# *Hop Brook*

## *Watershed Summary*

### WATERSHED DESCRIPTION AND MAPS

The Hop Brook watershed covers an area of approximately 8,716 acres in the mid-northern half of Connecticut, west of the Connecticut River (Figure 1). The watershed is located in the Towns of Simsbury and Canton.

The Hop Brook watershed includes one segment impaired for recreation due to elevated bacteria levels. This segment was assessed by Connecticut Department of Energy and Environmental Protection (CT DEEP) and included in the CT 2010 303(d) list of impaired waterbodies. An excerpt of the Integrated Water Quality Report is included in Table 1 to show the status of other waterbodies in the watershed (CT DEEP, 2010).

The entire stream length of Hop Brook (CT4318-00_01) has been listed as impaired, and consists of 6.74 miles of the river in Simsbury (Figure 2). The impaired segment of Hop Brook begins at the outlet to Simsbury Reservoir in Simsbury, crosses Route 309 twice, then turns north, continues easterly to cross Old Farms Road just north of Hop Brook Road, turns south again to cross several small residential streets, follows Route 309 east through Ensign Bickford Pond, crosses Route 10 (US 202), and ends at the confluence with the Farmington River in Simsbury.

The impaired segment of Hop Brook has a water quality classification of A. Designated uses include potential drinking water supplies, habitat for fish and other aquatic life and wildlife, recreation, navigation, and industrial and agricultural water supply. As there are no designated beaches in this segment of Hop Brook, the specific recreation impairment is for non-designated swimming and other water contact related activities.

**Impaired Segment Facts**

**Impaired Segment:** Hop Brook (CT4318-00_01)

**Towns:** Simsbury

**Impaired Segment Length (miles):** 6.74

**Water Quality Classification:** Class A

**Designated Use Impairment**: Recreation

**Sub-regional Basin Name and Code:** Hop Brook, 4318

**Regional Basin:** Farmington

**Major Basin:** Connecticut

**Watershed Area (acres):** 8,716

**MS4 Applicable?** Yes

**Applicable Season:** Recreation Season (May 1 to September 30)

**Figure 1: Watershed location in Connecticut**

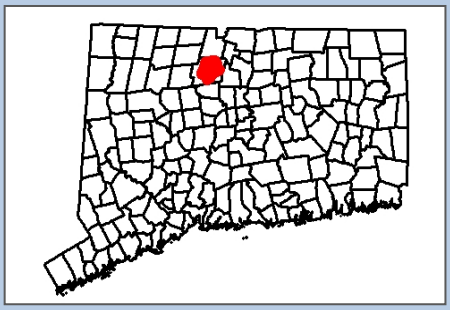


**Table 1: Impaired segment and nearby waterbodies from the Connecticut 2010 Integrated Water Quality Report**

| Waterbody ID | Waterbody Name | Location | Miles | Aquatic Life | Recreation | Fish Consumption |
|---|---|---|---|---|---|---|
| CT4318-00_01 | Hop Brook (Simsbury)-01 | From mouth at Farmington River, US to headwaters at Simsbury Reservoir, Simsbury. | 6.74 | FULL | NOT | FULL |

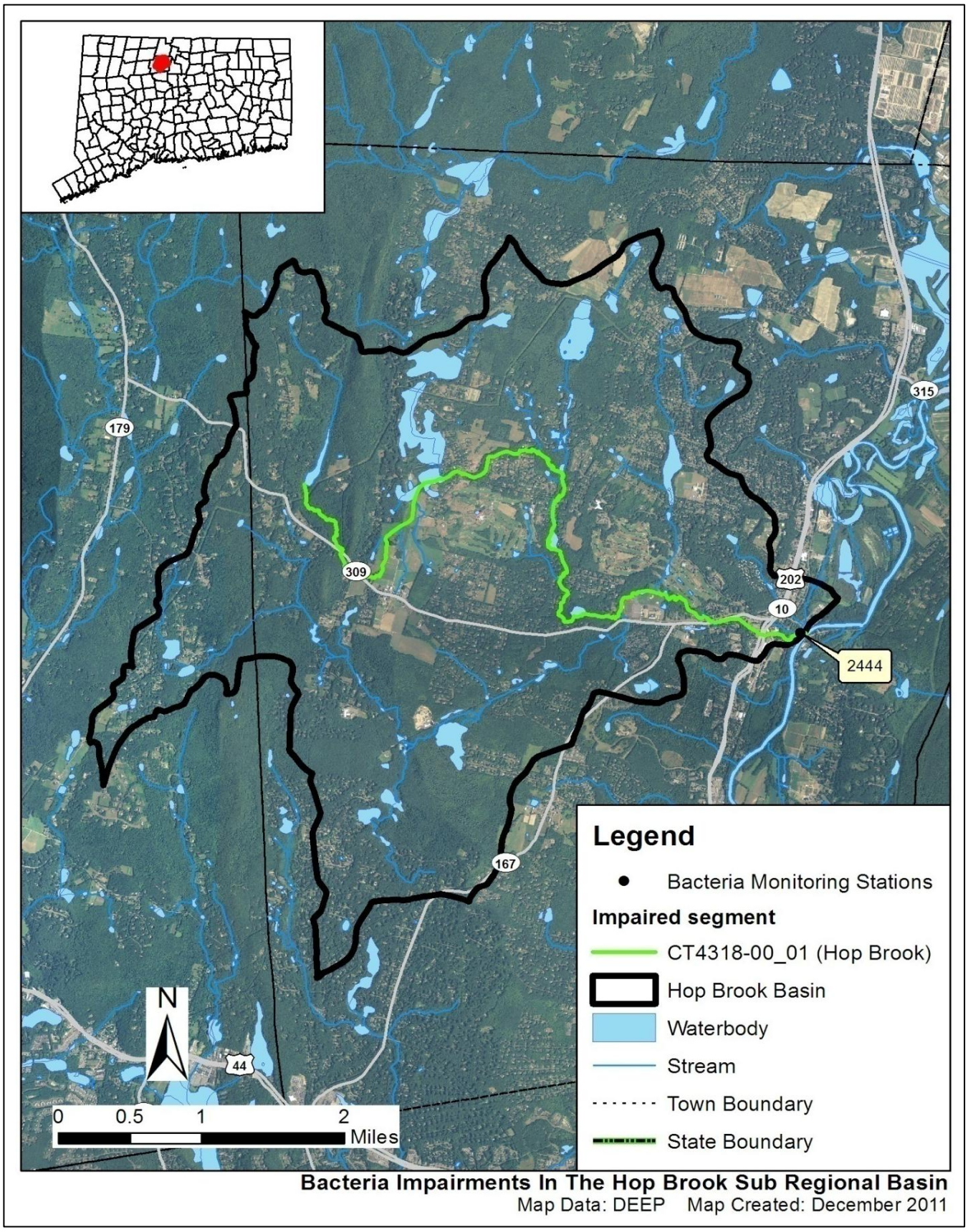
**Shaded cells indicate impaired segment addressed in this TMDL**

**FULL = Designated Use Fully Supported**

**NOT = Designated Use Not Supported**

**U = Unassessed**

**Figure 2: GIS map featuring general information of the Hop Brook watershed at the sub-regional level**



***Land Use***

Existing land use can affect the water quality of waterbodies within a watershed (USEPA, 2011c). Natural processes, such as soil infiltration of stormwater and plant uptake of water and nutrients, can occur in undeveloped portions of the watershed. As impervious surfaces (such as rooftops, roads, and sidewalks) increase within the watershed landscape from commercial, residential, and industrial development, the amount of stormwater runoff to waterbodies also increases. These waterbodies are negatively affected as increased pollutants from nutrients and bacteria from failing and insufficient septic systems, oil and grease from automobiles, and sediment from construction activities become entrained in this runoff. Agricultural land use activities, such as fertilizer application and manure from livestock, can also increase pollutants in nearby waterbodies (USEPA, 2011c).

As shown in Figures 3 and 4, the Hop Brook watershed consists of 55% forest, 33% urban, 7% agriculture, and 5% water land uses. The headwaters of Hop Brook begin at the outlet to the Simsbury Reservoir surrounded by mixed forest. Downstream at the Route 309 crossing, Hop Brook flows through residential and commercial development, continues northeasterly through agricultural hayfields and row crops, and circles around the Simsbury Farms Recreation Complex and Public Golf Course. Heading south then east through low density residential development and mixed forest areas, Hop Brook skirts around Hop Meadow Country Club and Simsbury High School, which has a major parking lot and recreation field. Before reaching the confluence with the Farmington River, Hop Brook crosses Route 309 to Ensign Bickford Pond through large apartment complexes and commercial buildings.

**Figure 3: Land use within the Hop Brook watershed**

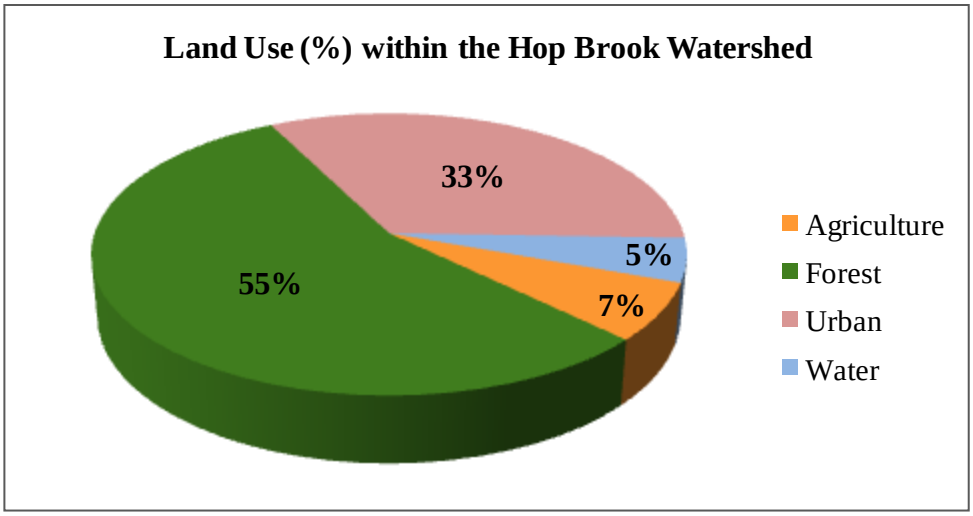
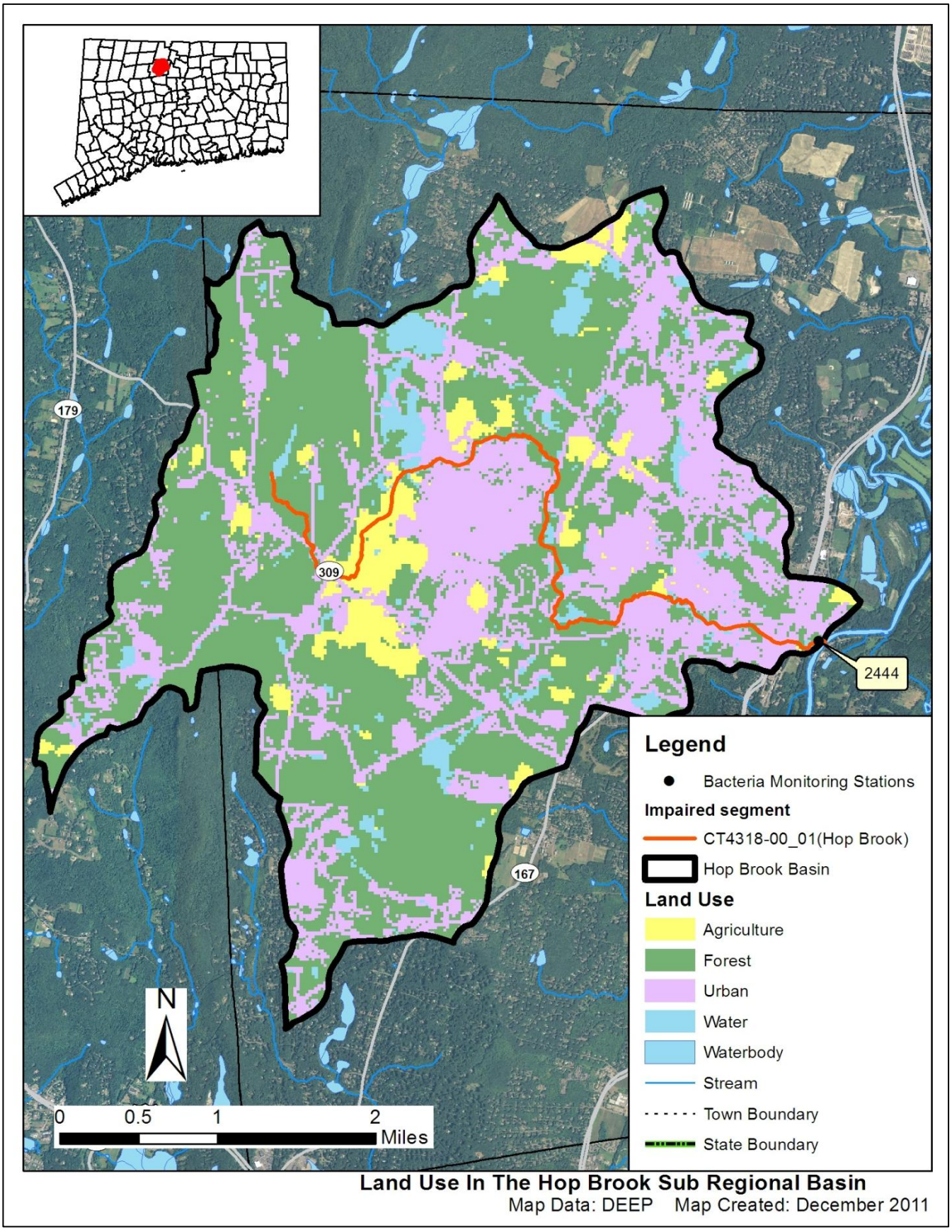


**Figure 4: GIS map featuring land use for the Hop Brook watershed at the sub-regional level**



## WHY IS A TMDL NEEDED?

*E. coli* is the indicator bacteria used for comparison with the CT State criteria in the CT Water Quality Standards (WQS) (CTDEEP, 2011). All data results are from CT DEEP, USGS, Bureau of Aquaculture, or volunteer monitoring efforts at stations located on the impaired segments.

**Table 2: Sampling station location description for impaired segments in the Hop Brook watershed**

| Waterbody ID | Waterbody Name | Station | Station Description | Municipality | Latitude | Longitude |
|---|---|---|---|---|---|---|
| CT4318-00_01 | Hop Brook | 2444 | Old Bridge Road | Simsbury | 41.868671 | -72.800644 |

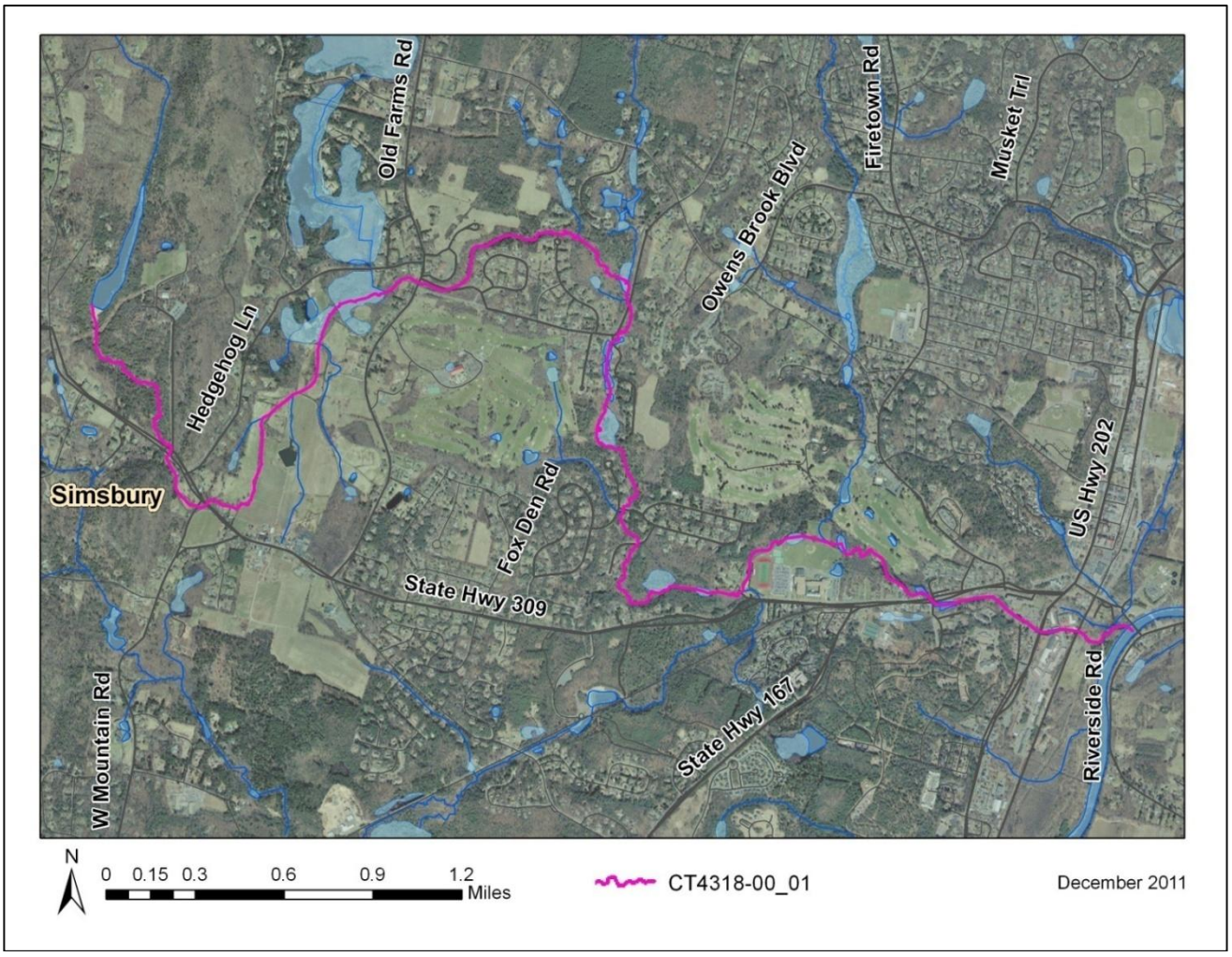
Hop Brook (CT4318-00_01) is a Class A freshwater river (Figure 5). Its applicable designated uses are potential drinking water supplies, habitat for fish and other aquatic life and wildlife, recreation, navigation, and industrial and agricultural water supply. Water quality analyses were conducted using data from one sampling location from 2007-2009 (Station 2444) (Table 2).

The water quality criteria for *E. coli*, along with bacteria sampling results for Station 2444 from 2007-2009, are presented in Table 9. The annual geometric mean was calculated for Station 2444 and exceeded the WQS for *E. coli* in 2008 and 2009. Single sample values at this station exceeded the WQS for *E. coli* for all sampling years on at least one sample date.

To aid in identifying possible bacteria sources, the geometric mean was also calculated for each station for wet-weather and dry-weather sampling days, where appropriate (Table 9). For the impaired segment of Hop Brook, only the geometric mean value for wet-weather at Station 2444 exceeded the WQS for *E. coli*.

Due to the elevated bacteria measurements presented in Table 9, this segment of Hop Brook did not meet CT's bacteria WQS, was identified as impaired, and was placed on the CT List of Waterbodies Not Meeting Water Quality Standards, also known as the CT 303(d) Impaired Waters 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 WQS.

**Figure 5: Aerial map of Hop Brook**



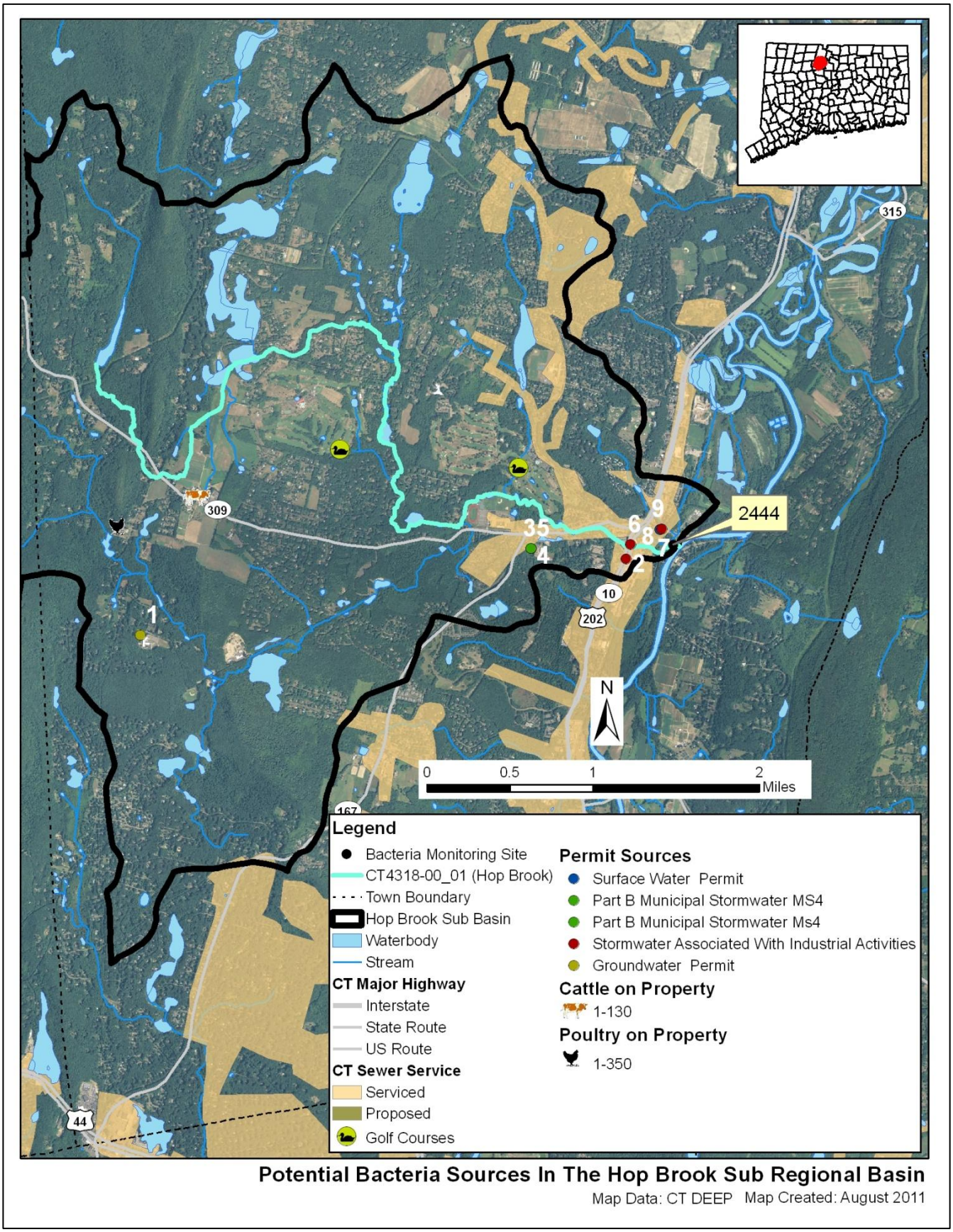
## POTENTIAL BACTERIA SOURCES

Potential sources of indicator bacteria in a watershed include point and non-point sources, such as stormwater runoff, agriculture, sanitary sewer overflows (collection system failures), illicit discharges, and inappropriate discharges to the waterbody. Potential sources that have been tentatively identified in the watershed based on land use (Figures 3 and 4) and a collection of local information for the impaired waterbody is presented in Table 3 and Figure 6. However, the list of potential sources is general in nature and should not be considered comprehensive. There may be other sources not listed here that contribute to the observed water quality impairment in the study segments. Further monitoring and investigation will confirm listed sources and discover additional ones. Some segments in this watershed are currently listed as unassessed by CT DEEP procedures. This does not suggest that there are no potential issues on this segment, but indicates a lack of current data to evaluate the segment as part of the assessment process. For some segments, there are data from permitted sources, and CT DEEP recommends that any elevated concentrations found from those permitted sources be addressed through voluntary reduction measures. More detailed evaluation of potential sources is expected to become available as activities are conducted to implement these TMDLs.

**Table 3: Potential bacteria sources in the Hop Brook watershed**

| Impaired Segment | Permit Source | Illicit Discharge | CSO/SSO Issue | Failing Septic System | Agricultural Activity | Stormwater Runoff | Nuisance Wildlife/Pets | Other |
|---|---|---|---|---|---|---|---|---|
| Hop Brook CT4318-00_01 | **x** | **x** | | **x** | **x** | **x** | **x** | |

**Figure 6: Potential sources in the Hop Brook watershed at the sub-regional level**



The potential sources map for the impaired basin was developed after thorough analysis of available data sets. If information is not displayed in the map, then no sources were discovered during the analysis. The following is the list of potential sources that were evaluated: problems with migratory waterfowl, golf course locations, reservoirs, proposed and existing sewer service, cattle farms, poultry farms, permitted sources of bacteria loading (surface water discharge, MS4 permit, industrial stormwater, commercial stormwater, groundwater permits, and construction related stormwater), and leachate and discharge sources (agricultural waste, CSOs, failing septic systems, landfills, large septic tank leach fields, septage lagoons, sewage treatment plants, and water treatment or filter backwash).

## Point Sources

Permitted sources within the watershed that could potentially contribute to the bacteria loading are identified in Table 4. This table includes permit types that may or may not be present in the impaired watershed. A list of active permits in the watershed is included in Table 6. Additional investigation and monitoring may reveal the presence of additional discharges in the watershed. Available effluent data from each of these permitted categories found within the watershed are compared to the CT State WQS for the appropriate receiving waterbody use and type.

**Table 4: General categories list of other permitted discharges**

| Permit Code | Permit Description Type | Number in watershed |
|---|---|---|
| CT | Surface Water Discharges | 1 |
| GPL | Discharge of Swimming Pool Wastewater | 0 |
| GSC | Stormwater Discharge Associated with Commercial Activity | 0 |
| GSI | Stormwater Associated with Industrial Activity | 4 |
| GSM | Part B Municipal Stormwater MS4 | 1 |
| GSN | Stormwater Registration – Construction | 0 |
| LF | Groundwater Permit (Landfill) | 0 |
| UI | Underground Injection | 2 |

### *Permitted Sources*

As shown in Table 6, there are multiple permitted discharges in the Hop Brook watershed. Bacteria data are currently not available for any of the permitted discharges in the watershed. Since the MS4 permits are not targeted to a specific location, but the geographic area of the regulated municipality, there is no one accurate location on the map to display the location of these permits. One dot will be displayed at the geographic center of the municipality as a reference point. Sometimes this location falls outside of the targeted watershed and therefore the MS4 permit will not be displayed in the Potential Sources Map. Using the municipal border as a guideline will show which areas of an affected watershed are covered by an MS4 permit.

**Table 5: Permitted facilities within the Hop Brook watershed**

| Town | Client | Permit ID | Permit Type | Site Name/Address | Map # |
|---|---|---|---|---|---|
| Simsbury | Town Of Simsbury | CT0100919 | Surface Water Permit | Simsbury Water Pollution Control Facility | 8 |
| Simsbury | Town Of Simsbury | GSI001748 | Stormwater Associated With Industrial Activities | Simsbury Water Pollution Control Facility | 7 |
| Simsbury | Girard Brothers Corp. | GSI001870 | Stormwater Associated With Industrial Activities | Simscroft-Echo Farms, Inc. | 9 |
| Simsbury | Ensign-Bickford Aerospace & Defense Company | GSI001629 | Stormwater Associated With Industrial Activities | Ensign-Bickford Aerospace & Defense Company | 2 |
| Simsbury | Dyno Nobel Inc | GSI001643 | Stormwater Associated With Industrial Activities | Dyno Nobel Inc | 6 |
| Simsbury | Town Of Simsbury | GSM000071 | Part B Municipal Stormwater Ms4 | Simsbury, Town Of | NA |
| Simsbury | Town Of Simsbury | UI0000330 | Groundwater Permit | Simsbury Public School/Tootin | 1 |
| Simsbury | Town Of Simsbury | UI0000330 | Groundwater Permit | Tootin' Hill School | 4 |

***Municipal Stormwater Permitted Sources***

Per the EPA Phase II Stormwater rule all municipal storm sewer systems (MS4s) operators located within US Census Bureau Urbanized Areas (UAs) must be covered under MS4 permits regulated by the appropriate State agency. There is an EPA waiver process that municipalities can apply for to not participate in the MS4 program. In Connecticut, EPA has granted such waivers to 19 municipalities. All participating municipalities within UAs in Connecticut are currently regulated under MS4 permits by CT DEEP staff in the MS4 program.

The US Census Bureau defines a UA as a densely settled area that has a census population of at least 50,000. A UA generally consists of a geographic core of block groups or blocks that exceeds the 50,000 people threshold and has a population density of at least 1,000 people per square mile. The UA will also include adjacent block groups and blocks with at least 500 people per square mile. A UA consists of all or part of one or more incorporated places and/or census designated places, and may include additional territory outside of any place. (67 FR 11663)

For the 2000 Census a new geographic entity was created to supplement the UA blocks of land. This created a block known as an Urban Cluster (UC) and is slightly different than the UA. The definition of a UC is a densely settled area that has a census population of 2,500 to 49,999. A UC generally consists of a geographic core of block groups or blocks that have a population density of at least 1,000 people per square mile, and adjacent block groups and blocks with at least 500 people per square mile. A UC consists of all or part of one or more incorporated places and/or census designated places; such a place(s)

together with adjacent territory; or territory outside of any place. The major difference is the total population cap of 49,999 people for a UC compared to >50,000 people for a UA. (67 FR 11663)

While it is possible that CT DEEP will be expanding the reach of the MS4 program to include UC municipalities in the near future they are not currently under the permit. However, the GIS layers used to create the MS4 maps in this Statewide TMDL did include both UA and UC blocks. This factor creates some municipalities that appear to be within an MS4 program that are not currently regulated through an MS4 permit. This oversight can explain a municipality that is at least partially shaded grey in the maps and there are no active MS4 reporting materials or information included in the appropriate appendix. While these areas are not technically in the MS4 permit program, they are still considered urban by the cluster definition above and are likely to contribute similar stormwater discharges to affected waterbodies covered in this TMDL.

As previously noted, EPA can grant a waiver to a municipality to preclude their inclusion in the MS4 permit program. One reason a waiver could be granted is a municipality with a total population less than 1000 people, even if the municipality was located in a UA. There are 19 municipalities in Connecticut that have received waivers, this list is: Andover, Bozrah, Canterbury, Coventry, East Hampton, Franklin, Haddam, Killingworth, Litchfield, Lyme, New Hartford, Plainfield, Preston, Salem, Sherman, Sprague, Stafford, Washington, and Woodstock. There will be no MS4 reporting documents from these towns even if they are displayed in an MS4 area in the maps of this document.

The list of US Census UCs is defined by geographic regions and is named for those regions, not necessarily by following municipal borders. In Connecticut the list of UCs includes blocks in the following Census Bureau regions: Colchester, Danielson, Lake Pocotopaug, Plainfield, Stafford, Storrs, Torrington, Willimantic, Winsted, and the border area with Westerly, RI (67 FR 11663). Any MS4 maps showing these municipalities may show grey areas that are not currently regulated by the CT DEEP MS4 permit program.

The impaired segment of the Hop Brook watershed is located within the Town of Simsbury, CT. The town is largely urbanized, as defined by the U.S. Census Bureau, and is required to comply with the General Permit for the Discharge of Stormwater from Small Municipal Storm Sewer Systems (MS4 permit) issued by the Connecticut Department of Energy and Environmental Protection (DEEP) (Figure 7). This general permit is only applicable to municipalities that are identified in Appendix A of the MS4 permit that contain designated urban areas and discharge stormwater via a separate storm sewer system to surface waters of the State. The permit requires municipalities to develop a Stormwater Management Plan (SMP) to reduce the discharge of pollutants and protect water quality. The MS4 permit is discussed further in the "TMDL Implementation Guidance" section of the core TMDL document. Additional information regarding stormwater management and the MS4 permit can be obtained on CTDEEP's website (http://www.ct.gov/dep/cwp/view.asp?a=2721&q=325702&depNav_GID=1654).

One MS4 outfall has been sampled for *E. coli* bacteria in the watershed (Table 5). This outfall, located in Simsbury, was sampled in 2005, and from 2007-2009, and it exceeded the single sample water quality standard of 410 colonies/100 mL once in 2009.

**Figure 7: MS4 areas of the Hop Brook watershed**

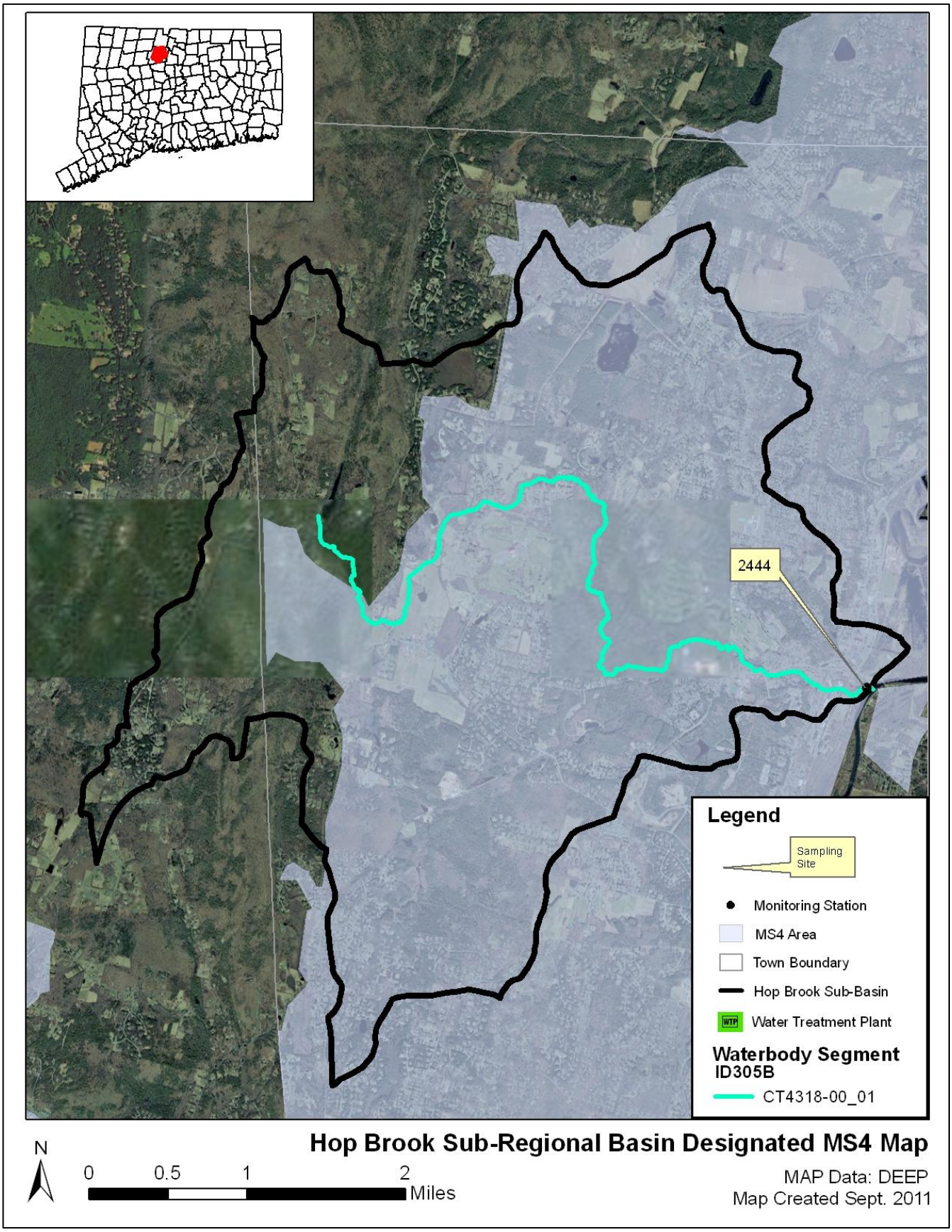


**Table 6: List of MS4 sample locations and *E. coli* (colonies/100 mL) results in the Hop Brook watershed**

| Town | Location | MS4 Type | Receiving Waters | Sample Date | Result |
|---|---|---|---|---|---|
| Simsbury | Grist Mill Road industrial #2 | Industrial | Hop Brook | 02/10/05 | 0 |
| Simsbury | Grist Mill Road industrial #2 | Industrial | Hop Brook | 12/29/05 | 45 |
| Simsbury | Grist Mill Road industrial #2 | Industrial | Hop Brook | 01/08/07 | 4 |
| Simsbury | Grist Mill Road industrial #2 | Industrial | Hop Brook | 11/06/07 | 225 |
| Simsbury | Grist Mill Road industrial #2 | Industrial | Hop Brook | 09/26/08 | 360 |
| Simsbury | Grist Mill Road industrial #2 | Industrial | Hop Brook | 09/11/09 | 1,800 |
| **Shaded cells indicate an exceedance of single-sample based water quality criteria (410 colonies/100 mL)** | | | | | |

***Publicly Owned Treatment Works***

As shown in Figure 7, there are no publicly owned treatment works (POTWs), or wastewater treatment plants, in the Hop Brook watershed, and therefore, POTWs are not a potential source of loading to the impaired segment of the Hop Brook watershed.

## Non-point Sources

Non-point source pollution (NPS) comes from many diffuse sources and is more difficult to identify and control. NPS pollution is often associated with land-use practices. Examples of NPS that can contribute bacteria to surface waters include insufficient septic systems, pet and wildlife waste, agriculture, and contact recreation (swimming or wading). Potential sources of NPS within the Hop Brook watershed are described below.

***Stormwater Runoff from Developed Areas***

Approximately 33% of the land use in the watershed is considered urban, and a portion of the impaired segment is located along the densely populated downstream portion of the watershed, particularly along Route 309 and at the confluence with the Farmington River where commercial and residential development are greatest (Figures 4 and 9). Urban areas are often characterized by impervious cover, or surface areas such as roofs and roads that force water to run off land surfaces rather than infiltrate into the soil. Studies have shown a link between increasing impervious cover and degrading water quality conditions in a watershed (CWP, 2003). In one study, researchers correlated the amount of fecal coliform to the percent of impervious cover in a watershed (Mallin *et al.*, 2000).

As shown in Figure 8, approximately 7% of the Hop Brook watershed contains 12-15% impervious cover, particularly in the area around the impaired segment near the confluence with the Farmington River (Figure 9). Water quality data taken at Station 2444, located at the confluence with the Farmington River, exceeded the wet-weather geometric mean limit, which suggests that stormwater runoff may be a source of bacteria to Hop Brook (Table 9). Stormwater pollution sources include fertilizer runoff, leaky septic systems, horse farms, golf courses, and impervious surfaces.

**Figure 8: Range of impervious cover (%) in the Hop Brook watershed**

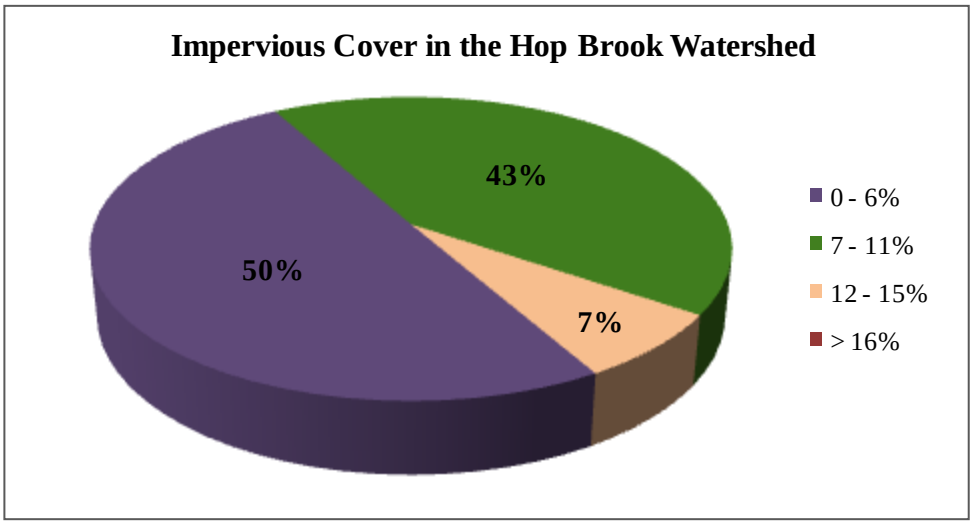
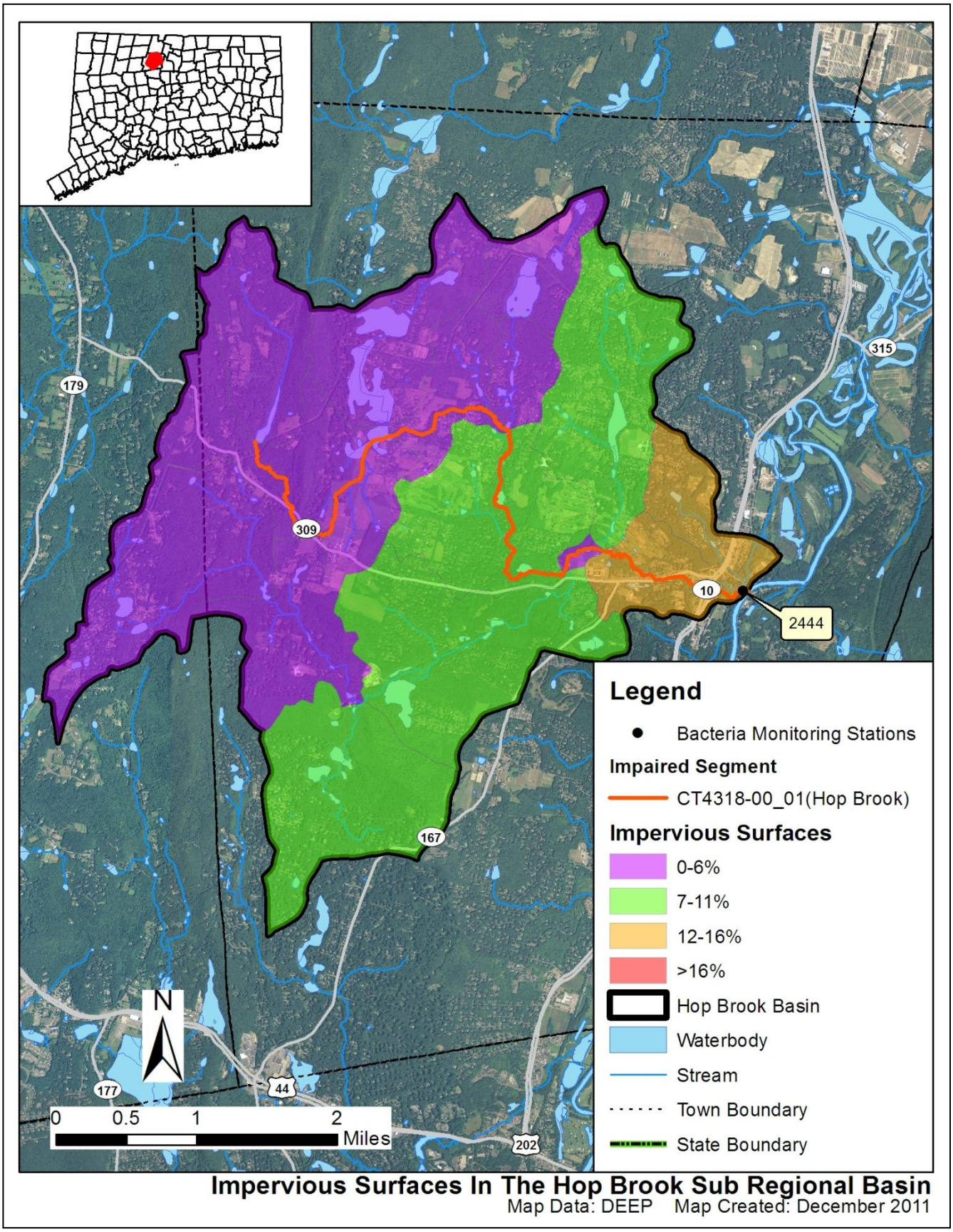


**Figure 9: Impervious cover (%) for the Hop Brook sub-regional watershed**



### *Agricultural Activities*

Agricultural operations are an important economic activity and landscape feature in many areas of the State. Runoff from agricultural fields may contain pollutants such as bacteria and nutrients (USEPA, 2011a). This runoff can include pollutants from farm practices such as storing manure, allowing livestock to wade in nearby waterbodies, applying fertilizer, and reducing the width of vegetated buffer along the shoreline. Agricultural land use makes up 7% of the Hop Brook watershed. Hop Brook flows through a large agricultural area just upstream of the Simsbury Farms Recreation Complex and Public Golf Course. This agricultural area includes several large hayfields, row crops, and a cattle farm with 1-130 cattle along Route 309 adjacent to Hop Brook (Figure 6). A chicken farm with 1-350 chickens was also identified in Figure 6, but is located upstream of Stratton Brook, approximately one half mile south of Hop Brook. Multiple hayfields and livestock farms are located throughout the watershed and pose as a threat to the water quality of Hop Brook.

### *Wildlife and Domestic Animal Waste*

Wildlife and domestic animals within the Hop Brook watershed represent another potential source of bacteria. 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 to the nearest surface water. These physical land alterations can exacerbate the impact of natural sources on water quality (USEPA, 2001). As the majority of the upstream portion of the watershed is undeveloped, wildlife waste is a potential source of bacteria to Hop Brook. However, much of the residential development in the watershed is located downstream near the impaired segment of Hop Brook, particularly along Route 309. As such, waste from domestic animals, such as dogs, may also be contributing to bacteria concentrations in the Hop Brook watershed.

The Simsbury Farms Recreation Complex and Public Golf Course, Hop Meadow Country Club, and Simsbury High School are located within the Hop Brook watershed adjacent to the impaired segment (Figure 6). Geese and other waterfowl are known to congregate in open areas including recreational fields, agricultural crop fields, and golf courses. In addition to creating a nuisance, large numbers of geese can also create unsanitary conditions on the grassed areas and cause water quality problems due to bacterial contamination associated with their droppings. Large populations of geese can also lead to habitat destruction as a result of overgrazing on wetland and riparian plants.

### *Insufficient Septic Systems and Illicit Discharges*

As shown in Figure 6, the majority of the Hop Brook watershed relies on onsite wastewater treatment systems, such as septic systems, particularly as Hop Brook moves upstream from the confluence with the Farmington River. Insufficient or failing septic systems can be significant sources of bacteria by allowing raw waste to reach surface waters. In Connecticut, local health directors or health districts are responsible for keeping track of any reported insufficient or failing septic systems in a specific municipality. The Town of Simsbury is part of the Farmington Valley Health District (http://www.fvhd.org/).

As shown in Figure 6, much of the watershed in the commercial and dense residential areas directly upstream of the confluence with the Farmington River along Route 303 and along Route 10 (US 202) relies on the municipal sewer system. Sewer system leaks and other illicit discharges or connections can contribute bacteria to nearby surface waters.

## Additional Sources

There may be other sources not listed here or identified in Figure 6 that contribute to the observed water quality impairment in Hop Brook. Further monitoring and investigation will confirm the listed sources and discover additional ones. More detailed evaluation of potential sources is expected to become available as activities are conducted to implement this TMDL.

## Land Use/Landscape

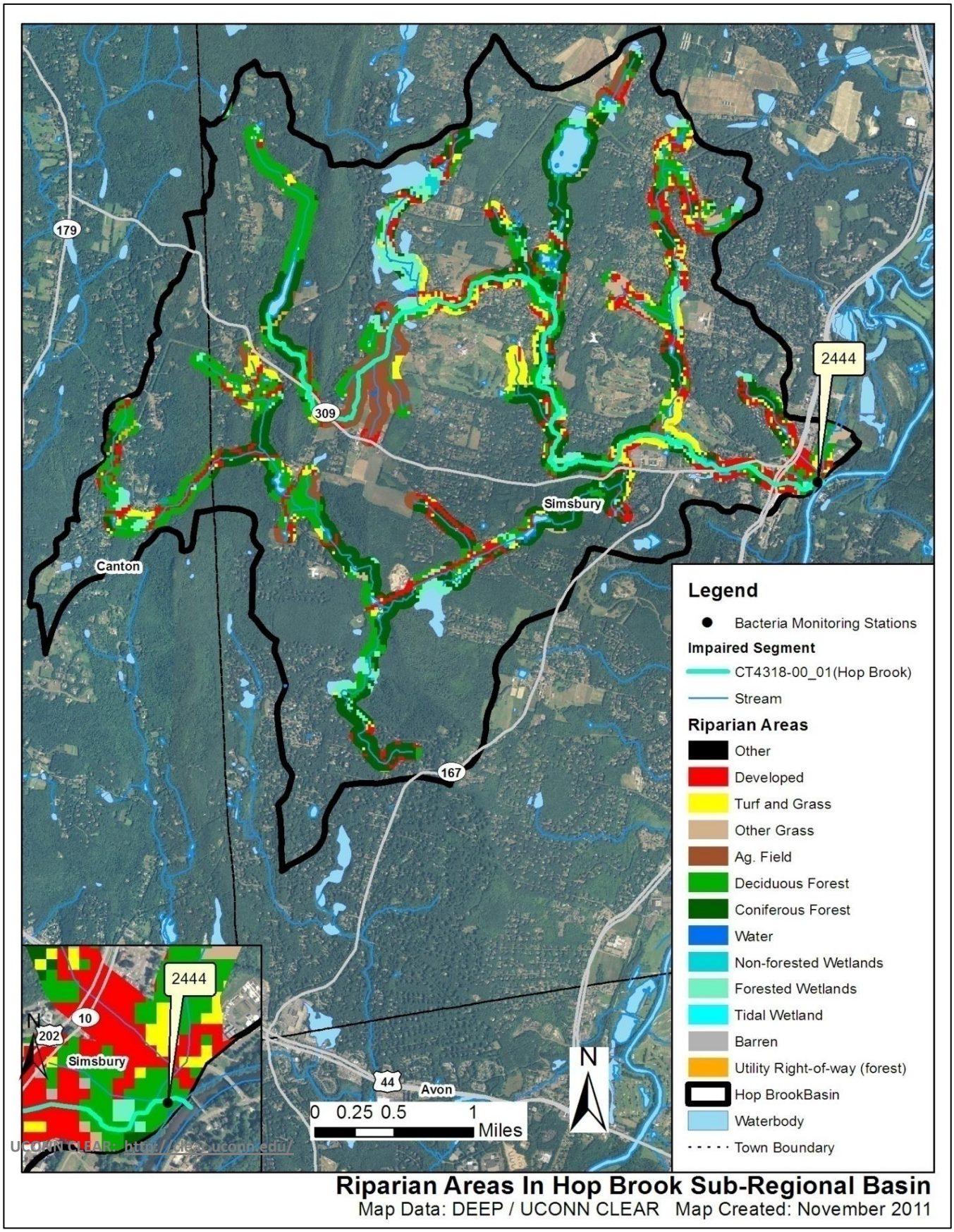
### *Riparian Buffer Zones*

The riparian buffer zone is the area of land located immediately adjacent to streams, lakes, or other surface waters. The boundary of the riparian zone and the adjoining uplands is gradual and not always well-defined. However, riparian zones differ from uplands because of high levels of soil moisture, frequent flooding, and the unique assemblage of plant and animal communities found there. Through the interaction of their soils, hydrology, and vegetation, natural riparian areas influence water quality as contaminants are taken up into plant tissues, adsorbed onto soil particles, or modified by soil organisms. Any change to the natural riparian buffer zone can reduce the effectiveness of the natural buffer and has the potential to contribute to water quality impairment (USEPA, 2011b).

The CLEAR program at UCONN has created streamside buffer layers for the entire State of Connecticut (http://clear.uconn.edu/), which have been used in this TMDL. Analyzing this information can reveal potential sources and implementation opportunities at a localized level. The land use directly adjacent to a waterbody can have direct impacts on water quality from surface runoff sources.

The majority of the riparian zone for the upper half of the impaired segment of Hop Brook is characterized by forested land use with a large agricultural area. The downstream half of the impaired segment of Hop Brook is characterized by developed land use with portions of turf/grass near the golf courses and forested land use in the low-density residential development areas (Figure 10). As previously noted, if not properly treated, runoff from developed areas may contain pollutants such as bacteria and nutrients.

**Figure 10: Riparian buffer zone information for the Hop Brook watershed**



## CURRENT MANAGEMENT ACTIVITIES

As indicated previously, the Town of Simsbury is regulated under the MS4 program. The MS4 General Permit is required for any municipality with urbanized areas that initiates, creates, originates or maintains any discharge of stormwater from a storm sewer system to waters of the state. The MS4 permit requires towns to design a Stormwater Management Plan (SMP) to reduce the discharge of pollutants in stormwater to improve water quality. The plan must address the following 6 minimum measures:

1. Public Education and Outreach.
2. Public Involvement/Participation.
3. Illicit discharge detection and elimination.
4. Construction site stormwater runoff control.
5. Post-construction stormwater management in new development and redevelopment.
6. Pollution prevention/good housekeeping for municipal operations.

Each municipality is also required to submit an annual update outlining the steps they are taking to meet the six minimum measures. All updates that address bacterial contamination in the watershed are summarized in Tables 7.

**Table 7: Summary of MS4 requirement updates related to the reduction of bacterial contamination from Simsbury, CT (GSM000071)**

| Minimum Measure | Simsbury Annual Report (2010) |
|---|---|
| Public Outreach and Education | No updates provided. |
| Public Involvement and Participation | No updates provided. |
| Illicit Discharge Detection and Elimination | 1) Checked all drainage outfalls for discharge issues, type of outfall construction, and condition of structures and pipes.<br><br>2) Identified cases of seepage from nearby sub-surface septic systems and referred to Farmington Valley Health District for repair or connection to sanitary sewer system. |
| Construction Site Stormwater Runoff Control | 1) Administered Erosion and Sedimentation Control Ordinance for 2 development projects. |
| Post Construction Stormwater Management | No updates provided. |
| Pollution Prevention and Good Housekeeping | 1) Used new treated salt mixture for road snow and ice control system, which eliminated sand deposition to drainage system.<br><br>2) Continued catch basin cleaning program of critical basins that directly discharge to waterbodies or infiltration structures.<br><br>3) Continued street sweeping program of 324 lane miles. |

## RECOMMENDED NEXT STEPS

The Town of Simsbury has developed and implemented programs to protect water quality from bacterial contamination. Future mitigative activities are necessary to ensure the long-term protection of Hop Brook and have been prioritized below.

### 1) Identify areas along Hop Brook to implement Best Management Practices (BMPs) to control stormwater runoff.

As noted previously, 33% of the Hop Brook watershed is considered urban, and the Town of Simsbury is an MS4 community regulated by the MS4 program. The lower portion of the watershed near the confluence with the Farmington River has an impervious cover between 12 and 15%, and bacteria sampling at Station 2444 along the impaired segment at the confluence with the Farmington River exceeded the wet-weather geometric mean limit. As such, stormwater runoff is most likely contributing bacteria to the waterbodies.

To identify areas that are contributing bacteria to the impaired segment, the towns should conduct wet-weather sampling at stormwater outfalls that discharge directly to the impaired segment in the Hop Brook watershed. Outfalls that show high bacteria concentrations should be prioritized for BMP installation. To treat stormwater runoff, the towns should identify areas along the impaired segment to install BMPs designed to encourage stormwater to infiltrate into the ground before entering the waterbodies. These BMPs would disconnect impervious areas and reduce pollutant loads to the river. More detailed information and BMP recommendations can be found in the core TMDL document. It may also be appropriate to investigate the large commercial complexes adjacent to Hop Brook, including Simsbury High School and various industrial buildings, to ensure adequate stormwater mitigation measures are being taken.

### 2) Ensure there are sufficient buffers on agricultural lands along Hop Brook.

Agricultural land use represents 7% of the Hop Brook watershed, and is a concern for water quality, particularly with several hayfields, row crops, and cattle and chicken farms identified along the impaired segment. If not already in place, agricultural producers should work with the CT Department of Agriculture and the U.S. Department of Agriculture Natural Resources Conservation Service to develop conservation plans for their farming activities within the watershed. These plans should focus on ensuring that there are sufficient stream buffers, that fencing exists to restrict livestock and horse access to streams and wetlands, and that animal waste handling, disposal, and other appropriate Best Management Practices (BMPs) are in place.

### 3) Evaluate municipal education and outreach programs regarding animal waste.

As most of the area surrounding the impaired segment is developed by residential neighborhoods and upstream portions are forested, any education and outreach program should highlight the importance of managing waste from horses, dogs, and other pets and not feeding waterfowl and wildlife. The town and residents can take measures to minimize waterfowl-related impacts such as allowing tall, coarse vegetation to grow in the riparian areas of Hop Brook that are frequented by waterfowl. Waterfowl, especially grazers like geese, prefer easy access to water. Maintaining an uncut vegetated buffer along the shore will make the habitat less desirable to geese and encourage migration. In addition, any educational program should emphasize that feeding waterfowl, such as ducks, geese, and swans, may contribute to water quality impairments in Hop Brook and can harm human health and the environment. Animal wastes should be disposed of away from any waterbody or storm drain system. BMPs effective at

reducing the impact of animal waste on water quality include installing signage, providing pet waste receptacles in high-use areas, enacting ordinances requiring the clean-up of pet waste, and targeting educational and outreach programs in problem areas.

**4) Continue monitoring of permitted sources.**

Bacteria data are currently not available for any of the permitted discharges in the watershed. Further monitoring will provide information essential to better locate, understand, and reduce pollution sources. If any current monitoring is not done with appropriate bacterial indicator based on the receiving water, then a recommended change during the next permit reissuance is to include the appropriate indicator species. If facility monitoring indicates elevated bacteria, then implementation of permit required, and voluntary measures to identify and reduce sources of bacterial contamination at the facility are an additional recommendation. Regular monitoring should be established for all permitted sources to ensure compliance with permit requirements and to determine if current requirements are adequate or if additional measures are necessary for water quality protection.

Section 6(k) of the MS4 General Permit requires a municipality to modify their Stormwater Management Plan to implement the TMDL within four months of TMDL approval by EPA if stormwater within the municipality contributes pollutant(s) in excess of the allocation established by the TMDL. For discharges to impaired waterbodies, the municipality must assess and modify the six minimum measures of its plan, if necessary, to meet TMDL standards. Particular focus should be placed on the following plan components: public education, illicit discharge detection and elimination, stormwater structures cleaning, and the repair, upgrade, or retrofit of storm sewer structures. The goal of these modifications is to establish a program that improves water quality consistent with TMDL requirements. Modifications to the Stormwater Management Plan in response to TMDL development should be submitted to the Stormwater Program of DEEP for review and approval.

Table 8 details the appropriate bacteria criteria for use as waste load allocations established by this TMDL for use as water quality targets by permittees as permits are renewed and updated, within the Hop Brook watershed.

For any municipality subject to an MS4 permit and affected by a TMDL, the permit requires a modification of the SMP to include BMPs that address the included impairment. In the case of bacteria related impairments municipal BMPs could include: implementation or improvement to existing nuisance wildlife programs, septic system monitoring programs, any additional measures that can be added to the required illicit discharge detection and elimination (IDDE) programs, and increased street sweeping above basic permit requirements. Any non-MS4 municipalities can implement these same types of initiatives in effort to reduce bacteria source loading to impaired waterways.

Any facilities that discharge non-MS4 regulated stormwater should update their Pollution Prevention Plan to reflect BMPs that can reduce bacteria loading to the receiving waterway. These BMPs could include nuisance wildlife control programs and any installations that increase surface infiltration to reduce overall stormwater volumes. Facilities that are regulated under the Commercial Activities Stormwater Permit should report any updates to their SMP in their summary documentation submitted to DEEP.

**Table 8. Bacteria (e.coli) TMDLs, WLAs, and LAs for Recreational Use**

| | | Instantaneous *E. coli* (#/100mL) | | | | | | Geometric Mean *E. coli* (#/100mL) | |
|---|---|---|---|---|---|---|---|---|---|
| **Class** | **Bacteria Source** | **WLA[6]** | | | **LA[6]** | | | **WLA[6]** | **LA[6]** |
| A | Non-Stormwater NPDES | 0 | 0 | 0 | | | | 0 | |
| | CSOs | 0 | 0 | 0 | | | | 0 | |
| | SSOs | 0 | 0 | 0 | | | | 0 | |
| | Illicit sewer connection | 0 | 0 | 0 | | | | 0 | |
| | Leaking sewer lines | 0 | 0 | 0 | | | | 0 | |
| | Stormwater (MS4s) | 235[7] | 410[7] | 576[7] | | | | 126[7] | |
| | Stormwater (non-MS4) | | | | 235[7] | 410[7] | 576[7] | | 126[7] |
| | Wildlife direct discharge | | | | 235[7] | 410[7] | 576[7] | | 126[7] |
| | Human or domestic animal direct discharge[5] | | | | 235 | 410 | 576 | | 126 |

(1) **Designated Swimming.** Procedures for monitoring and closure of bathing areas by State and Local Health Authorities are specified in: Guidelines for Monitoring Bathing Waters and Closure Protocol, adopted jointly by the Department of Environmental Protections and the Department of Public Health. May 1989. Revised April 2003 and updated December 2008.

(2) **Non-Designated Swimming.** Includes areas otherwise suitable for swimming but which have not been designated by State or Local authorities as bathing areas, waters which support tubing, water skiing, or other recreational activities where full body contact is likely.

(3) **All Other Recreational Uses.**

(4) Criteria for the protection of recreational uses in Class B waters do not apply when disinfection of sewage treatment plant effluents is not required consistent with Standard 23. (Class B surface waters located north of Interstate Highway I-95 and downstream of a sewage treatment plant providing seasonal disinfection May 1 through October 1, as authorized by the Commissioner.)

(5) Human direct discharge = swimmers

(6) Unless otherwise required by statute or regulation, compliance with this TMDL will be based on ambient concentrations and not end-of-pipe bacteria concentrations

(7) Replace numeric value with “natural levels” if only source is naturally occurring wildlife. Natural is defined as the biological, chemical and physical conditions and communities that occur within the environment which are unaffected or minimally affected by human influences (CT DEEP 2011a). Sections 2.2.2 and 6.2.7 of this Core Document deal with BMPs and delineating type of wildlife inputs.

**5) Develop a system to monitor septic systems.**

The majority of the Hop Brook watershed relies on septic systems. If not already in place, Simsbury should establish a program to ensure that existing septic systems are properly operated and maintained, and create an inventory of existing septic 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 systems within a reasonable timeframe can be adopted. The town can also develop a program to assist citizens with the replacement and repair of older and failing systems. The Town of Simsbury already identified seepage from a subsurface septic system and reported it to the Farmington Valley Health District.

**6) Implement a program to evaluate the sanitary sewer system.**

The downstream portion of the Hop Brook watershed near the confluence with the Farmington River relies on a municipal sewer system (Figure 6). It is important for Simsbury to develop a program to evaluate its sanitary sewer and reduce leaks and overflows. This program should include periodic inspections of the sewer line.

## BACTERIA DATA AND PERCENT REDUCTIONS TO MEET THE TMDL

### Table 9: Hop Brook Bacteria Data

***Waterbody ID:*** CT4318-00_01

***Characteristics:*** Freshwater, Class A, Potential Drinking Water Supplies, Habitat for Fish and other Aquatic Life and Wildlife, Recreation, Navigation, and Industrial and Agricultural Water Supply

***Impairment:*** Recreation (*E. coli bacteria)*

***Water Quality Criteria for E. coli:***

Geometric Mean: 126 colonies/100 mL

Single Sample: 410 colonies/100 mL

***Percent Reduction to meet TMDL:***

Geometric Mean: **62%**

Single Sample: **87%**

***Data:*** 2007-2009 from CT DEEP targeted sampling efforts, 2012 TMDL Cycle

**Single sample *E. coli* (colonies/100 mL) data from Station 2444 on Hop Brook with annual geometric means calculated**

| Station Name | Station Location | Date | Results | Wet/Dry | Geomean |
|---|---|---|---|---|---|
| 2444 | Old Bridge Road crossing | 6/4/2007 | 2419 | wet | 117 |
| 2444 | Old Bridge Road crossing | 6/18/2007 | 228 | dry | |
| 2444 | Old Bridge Road crossing | 7/2/2007 | 75 | dry | |
| 2444 | Old Bridge Road crossing | 7/16/2007 | 75 | dry | |
| 2444 | Old Bridge Road crossing | 8/13/2007 | 41 | dry | |
| 2444 | Old Bridge Road crossing | 8/27/2007 | 20 | dry | |
| 2444 | Old Bridge Road crossing | 6/9/2008 | 388 | wet | **328* (62%)** |
| 2444 | Old Bridge Road crossing | 6/23/2008 | **3255* (87%)** | wet | |
| 2444 | Old Bridge Road crossing | 7/7/2008 | 185 | dry | |
| 2444 | Old Bridge Road crossing | 7/21/2008 | 576 | wet | |
| 2444 | Old Bridge Road crossing | 8/4/2008 | 108 | dry | |
| 2444 | Old Bridge Road crossing | 8/18/2008 | 86 | dry | |

**Single sample *E. coli* (colonies/100 mL) data from Station 2444 on Hop Brook with annual geometric means calculated (continued)**

| Station Name | Station Location | Date | Results | Wet/Dry | Geomean |
|---|---|---|---|---|---|
| 2444 | Old Bridge Road crossing | 6/1/2009 | 98 | dry | 239 |
| 2444 | Old Bridge Road crossing | 6/15/2009 | 1314 | wet | |
| 2444 | Old Bridge Road crossing | 6/29/2009 | 75 | dry | |
| 2444 | Old Bridge Road crossing | 7/13/2009 | 134 | dry | |
| 2444 | Old Bridge Road crossing | 7/27/2009 | 813 | wet | |
| 2444 | Old Bridge Road crossing | 8/10/2009 | 183 | dry | |
| 2444 | Old Bridge Road crossing | 8/24/2009 | 228 | wet | |

**Shaded cells indicate an exceedance of water quality criteria**

***Indicates single sample and geometric mean values used to calculate the percent reduction**

**Wet and dry weather geometric mean values for Station 2444 on Hop Brook**

| Station Name | Station Location | Years Sampled | Number of Samples | | Geometric Mean | | |
|---|---|---|---|---|---|---|---|
| | | | Wet | Dry | All | Wet | Dry |
| 2444 | Old Bridge Road crossing | 2007-2009 | 7 | 12 | 211 | 886 | 91 |

**Shaded cells indicate an exceedance of water quality criteria**

**Weather condition determined from rain gage at the Hartford Bradley International Airport**

## REFERENCES

Costa, Joe (2011). Calculating Geometric Means. Buzzards Bay National Estuary Program. **Online**: http://www.buzzardsbay.org/geomean.htm

CTDEEP (2010). State of Connecticut Integrated Water Quality Report. **Online:**

http://www.ct.gov/dep/lib/dep/water/water_quality_management/305b/ctiwqr10final.pdf

CTDEEP (2011). State of Connecticut Water Quality Standards. **Online:** http://www.ct.gov/dep/lib/dep/water/water_quality_standards/wqs_final_adopted_2_25_11.pdf

CWP (2003). Impacts of Impervious Cover on Aquatic Systems. Center for Watershed Protection. **Online**: http://clear.uconn.edu/projects/tmdl/library/papers/Schueler_2003.pdf

Federal Register 67 (March 15, 2002) 11663-11670. Urban Area Criteria for Census 2000.

Mallin, M.A., K.E. Williams, E.C. Escham, R.P. Lowe (2000). Effect of Human Development on Bacteriological Water Quality in Coastal Wetlands. Ecological Applications 10: 1047-1056.

USEPA (2001). Managing Pet and Wildlife Waste to Prevent Contamination of Drinking Water. **Online**: http://www.epa.gov/safewater/sourcewater/pubs/fs_swpp_petwaste.pdf.

USEPA (2011a). Managing Nonpoint Source Pollution from Agriculture. **Online:** http://water.epa.gov/polwaste/nps/outreach/point6.cfm

USEPA (2011b). Riparian Zone and Stream Restoration. **Online:** http://epa.gov/ada/eco/riparian.html

USEPA (2011c). Land Use Impacts on Water. **Online**: http://epa.gov/greenkit/toolwq.htm