasize that feeding waterfowl, such as ducks, geese, and swans, contributes to water quality impairments in Spring Brook and can harm human health and the environment.

Stormwater Management

RIDOT (RIPDES permit RIR040036) and the Town of Westerly (RIPDES permit RIR044014) are municipal separate storm sewer (MS4) operators in the Pawcatuck River watershed have prepared the required Phase II Stormwater Management Plans (SWMPP).

The Town of Westerly adopted an illicit discharge detection and elimination ordinance in 2008. This type of ordinance prohibits illicit discharges to the storm drain system and provides an enforcement mechanism. It is recommended that any stormwater outfalls discharging in the vicinity of the sampling locations be monitored to check for illicit discharges. Illicit discharges can be identified through continued dry weather outfall sampling and microbial source tracking.

RIDOT's SWMPP and its 2011 Compliance Update outline its goals for compliance with the General Permit statewide. It should be noted that RIDOT has chosen to enact the General Permit statewide, not just for the urbanized and densely populated areas that are required by the permit. RIDOT has finished mapping its outfalls throughout the state and is working to better document and expand its catch basin inspection and maintenance programs along with its BMP maintenance program. SWMPPs are being utilized for RIDOT construction projects. RIDOT also funds the University of Rhode Island Cooperative Extension's Stormwater Phase II Public Outreach and Education Project, which provides participating MS4s with education and outreach programs that can be used to address TMDL public education recommendations.

As mentioned previously, the Spring Brook watershed has an impervious cover of 14%, a level where stormwater impacts are expected. At this threshold, RIDEM is requiring MS4 operators to revise their post-construction stormwater ordinances as described in Section 6.3 of the Core TMDL Document. RIDEM also requires the MS4 operators to continue to comply with and adapt the minimum measures to reflect the bacteria impairments in the regulated areas. Information regarding plans to revise the post construction ordinance should be documented in a TMDL Implementation Plan (TMDL IP). Other TMDL IP requirements described in Section 6.2 of the Core TMDL Document are not applicable to the MS4 operators for watershed areas having impervious cover between 10 and 15 %. Information regarding how the MS4 operators' minimum measures are addressing the pollutant of concern (i.e. bacteria) should be documented in the MS4 operators' annual report, consistent with Part IV.G.2.d of the RIPDES General Permit (RIDEM, 2010b). Further detail is also included in Sections 6.3 of the core document.

Illicit Discharges

Westerly should also implement a program to evaluate its sanitary sewer system and identify and as needed, reduce leaks and overflows.

Land Use Protection

Woodland and wetland areas within the Spring Brook watershed absorb and filter pollutants from stormwater runoff, and help protect both water quality in the stream and stream channel stability. As these areas represent the majority of the land use in the Spring Brook watershed, it is important to preserve these undeveloped areas, and institute controls on development in the watershed.

The steps outlined above will support the goal of mitigating bacteria sources and meeting water quality standards in Spring Brook.

Table 1: Spring Brook Bacteria Data

Waterbody ID: RI0008039R-41

Watershed Planning Area: 23 – Wood-Pawcatuck

Characteristics: Freshwater, Class B, Primary and Secondary Contact Recreation, Fish and Wildlife Habitat

Impairment: Enterococci (colonies/100mL)

Water Quality Criteria for Enterococci: Geometric Mean: 54 colonies/100 mL

Percent Reduction to meet TMDL: 99.3% (Includes 5% Margin of Safety)

Data: 2011

Single Sample Enterococci (colonies/100 mL) Results for the Spring Brook (2011) with Geometric Mean Statistics

Station Name	Station Location	Date	Result	Wet/Dry	Geometric Mean
SB01	Spring Brook at Boom Bridge Road	08/03/11	2500	DRY	951.5 [†]
SB01	Spring Brook at Boom Bridge Road	08/15/11	2500	WET	
SB01	Spring Brook at Boom Bridge Road	08/17/11	1203.31	WET	
SB01	Spring Brook at Boom Bridge Road	09/13/11	467.75	DRY	
SB01	Spring Brook at Boom Bridge Road	09/28/11	221.7	DRY	
LPK01	Spring Brook at Spring Brook Road	05/01/11	131	DRY	438.8
LPK01	Spring Brook at Spring Brook Road	06/27/11	345	DRY	
LPK01	Spring Brook at Spring Brook Road	07/06/11	2500	DRY	
LPK01	Spring Brook at Spring Brook Road	07/20/11	1300	DRY	
LPK01	Spring Brook at Spring Brook Road	08/03/11	DRY	DRY	
LPK01	Spring Brook at Spring Brook Road	08/15/11	2500	WET	
LPK01	Spring Brook at Spring Brook Road	08/17/11	980.4	WET	
LPK01	Spring Brook at Spring Brook Road	08/18/11	345	WET	
LPK01	Spring Brook at Spring Brook Road	09/13/11	129.9	DRY	
LPK01	Spring Brook at Spring Brook Road	09/27/11	83.9	DRY	
LPK01	Spring Brook at Spring Brook Road	09/28/11	195.6	DRY	

Shaded cells indicate an exceedance of water quality criteria. Values in red were reported as greater than the detection limit. For the purpose of mathematical calculations, the values were increased one significant number (NSSP, 2007).

[†] Indicated geometric mean used to calculate the percent reduction

Wet and Dry Weather Geometric Mean Enterococci Values for all Stations

Station Name	Station Location	Year Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
LPK01	Spring Brook at Spring Brook Road	2011	3	7	438.8	945.6	315.8
SB01	Spring Brook at Boom Bridge Road	2011	2	3	951.5	NA	637.6
Shaded cells indicate an exceedance of water quality criteria Weather condition determined from rain gage at Westerly Airport in Westerly, RI							

References

- NSSP. 2007. *National Shellfish Sanitation Program: Guide for the Control of Molluscan Shellfish*. Report Prepared by United States Food and Drug Administration and Interstate Shellfish Sanitation Conference.
- RIDEM (2010a). *MS4 Compliance Status Report for RI Statewide Bacteria TMDL*. Rhode Island Department of Environmental Management.
- RIDEM (2010b). *State of Rhode Island and Providence Plantations Water Quality Regulations*. Amended December, 2010b. Rhode Island Department of Environmental Management.
- RIDEM (2010c). *Total Maximum Daily Load Analysis for the Pawcatuck River and Little Narragansett Bay Waters (Bacteria Impairments)*. Rhode Island Department of Environmental Management.
- RIDEM (2011a). Certificate of Approval for Westerly Community Septic System Loan Program. Letter sent from RIDEM to Westerly on August 19, 2011.
- RIDEM (2011b). *Rhode Island Statewide Total Maximum Daily Load (TMDL) for Bacteria Impaired Waters, September 2011*, Report prepared by FB Environmental with funding by the Environmental Protection Agency for the Rhode Island Department of Environmental Management, Office of Water Resources, Providence, RI.
- RIDEM (2012). *State of Rhode Island 2012 303(d) List: List of Impaired Waters, Final August 2012*, Rhode Island Department of Environmental Management, Office of Water Resources, Providence, RI.
- RI HEALTH (2003). *Aquidneck Island Drinking Water Assessment Results*, Source Water Protection Assessment conducted by the University of Rhode Island for the Rhode Island Department of Health, Office of Drinking Water Supply.
- Town of Westerly (1999). *Town of Westerly Rhode Island, Wastewater Facilities Plan: November 1998 (Revised December 1999)*, Report Prepared by BETA Engineering, Inc. for the Town of Westerly.
- USEPA (2002). *Onsite Wastewater Treatment Systems Manual* – Office of Water, Office of Research and Development – EPA/625/R-00/008. Online: www.epa.gov/owm/septic/pubs/septic_2002_osdm_all.pdf.