



# North Branch Park River

## Watershed Summary

### WATERSHED DESCRIPTION AND MAPS

The North Branch Park River watershed covers an area of approximately 18,437 acres in central Connecticut (Figure 1). There are multiple towns located at least partially in the watershed, including the municipalities of West Hartford, Hartford, and Bloomfield, CT.

The North Branch Park River watershed includes two segments impaired for recreation due to elevated bacteria levels. These segments were 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 waterbodies in the watershed (CT DEEP, 2010).

North Branch Park River (Segment 2) (CT4404-00\_02) is 5.39 miles long and begins at the confluence with Wash Brook just downstream of the confluence of Wash Brook and Beamans Brook in Bloomfield, continues southerly into West Hartford, flows parallel to Route 189, flows into Hartford, crosses US Route 44 and Asylum Avenue, and ends at the downstream side of Farmington Avenue at the entrance of the North Branch Park River (Segment 1) conduit in Hartford. North Branch Park River (Segment 1) (CT4404-00\_01) is 0.51 miles long completely within an underground conduit and begins near Farmington Avenue and ends at the confluence with the Park River just downstream of the Interstate 84 crossing in Hartford. These segments have been altered by human activities, including rerouting and channelization prior to 1985, and current maps may not reflect the true routing of these urban streams.

The impaired segments of North Branch Park River have a water quality classification of A. Designated uses include potential drinking water supply, habitat for fish and other aquatic life and wildlife, recreation, and industrial and agricultural water supply. These segments of the river are impaired due to elevated bacteria concentrations, affecting the designated use of recreation. As there are no designated beaches in these segments of North Branch Park River, the specific recreation impairment is for non-designated swimming and other water contact related activities.

### Impaired Segment Facts

#### **Impaired Segments:**

1. North Branch Park River (Segment 1) (CT4404-00\_01)
2. North Branch Park River (Segment 2) (CT4404-00\_02)

**Municipality:** West Hartford, Hartford, Bloomfield

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

4404-00\_01 (0.51); 4404-00\_02 (5.39)

#### **Water Quality Classification:**

Class A

#### **Designated Use Impairment:**

Recreation

#### **Sub-regional Basin Name and Code:**

North Branch Park River, 4404

**Regional Basin:** Connecticut

**Major Basin:** Park

**Watershed Area (acres):** 18,437

**MS4 Applicable?** Yes

**Applicable Season:** Recreation

Season (May 1 to September 30)

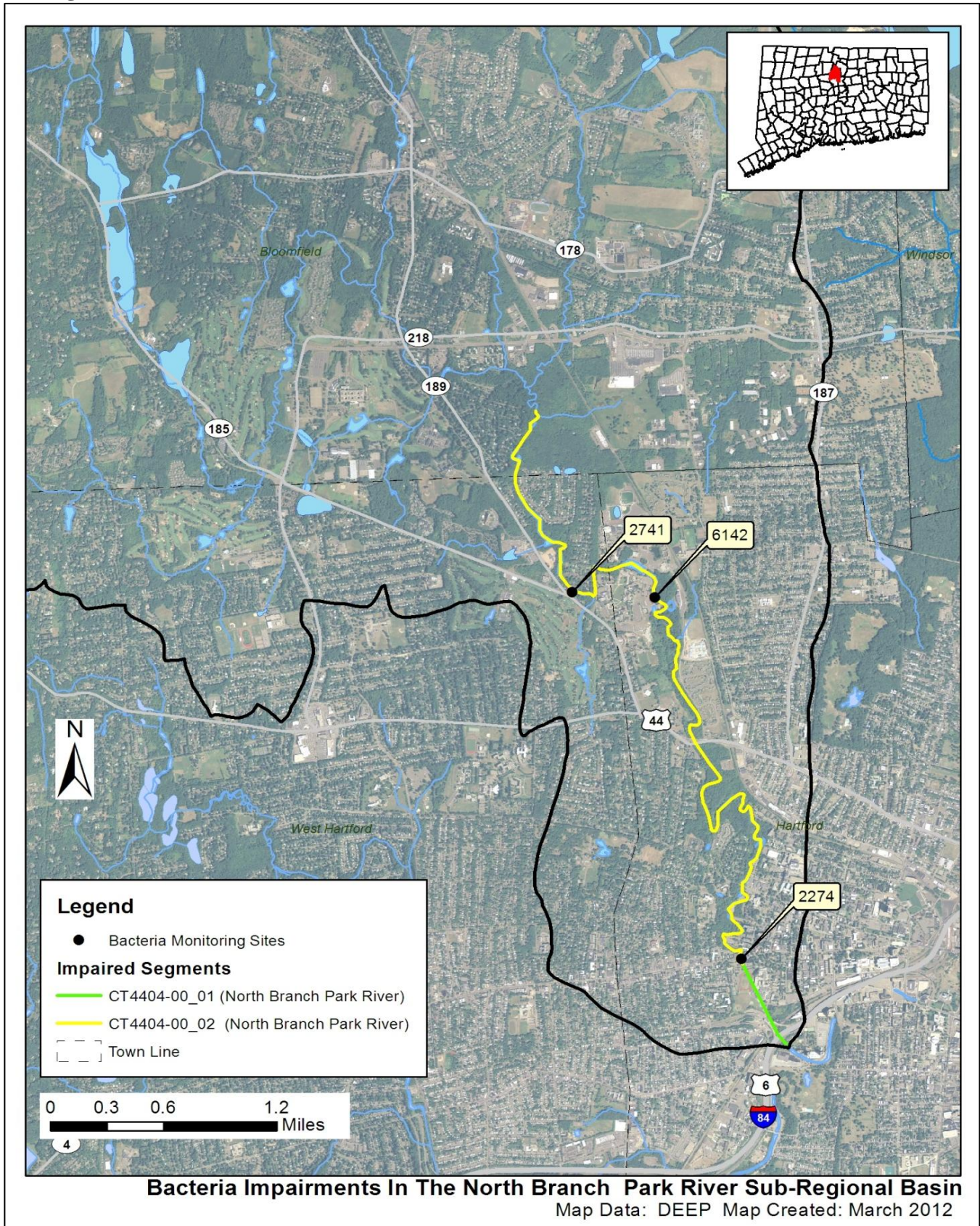
**Figure 1: Watershed location in Connecticut**



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

<b>Waterbody ID</b>	<b>Waterbody Name</b>	<b>Location</b>	<b>Miles</b>	<b>Aquatic Life</b>	<b>Recreation</b>	<b>Fish Consumption</b>
CT4404-00_01	North Branch Park River (Segment 1)	From mouth at confluence with Park River just DS of I84 crossing, US to entrance of conduit (entire segment in pipe) near Farmington Avenue, Hartford.	0.51	NOT	NOT	FULL
CT4404-00_02	North Branch Park River (Segment 2)	From DS side of Farmington Avenue (at entrance of conduit), US to confluence with Wash Brook (just DS of confluence of Wash Brook and Beamans Brook), Bloomfield.	5.39	NOT	NOT	FULL
<p><b>Shaded cells indicate impaired segment addressed in this TMDL</b>  <b>FULL = Designated Use Fully Supported</b>  <b>NOT = Designated Use Not Supported</b>  <b>U = Unassessed</b></p>						

Figure 2: GIS map featuring general information of the North Branch Park River 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 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 North Branch Park River watershed consists of 52% urban area, 33% forest, 11% agriculture, and 4% water. North Branch Park River (Segment 2) begins north of the University of Hartford Campus near the Hartford Country Club, and passes through dense residential development, row crops, a YMCA construction site, several recreational fields, apartment complexes, the University of Connecticut School of Law campus, and major commercial areas along Farmington and Asylum Avenues. North Branch Park River (Segment 1) is located entirely within an underground conduit, passing under Greater Hartford Classical Magnet School, various commercial businesses, and Interstate 84. Underground conduits and human alterations make it difficult to determine land use impacts from aerial maps, particularly for the end of North Branch Park River (Segment 2) as it connects with North Branch Park River (Segment 1).

**Figure 3: Land use within the North Branch Park River watershed**

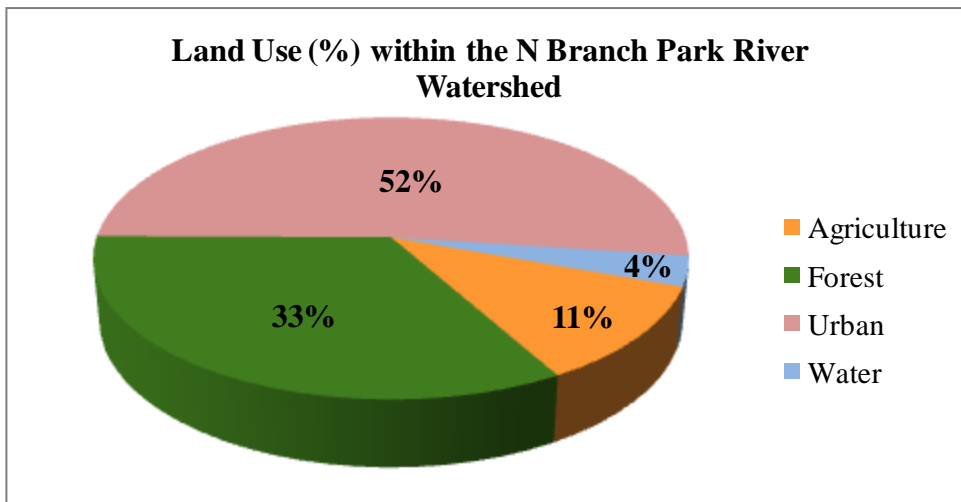
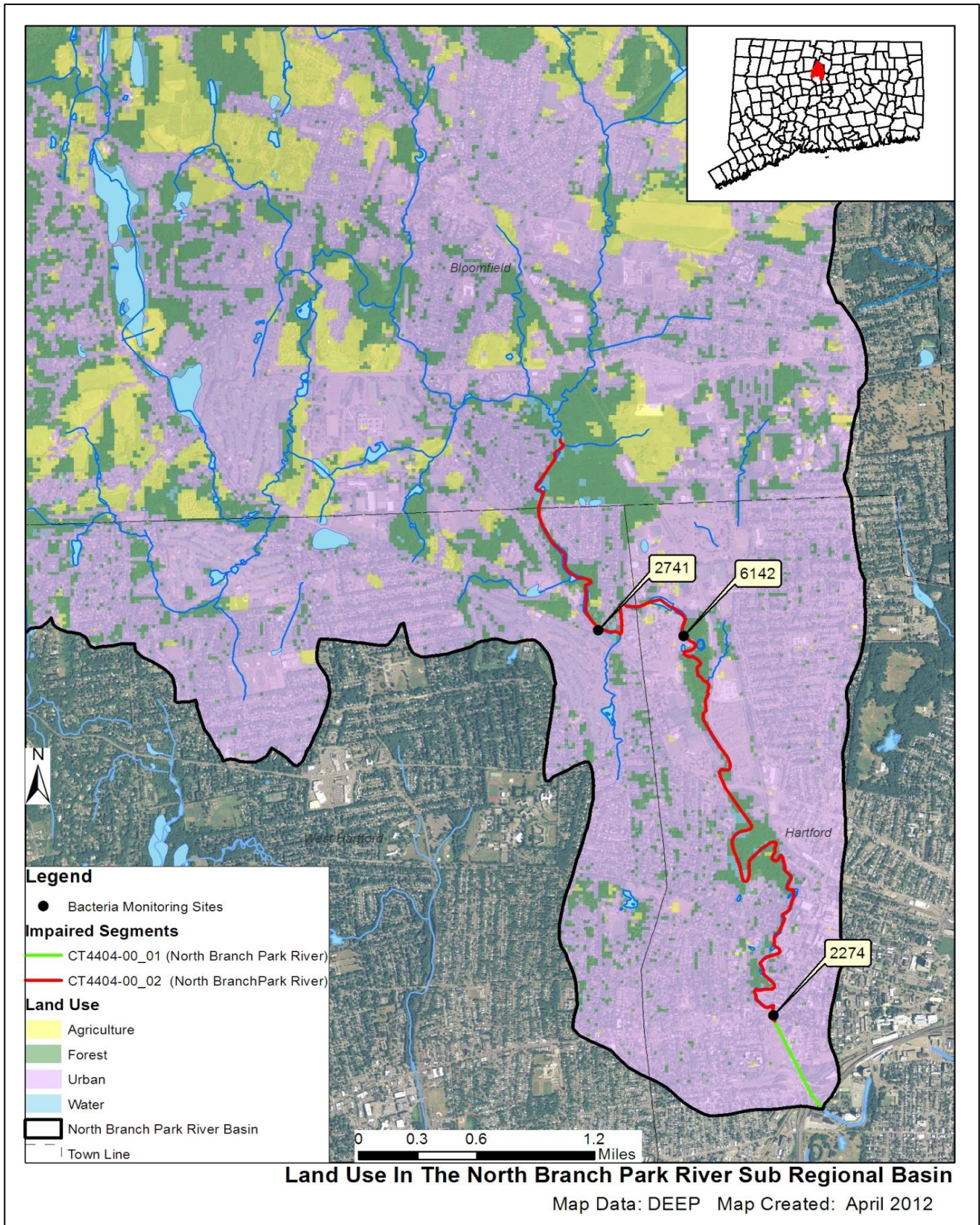


Figure 4: GIS map featuring land use for the North Branch Park River watershed at the sub-regional level



**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 the impaired segments in the North Branch Park River watershed (stations organized downstream to upstream)**

Waterbody ID	Waterbody Name	Station	Station Description	Municipality	Latitude	Longitude
CT4404-00_02	North Branch Park River	2274	Behind #19 Woodland Street	Hartford	41.7672263056	-72.7032678333
		6142	NW corner of Lot C at the University of Hartford	West Hartford	41.7960000000	-72.7114000000
		2741	Sunny Reach Drive	Bloomfield	41.7970000000	-72.7200000000

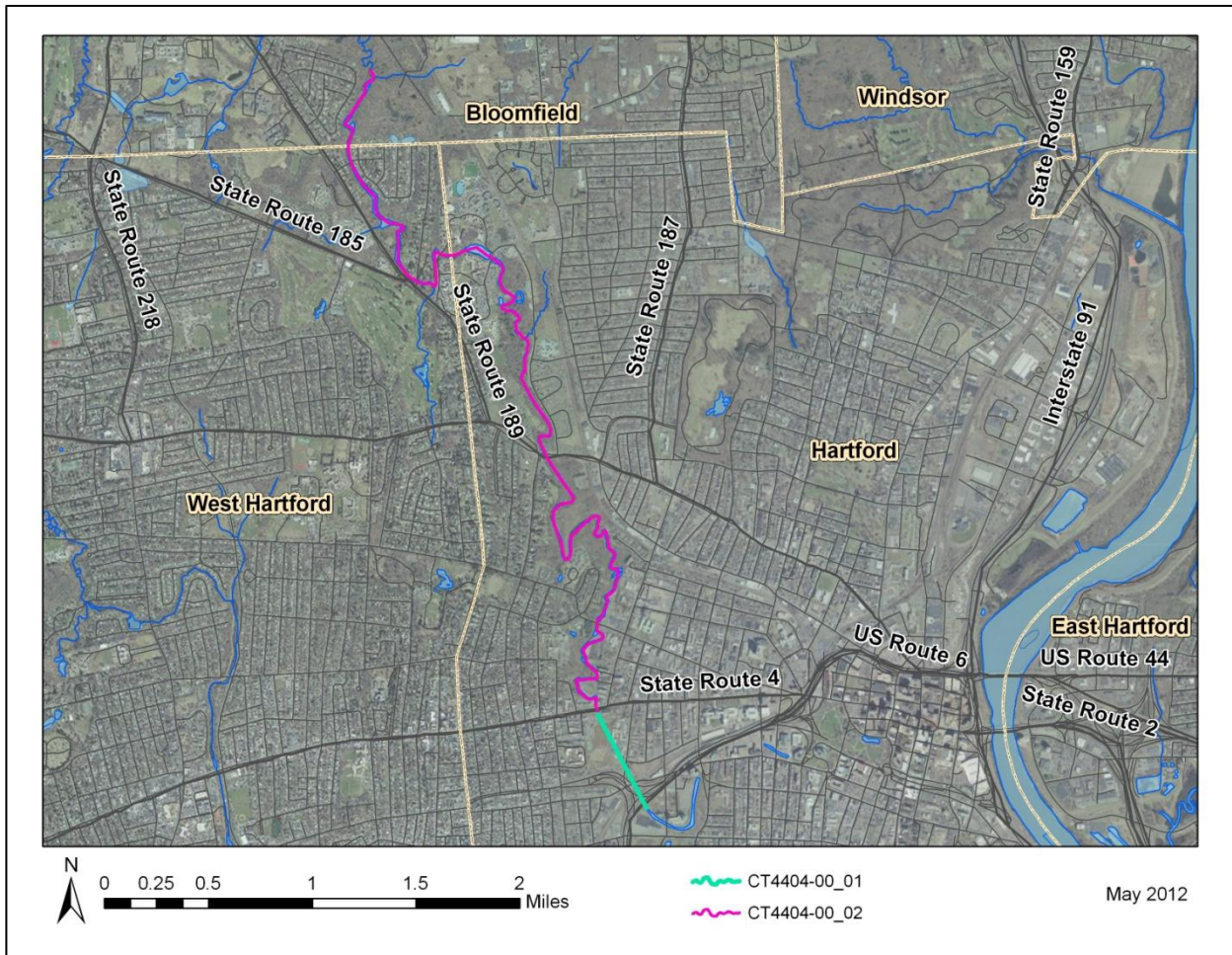
The impaired segments of North Branch Park River are Class A freshwater rivers (Figure 5). Their applicable designated uses are potential drinking water supply, habitat for fish and other aquatic life and wildlife, recreation, and industrial and agricultural water supply. Water quality analyses were conducted using data from three sampling locations (Stations 2274, 6142, and 2741) from 2008-2010 on North Branch Park River (Segment 2) (CT4404-00\_02) (Table 2). Percent reductions from the nearest station (Station 2274) upstream of North Branch Park River (Segment 1) were applied since bacteria data is currently not available for Segment 1. 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 13).

North Branch Park River (Segment 1) (CT4404-00\_01): Percent reductions for this segment were based on the nearest upstream station (Station 2274) on North Branch Park River (Segment 2). Station 2274 exceeded the WQS for *E. coli* for geometric mean and single sample values during all sampling years. Geometric mean values also exceeded the WQS for *E. coli* during both wet and dry-weather (Table 13).

North Branch Park River (Segment 2) (CT4404-00\_02): As shown in Table 13, geometric mean and single sample values exceeded the WQS for *E. coli* at all stations for all sampling years. Geometric mean values were also calculated for wet and dry-weather conditions, and Station 2274 and 2741 exceeded the WQS for *E. coli* during both wet and dry-weather and Station 6142 exceeded the WQS for *E. coli* during dry-weather only.

Due to the elevated bacteria measurements presented in Table 13, these segments of North Branch Park River did not meet CT's bacteria WQS, were identified as impaired, and were 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 the impaired segments of North Branch Park River (Segment 1 is located within an underground conduit)



**POTENTIAL BACTERIA SOURCES**

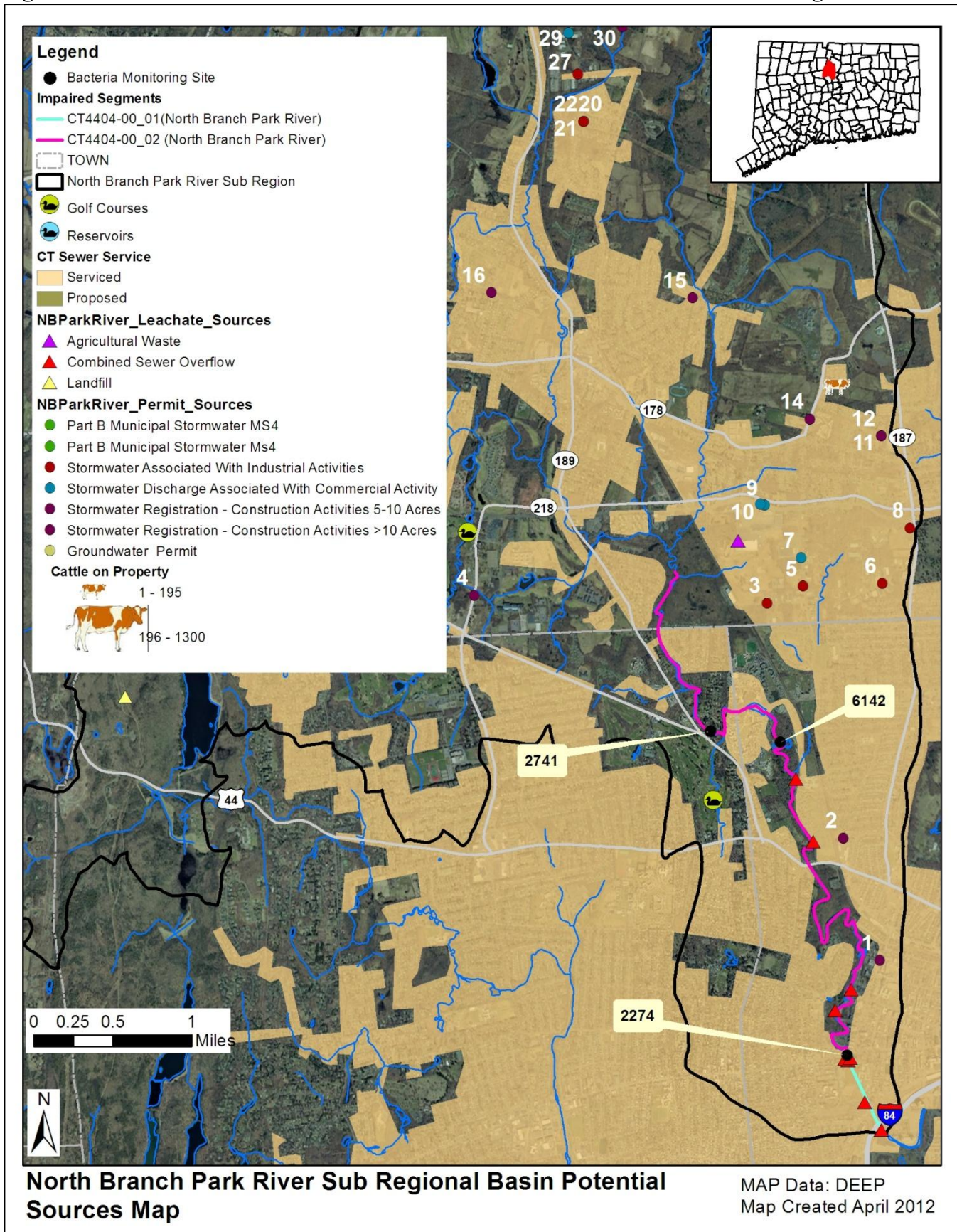
Potential sources of indicator bacteria in a watershed include point and non-point sources, such as stormwater runoff, agriculture, sanitary sewer overflows (collection system failures), illicit discharges, and inappropriate discharges to the waterbody. Potential sources that have been tentatively identified in the North Branch Park River watershed based on land use (Figures 3 and 4) and a collection of local information for the impaired waterbody are 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 segment. Further monitoring and investigation will confirm listed sources and discover additional ones. 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 North Branch Park River watershed**

<b>Impaired Segment</b>	<b>Permit Source</b>	<b>Illicit Discharge</b>	<b>CSO/SSO Issue</b>	<b>Failing Septic System</b>	<b>Agricultural Activity</b>	<b>Stormwater Runoff</b>	<b>Nuisance Wildlife/ Pets</b>	<b>Other</b>
North Branch Park River (Segment 1) CT4404-00_01	x	x	x	x		x	x	
North Branch Park River (Segment 2) CT4404-00_02	x	x	x	x	x	x	x	



Figure 6: Potential sources in the North Branch Park River 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 5. Additional investigation and monitoring could 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. When available, bacteria data results from these permitted sources are listed in Table 6.

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

Permit Code	Permit Description Type	Number in watershed
CT	Surface Water Discharges	0
GPL	Discharge of Swimming Pool Wastewater	0
GSC	Stormwater Discharge Associated with Commercial Activity	5
GSI	Stormwater Associated with Industrial Activity	18
GSM	Part B Municipal Stormwater MS4	3
GSN	Stormwater Registration – Construction	12
LF	Groundwater Permit (Landfill)	0
UI	Underground Injection	1

***Permitted Sources***

As shown in Table 5, there are multiple permitted discharges in the North Branch Park River watershed. Bacteria data from 2001-2003 from several of these industrial permitted facilities are included in Table 6. Although Connecticut does not have a recreation WQS for fecal coliform bacteria, multiple samples were high, exceeding 4,000 colonies/100 mL, including Kaman Aerospace Corporation (GSI000467), Nationwide Moving & Storage (GSI000869), Beacon Industries (GSI001006), Deringer-Ney, Inc. (GSI001526), and Metal Management Aerospace (GSI000683). Permitted sources discharging directly to the impaired segments are a potential source of bacterial contamination to North Branch Park River.

Figure 6 also identified multiple CSOs in the southern portion of the watershed along North Branch Park River (Segments 1 and 2). The North Branch Park River Watershed Management Plan (2010) identified CSOs as a primary source of bacterial contamination in the watershed. Overflowing CSOs will deposit

raw sewage with high levels of bacteria into receiving water. More information on CSOs can be found in the core TMDL document (Section 6.2.5).

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 North Branch Park River watershed**

Town	Client	Permit ID	Permit Type	Site Name	Address	Map #
Bloomfield	Home Depot U.S.A., Inc.	GSC000214	Stormwater Discharge Associated With Commercial Activity	Home Depot, The	55 Granby Street	7
Bloomfield	Lowe's Home Centers, Inc.	GSC000261	Stormwater Discharge Associated With Commercial Activity	Lowe's Home Centers, Inc.	325 Cottage Grove Road	9
Bloomfield	Home Depot U.S.A., Inc.	GSC000335	Stormwater Discharge Associated With Commercial Activity	Home Depot Distribution Center # 5979	74 Griffin Road S	35
Bloomfield	Home Depot Distribution Center	GSC000336	Stormwater Discharge Associated With Commercial Activity	Home Depot Distribution Center # 5982	170 Highland Park Drive	29
Bloomfield	Amcap Copaco, Llc	GSC000367	Stormwater Discharge Associated With Commercial Activity	Copaco Center	335 Cottage Grove Road	10
Bloomfield	Birken Manufacturing Co.	GSI000225	Stormwater Associated With Industrial Activities	Birken Manufacturing Co., Inc.	3 Old Windsor Road	23
Bloomfield	Kaman Aerospace Corp.	GSI000467	Stormwater Associated With Industrial Activities	Helicopters Division	Old Windsor Road	22
Bloomfield	Kamatics Corp.	GSI000470	Stormwater Associated With Industrial Activities	Kamatics Corp.	1330 Blue Hills Avenue	28
Bloomfield	Nationwide Moving & Storage Co., Inc.	GSI000869	Stormwater Associated With Industrial Activities	Nationwide Moving & Storage Co., Inc.	100 Peters Road	27
Bloomfield	Beacon Industries, Inc.	GSI001006	Stormwater Associated With Industrial Activities	Beacon Industries, Inc.	85 Granby Street	5
Bloomfield	Turbine Controls, Inc.	GSI001136	Stormwater Associated With Industrial Activities	Turbine Controls, Inc.	5 Old Windsor Road	26
Bloomfield	Capewell Horsenails, Inc.	GSI001273	Stormwater Associated With Industrial Activities	Capewell Horsenails, Inc.	1404 Blue Hills Avenue	32

**Table 5: Permitted facilities within the North Branch Park River watershed (continued)**

Town	Client	Permit ID	Permit Type	Site Name	Address	Map #
Bloomfield	Finlay Printing, Llc	GSI001320	Stormwater Associated With Industrial Activities	Finlay Printing, Llc	44 Tobey Road	3
Bloomfield	Deringer-Ney, Inc.	GSI001526	Stormwater Associated With Industrial Activities	Deringer-Ney, Inc.	2 Douglas Street, Ney Industrial Park	8
Bloomfield	Pepperidge Farm, Inc.	GSI001626	Stormwater Associated With Industrial Activities	Pepperidge Farm Bloomfield Plant	1414 Blue Hills Avenue	33
Bloomfield	JDS Uniphase Corp.	GSI001833	Stormwater Associated With Industrial Activities	JDS Uniphase Corp.	45 Griffin Road S	37
Bloomfield	Aqua Blasting Corp.	GSI002082	Stormwater Associated With Industrial Activities	Aqua Blasting Corp.	2 Northwood Drive	17
Bloomfield	Turbine Controls, Inc.	GSI002154	Stormwater Associated With Industrial Activities	Turbine Controls, Inc.	5 Old Windsor Road	24
Bloomfield	Turbine Controls, Inc.	GSI002154	Stormwater Associated With Industrial Activities	Turbine Controls, Inc.	5 Old Windsor Road	25
Bloomfield	Aerospace Alloys, Inc.	GSI002166	Stormwater Associated With Industrial Activities	Aerospace Alloys, Inc.	11 Britton Drive	6
Bloomfield	Wood Group Pratt & Whitney Industrial Engine Services Llc	GSI002172	Stormwater Associated With Industrial Activities	Bloomfield Blue Hills Avenue Facility	1460 Blue Hills Avenue	31
Bloomfield	Home Depot U.S.A., Inc.	GSI002301	Stormwater Associated With Industrial Activities	Home Depot Distribution Center # 5979	74 Griffin Road S	34
Bloomfield	Otis Elevator Co.	GSI002319	Stormwater Associated With Industrial Activities	Otis Elevator Co.	212 West Newberry Road	38
Bloomfield	Town Of Bloomfield	200903888	Part B Municipal Stormwater MS4	Bloomfield, Town Of	MS4 Permit	19
Bloomfield	Town Of Bloomfield	GSM000035	Part B Municipal Stormwater MS4	Bloomfield, Town Of	MS4 Permit	21
Bloomfield	Cat Developers Five Llc	GSN001670	Stormwater Registration - Construction Activities 5-10 Acres	Edwards Way	4 Capewell Drive	36
Bloomfield	Town Of Bloomfield	GSN001788	Stormwater Registration - Construction Activities >10 Acres	Bloomfield Early Childhood Magnet School	44 Brown Street	16

**Table 5: Permitted facilities within the North Branch Park River watershed (continued)**

Town	Client	Permit ID	Permit Type	Site Name	Address	Map #
Bloomfield	Gillette Ridge, Llc	GSN001817	Stormwater Registration - Construction Activities 5-10 Acres	The Greens at Gillette Ridge Area D	Hall Boulevard	4
Bloomfield	R & D Dynamics Corp.	GSN001872	Stormwater Registration - Construction Activities 5-10 Acres	R & D Dynamics Corp.	49 W Dudley Town Road	18
Bloomfield	Ludlow Construction Company, Inc.	GSN002141	Stormwater Registration - Construction Activities 5-10 Acres	Water Main Replacement in Cold Spring Drive	Cold Spring Drive	13
Bloomfield	Mather Corp.	GSN002152	Stormwater Registration - Construction Activities 5-10 Acres	Metacomet School	185 School Street	14
Bloomfield	Mather Corp.	GSN002153	Stormwater Registration - Construction Activities 5-10 Acres	Laurel Elementary School	1 Filley Street	15
Bloomfield	Windsor Sanitation, Inc.	GSN002154	Stormwater Registration - Construction Activities 5-10 Acres	Windsor Sanitation	33 Mucko Road	30
Bloomfield	Connecticut Light and Power Company	GSN002224	Stormwater Registration - Construction Activities >10 Acres	Greater Springfield Reliability Project	12 Miles Of New Overhead 345-Kv Transmission Line	11
Bloomfield	Connecticut Light and Power Company	GSN002224	Stormwater Registration - Construction Activities >10 Acres	Greater Springfield Reliability Project	12 Miles Of New Overhead 345-Kv Transmission Line	12
Bloomfield	Kaman Aerospace Corp.	UI0000485	Groundwater Permit	Helicopters Division	Old Windsor Road	20
Hartford	City of Hartford	GSM000062	Part B Municipal Stormwater MS4	Hartford, City of	MS4 Permit	NA
Hartford	St Francis Hospital & Medical Center	GSN001758	Stormwater Registration - Construction Activities 5-10 Acres	John T. O'Connell Tower	Ashley, Atwood, and Collins Street	1
Hartford	Manafort Brothers, Inc.	GSN002078	Stormwater Registration - Construction Activities 5-10 Acres	Granby Street Area Sewer Separation Project 2/5	33-353 Granby Street	2
West Hartford	Town Of West Hartford	GSM000001	Part B Municipal Stormwater MS4	West Hartford, Town Of	MS4 Permit	NA

**Table 6: Industrial permits in the North Branch Park River watershed and available fecal coliform data (colonies/100mL). The results cannot be compared to the water quality standard as there is no recreation standard for fecal coliform.**

Town	Location	Permit Number	Receiving Water	Sample Location	Sample Date	Result
Bloomfield	Town of Bloomfield	GSI000382	North Branch Park River	Unknown	05/21/03	>600
Bloomfield	Kaman Aerospace Corp.	GSI000467	North Branch Park River	outfall #1	06/20/01	10
Bloomfield	Kaman Aerospace Corp.	GSI000467	North Branch Park River	outfall #1	06/05/02	230
Bloomfield	Kaman Aerospace Corp.	GSI000467	North Branch Park River	outfall #6	06/20/01	1,500
Bloomfield	Kaman Aerospace Corp.	GSI000467	North Branch Park River	outfall #6	06/05/02	4,300
Bloomfield	Kaman Aerospace Corp.	GSI000467	North Branch Park River	outfall #7	06/20/01	1,200
Bloomfield	Kaman Aerospace Corp.	GSI000467	North Branch Park River	outfall #7	06/05/02	220
Bloomfield	Kamatics Corp.	GSI000470	North Branch Park River	outfall #4	06/20/01	10
Bloomfield	Kamatics Corp.	GSI000470	North Branch Park River	outfall #4	06/05/02	960
Bloomfield	Mosey's (SMG, Inc.)	GSI000519	North Branch Park River	001	08/20/02	350
Bloomfield	Mosey's (SMG, Inc.)	GSI000519	North Branch Park River	CB @ road S of driveway	09/10/01	70
Bloomfield	Nationwide Moving & Storage	GSI000869	North Branch Park River	N pipe into CB-2	09/30/01	30
Bloomfield	Nationwide Moving & Storage	GSI000869	North Branch Park River	N pipe into CB-2	09/15/02	10,000
Bloomfield	Beacon Industries, Inc.	GSI001006	North Branch Park River	SW SD	02/27/02	90
Bloomfield	Beacon Industries, Inc.	GSI001006	North Branch Park River	SW SD	06/12/02	7,600
Bloomfield	Beacon Industries, Inc.	GSI001006	North Branch Park River	SW SD	07/09/03	70
Bloomfield	Turbine Controls, Inc.	GSI001136	Beamans Brook	Unknown	08/31/01	>600
Bloomfield	Turbine Controls, Inc.	GSI001136	Beamans Brook	Unknown	04/25/02	10
Bloomfield	Capewell Horesnails, Inc.	GSI001273	North Branch Park River	runoff @ back of facility	02/27/02	100

**Table 6: Industrial permits in the North Branch Park River watershed and available fecal coliform data (colonies/100mL). The results cannot be compared to the water quality standard as there is no recreation standard for fecal coliform. (continued)**

Town	Location	Permit Number	Receiving Water	Sample Location	Sample Date	Result
Bloomfield	Capewell Horesnails, Inc.	GSI001273	North Branch Park River	runoff @ back of facility	11/04/02	100
Bloomfield	Finlay Printing, Llc	GSI001320	Wash Brook	NW parking lot drain	03/13/02	300
Bloomfield	Deringer-Ney, Inc.	GSI001526	North Branch Park River	Unknown	08/20/02	5,200
Bloomfield	Deringer-Ney, Inc.	GSI001526	North Branch Park River	Unknown	06/18/03	1,100
Hartford	Metal Management Aerospace	GSI000683	North Branch Park River	Outfall #1	10/15/01	3,700
Hartford	Metal Management Aerospace	GSI000683	North Branch Park River	Outfall #1	06/04/02	2,520
Hartford	Metal Management Aerospace	GSI000683	North Branch Park River	Outfall #2	10/15/01	1,200
Hartford	Metal Management Aerospace	GSI000683	North Branch Park River	Outfall #2	06/04/02	2,220
Hartford	Metal Management Aerospace	GSI000683	North Branch Park River	Outfall #4	10/15/01	7,000
Hartford	Metal Management Aerospace	GSI000683	North Branch Park River	Outfall #4	06/04/02	4,600
Hartford	Metal Management Aerospace	GSI000683	North Branch Park River	Outfall #7	10/15/01	3,500
Hartford	Metal Management Aerospace	GSI000683	North Branch Park River	Outfall #7	08/29/02	>2000

***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 segments of the North Branch Park River watershed are located within the Towns of West Hartford and Bloomfield and the City of Hartford. These municipalities have designated urban areas, as defined by the U.S. Census Bureau, and are 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 required municipalities to develop a Stormwater Management Plan (SMP) to reduce the discharge of pollutants as well as to 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](http://www.ct.gov/dep/cwp/view.asp?a=2721&q=325702&depNav_GID=1654)).

Multiple MS4 outfalls have been sampled for *E. coli* bacteria in the watershed (Table 7). In Bloomfield, six MS4 outfalls were sampled from 2004 – 2009. Of these outfalls, all six exceeded the single sample



water quality standard of 410 colonies/100 mL on at least one sample date. In Hartford, three MS4 outfalls were sampled from 2006-2009. Of these outfalls, all three exceeded the single sample water quality standard of 410 colonies/100 mL on all sample dates.

**Table 7: List of MS4 sample locations and *E. coli* (colonies/100 mL) results in the North Branch Park River**

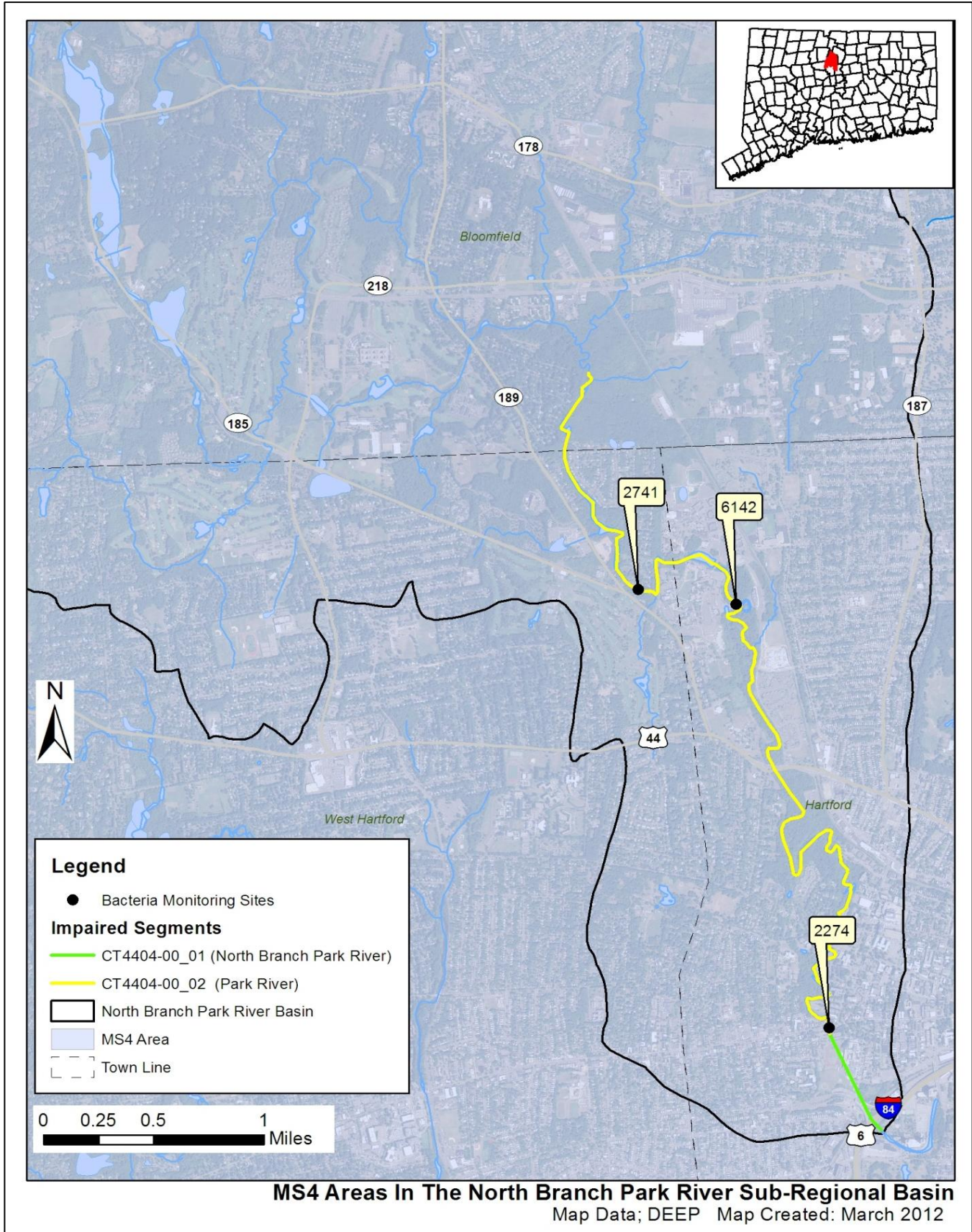
Town	Location	MS4 Type	Receiving Waters	Sample Date	Result
Bloomfield	C-1 Barnard Lane	Commercial	North Branch Park River	12/01/04	>600
Bloomfield	C-1 Barnard Lane	Commercial	North Branch Park River	11/09/05	70
Bloomfield	C-1 Barnard Lane	Commercial	North Branch Park River	10/17/06	500
Bloomfield	C-1 Barnard Lane	Commercial	North Branch Park River	11/25/08	1,250
Bloomfield	C-1 Barnard Lane	Commercial	North Branch Park River	06/09/09	4,110
Bloomfield	C-1 Barnard Lane	Commercial	North Branch Park River	07/21/09	5,480
Bloomfield	C-2 Seneca Road	Commercial	North Branch Park River	12/01/04	>600
Bloomfield	C-2 Seneca Road	Commercial	North Branch Park River	11/09/05	>600
Bloomfield	C-2 Seneca Road	Commercial	North Branch Park River	10/17/06	640
Bloomfield	C-2 Seneca Road	Commercial	North Branch Park River	11/25/08	2,500
Bloomfield	C-2 Seneca Road	Commercial	North Branch Park River	06/09/09	4,880
Bloomfield	C-2 Seneca Road	Commercial	North Branch Park River	07/21/09	210
Bloomfield	I-1 Granby Street	Industrial	North Branch Park River	12/01/04	80
Bloomfield	I-1 Granby Street	Industrial	North Branch Park River	11/09/05	10
Bloomfield	I-1 Granby Street	Industrial	North Branch Park River	10/17/06	300
Bloomfield	I-1 Granby Street	Industrial	North Branch Park River	11/25/08	1,000
Bloomfield	I-1 Granby Street	Industrial	North Branch Park River	06/09/09	14,140
Bloomfield	I-1 Granby Street	Industrial	North Branch Park River	07/21/09	2,280

**Table 7: List of MS4 sample locations and *E. coli* (colonies/100 mL) results in the North Branch Park River (continued)**

Town	Location	MS4 Type	Receiving Waters	Sample Date	Result
Bloomfield	I-2 East Dudley Town Road	Industrial	North Branch Park River	06/09/09	440
Bloomfield	I-2 East Dudley Town Road	Industrial	North Branch Park River	07/21/09	250
Bloomfield	R-1 Thistle Pond Drive	Residential	North Branch Park River	12/01/04	>600
Bloomfield	R-1 Thistle Pond Drive	Residential	North Branch Park River	11/09/05	10
Bloomfield	R-1 Thistle Pond Drive	Residential	North Branch Park River	10/17/06	80
Bloomfield	R-1 Thistle Pond Drive	Residential	North Branch Park River	11/25/08	600
Bloomfield	R-1 Thistle Pond Drive	Residential	North Branch Park River	06/09/09	4,110
Bloomfield	R-1 Thistle Pond Drive	Residential	North Branch Park River	07/21/09	7,700
Bloomfield	R-2 Brentwood Drive	Residential	North Branch Park River	12/01/04	>600
Bloomfield	R-2 Brentwood Drive	Residential	North Branch Park River	11/09/05	>600
Bloomfield	R-2 Brentwood Drive	Residential	North Branch Park River	10/17/06	720
Bloomfield	R-2 Brentwood Drive	Residential	North Branch Park River	11/25/08	6,600
Bloomfield	R-2 Brentwood Drive	Residential	North Branch Park River	06/09/09	2,760
Bloomfield	R-2 Brentwood Drive	Residential	North Branch Park River	07/21/09	960
Hartford	HAR-3 - W of Woodlawn Street - St Francis Hospital	Commercial	North Branch Park River	11/12/04	9,000
Hartford	HFD 2- Woodland Drive	Commercial	North Branch Park River	08/25/06	10,000
Hartford	HFD 2- Woodland Drive	Residential	North Branch Park River	09/11/09	14,000
Hartford	HFD 3 - Asylum Avenue	Commercial	North Branch Park River	08/25/06	10,000
Hartford	HFD 3 - Asylum Avenue	Commercial	North Branch Park River	12/10/08	1,800
Hartford	HFD 3 - Asylum Avenue	Commercial	North Branch Park River	06/09/09	10,000
Hartford	HFD 3 - Asylum Avenue	Commercial	North Branch Park River	09/11/09	26,000

**Shaded cells indicate an exceedance of single-sample based water quality criteria (410 colonies/100 mL)**

Figure 7: MS4 areas of the North Branch Park River 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 North Branch Park River watershed are described below. The 2010 North Branch Park River Watershed Management Plan describes many of these sources in greater detail ([http://www.ct.gov/dep/lib/dep/water/watershed\\_management/wm\\_plans/nbparkr/nbpr\\_wbp.pdf](http://www.ct.gov/dep/lib/dep/water/watershed_management/wm_plans/nbparkr/nbpr_wbp.pdf)).

### ***Illicit Discharges and Insufficient Septic Systems***

As shown in Figure 6, most of the watershed is serviced by sanitary sewers, and there are multiple CSOs located along the impaired segments in Hartford (Figure 6). Sewer system leaks and other illicit discharges may be contributing bacteria to the impaired segments of North Branch Park River.

Portions of North Branch Park River also rely on onsite wastewater treatment systems, such as septic systems. 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 Towns of West Hartford and Bloomfield are part of the West Hartford-Bloomfield Health District (<http://www.westhartford.org/whcares/TownDepartments/HealthDistrict/Health1.htm>). The City of Hartford has a full-time health director ([http://www.hartford.gov/Human\\_services/default.htm](http://www.hartford.gov/Human_services/default.htm)).

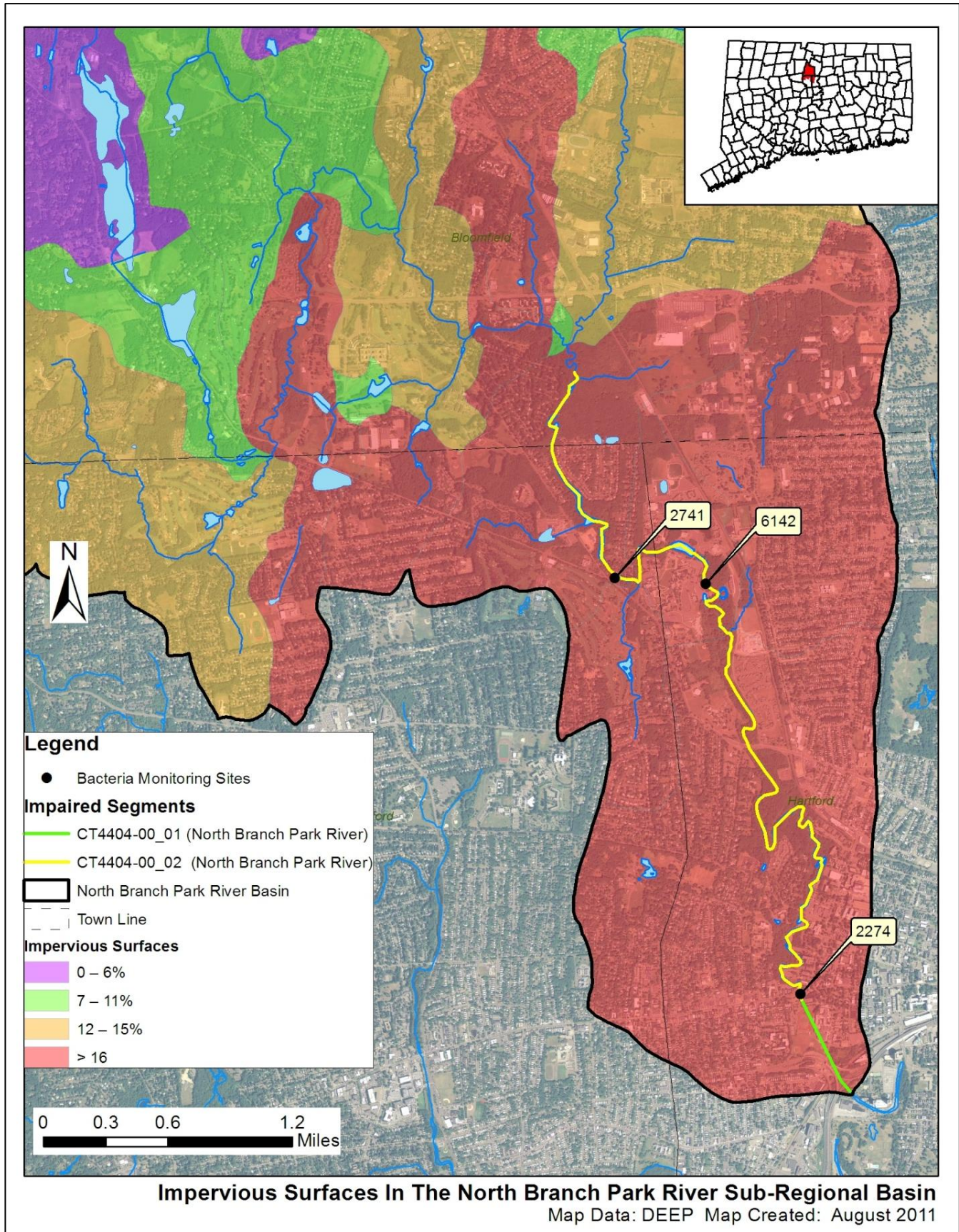
As shown in Table 13, geometric mean values during dry-weather exceeded the WQS for *e. coli* at all three stations along North Branch Park River (Segment 2). The area surrounding these stations is serviced by sanitary sewer systems and septic systems, which may indicate that bacteria from leaky pipes are a source of bacterial contamination to the impaired segments of North Branch Park River. The particularly high exceedances at Stations 2274 and 2741 along North Branch Park River (Segment 2) during wet-weather also suggest that point discharges from overflowing CSOs may be a significant source of bacterial contamination.

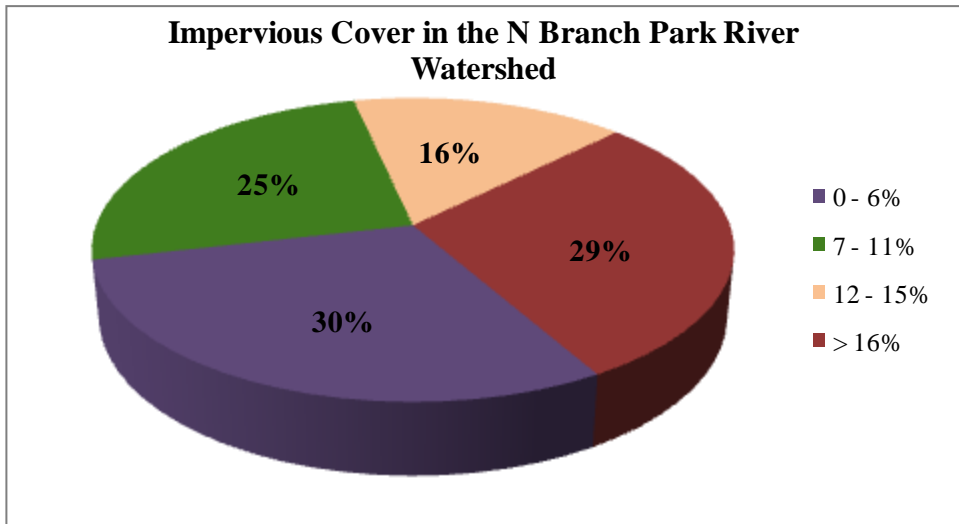
### ***Stormwater Runoff from Developed Areas***

The majority of the North Branch Park River watershed is developed with approximately 52% considered urban, particularly around the impaired segments (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 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).

Approximately 29% of the North Branch Park River watershed is characterized by greater than 16% impervious cover, particularly as the impaired segments flow through dense commercial and residential areas (Figures 8 and 9). Water quality data taken at Stations 2274 and 2741 along North Branch Park River (Segment 2) were consistently high, especially during wet weather, which suggests that stormwater runoff may be a source of bacteria to North Branch Park River (Table 13).

Figure 8: Impervious cover (%) for the North Branch Park River sub-regional watershed



**Figure 9: Range of impervious cover (%) in the North Branch Park River watershed**

### ***Wildlife and Domestic Animal Waste***

Wildlife and domestic animals within the North Branch Park River watershed represent another potential source of bacteria 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).

Geese and other waterfowl are known to congregate in open areas including recreational fields, agricultural crop fields, and golf courses. There are several open spaces near the impaired segments, including the Hartford Country Club, Tumble Brook Country Club, Wampanoag Country Club, Eisenhower Park, Gillette Ridge Golf Club, Elizabeth Park, UConn Law School athletic fields, and Filley Park. 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 lead to habitat destruction as a result of overgrazing on wetland and riparian plants

Also, dense residential development surrounds much of the impaired segments of North Branch Park River (Figure 4). When not disposed properly, waste from domestic animals such as dogs can enter surface waters either directly or indirectly through stormwater infrastructure. Therefore, pet waste may also be contributing to bacteria concentrations in North Branch Park River.

### ***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. Although agricultural land use makes up 11% of the North Branch Park River watershed, no major agricultural areas were identified as direct potential sources of bacterial contamination to the impaired segments of North Branch Park River. A small cattle farm operation (1-195 cattle) was identified upstream of the impaired segments along Route 178 in Bloomfield, and an agricultural waste site was identified along a tributary leading to the beginning of North Branch Park River (Segment 2) just

south of Route 218 in Bloomfield (Figure 6). Most agricultural operations, including hayfields and row crops, are located in the upper reaches of the watershed, but may still be impacting water quality along tributaries in Bloomfield and ultimately the impaired segments downstream.

### **Additional Sources**

There may be other sources not listed here or identified in Figure 6 that contribute to the observed water quality impairment in North Branch Park River. 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**

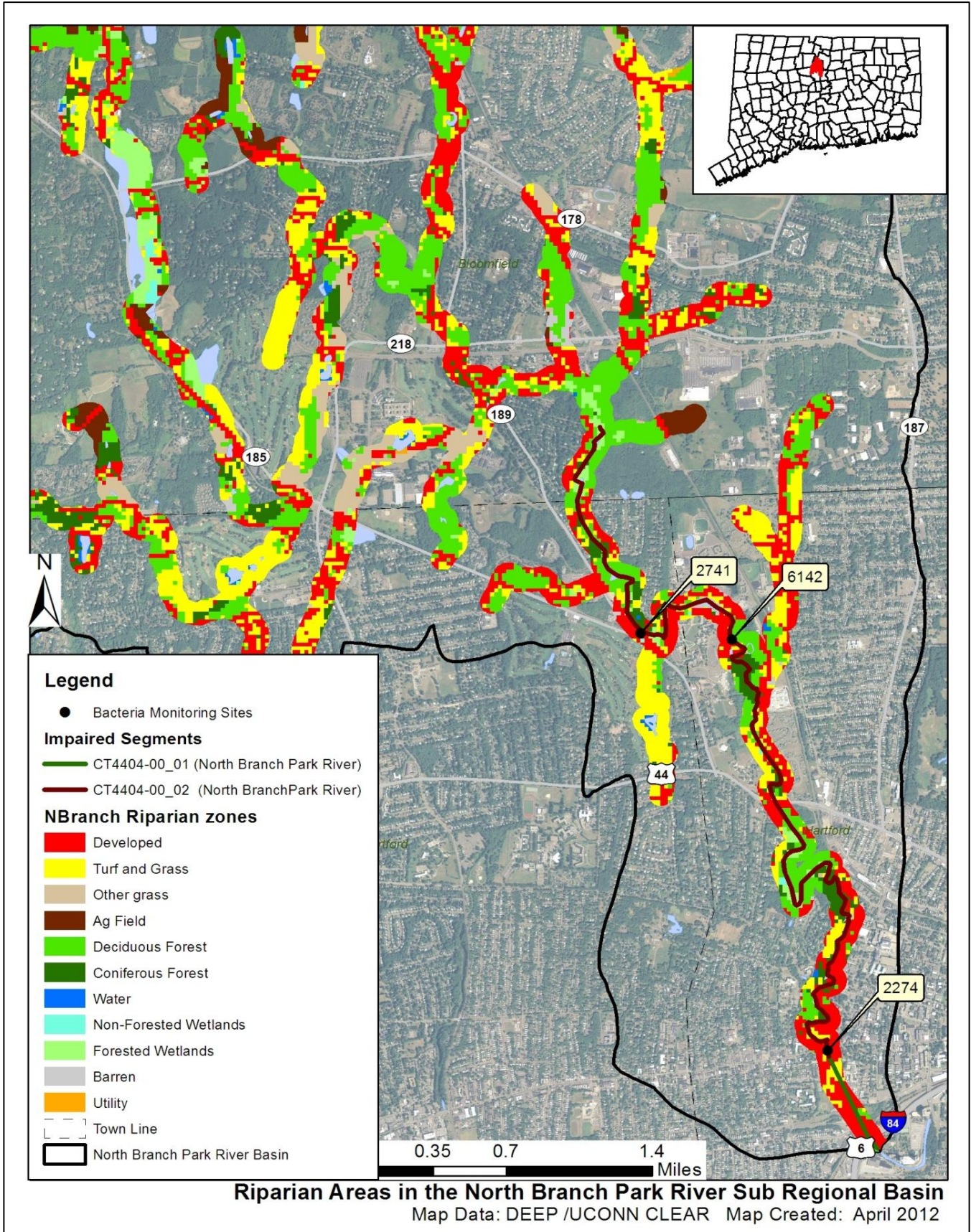
#### ***Riparian Buffer Zones***

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 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 unique 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. 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 impaired segments of North Branch Park River are characterized by developed land use with portions of forested and turf/grass areas (Figure 10). Developed areas within the riparian zone likely contribute pollutants such as bacteria to the waterbody since the natural riparian buffer cannot treat stormwater runoff from impervious surfaces.

Figure 10: Riparian buffer zone information for the North Branch Park River watershed





**CURRENT MANAGEMENT ACTIVITIES**

The Towns of West Hartford and Bloomfield and the City of Hartford have developed and implemented programs to protect water quality from bacterial contamination. In 2010, the North Branch Park River Watershed Management Plan was completed (Fuss & O’Neill, 2010). This document outlines current actions in the watershed and recommends future actions necessary to maintain or improve water quality.

As indicated previously, the Towns of West Hartford and Bloomfield and the City of Hartford are 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 the new development and redevelopment.
6. Pollution prevention/good housekeeping for municipal operations.

Each municipality is 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 8, 9, and 10.

**Table 8: Summary of MS4 requirement updates related to the reduction of bacterial contamination from West Hartford, CT (Permit #GSM000001)**

Minimum Measure	West Hartford 2007 Annual Report
Public Outreach and Education	1) Provided online links to CT DEEP's MS4 outreach materials.
	2) Public awareness bulletins of new large constructions projects delivered with tax bills.
Public Involvement and Participation	1) Held public meetings for new development projects, which included storm water reviews.
Illicit Discharge Detection and Elimination	1) Conducted stormwater outfall sampling at six locations.
Construction Site Stormwater Runoff Control	1) Conducted strict review of new Blue Back Square (West Hartford Center) and housing condo construction projects.
Post Construction Stormwater Management	1) Conducted annual water samplings at the Public Works Department site.
Pollution Prevention and Good Housekeeping	1) Labeled catch basins that drain to watercourses.
	2) Cleaned 2,833 catch basins.
	3) Swept all town roads.

**Table 9: Summary of MS4 requirement updates related to the reduction of bacterial contamination from Hartford, CT (Permit #GSM000062)**

Minimum Measure	City of Hartford 2010 Annual Report
Public Outreach and Education	<ol style="list-style-type: none"> <li>1) Distributing stormwater brochures to city residents.</li> <li>2) Distributing information regarding stormwater BMPs.</li> <li>3) Developed stormwater videos which aired on local access TV.</li> <li>4) Participated in CT River Watershed Council's Source to the Sound Cleanup.</li> </ol>
Public Involvement and Participation	<ol style="list-style-type: none"> <li>1) Participated in CT River Watershed Council's Source to the Sound Cleanup.</li> <li>2) Sponsored/coordinated hazardous waste collection events.</li> </ol>
Illicit Discharge Detection and Elimination	<ol style="list-style-type: none"> <li>1) Inspecting nine outfalls for illicit discharges.</li> <li>2) Distributing literature regarding illicit discharges.</li> </ol>
Construction Site Stormwater Runoff Control	<ol style="list-style-type: none"> <li>1) Assessed training needs of inspection staff relative to runoff controls measures.</li> </ol>
Post Construction Stormwater Management	No updates.
Pollution Prevention and Good Housekeeping	<ol style="list-style-type: none"> <li>1) Cleaned and repaired catch basins throughout city.</li> <li>2) Performed significant street cleaning; up to 3 times per week.</li> <li>3) Performed stormwater training of key city staff.</li> </ol>

**Table 10: Summary of MS4 requirement updates related to the reduction of bacterial contamination from Bloomfield, CT (Permit #GSM000035)**

Minimum Measure	Bloomfield Annual Report (2006)
Public Outreach and Education	<ol style="list-style-type: none"> <li>1) Posted EPA brochure <i>After the Storm, A Citizen's Guide to Understanding Stormwater</i> to web page. 6th grade students handed out brochures to homeowners explaining their storm drain stenciling project in the Kenwood Circle neighborhood.</li> <li>2) Sponsored HazWaste Collection Day twice in 2006.</li> </ol>
Public Involvement and Participation	<ol style="list-style-type: none"> <li>1) Held open meetings with the Stormwater Committee.</li> </ol>
Illicit Discharge Detection and Elimination	<ol style="list-style-type: none"> <li>1) Completed inspection and mapping of all town outfalls greater than 12 inches.</li> <li>2) Conducted wet weather sampling and analysis at six outfalls.</li> </ol>
Construction Site Stormwater Runoff Control	<ol style="list-style-type: none"> <li>1) Will perform inspections of all construction sites at least once per month, and also after heavy rains, and will perform follow-up inspections to ensure that problems are resolved promptly.</li> </ol>
Post Construction Stormwater Management	<ol style="list-style-type: none"> <li>1) Reviewed land use permit applications for post-construction stormwater quality BMPs for all major town projects.</li> </ol>
Pollution Prevention and Good Housekeeping	<ol style="list-style-type: none"> <li>1) Continued to sweep all streets at least once per year and identify areas that may require sweeping more than once per year.</li> <li>2) Cleaned 800 catch basins in 2005 and 2006 or roughly 50% of the estimated total number of catch basins in town.</li> </ol>

### RECOMMENDED NEXT STEPS

As shown above, the Towns of West Hartford and Bloomfield and the City of Hartford have developed and implemented programs to protect water quality from bacterial contamination. Future mitigative activities are necessary to ensure the long-term protection of the impaired segments in North Branch Park River and have been prioritized below. Some of these actions are provided in more detail in the North Branch Park River Watershed Management Plan (Fuss & O'Neill, 2010).

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

Most of the North Branch Park River watershed surrounding the impaired segments relies on a municipal sewer system (Figure 6). The municipalities should continue to develop and expand a program to evaluate the sanitary sewer system and reduce leaks and overflows. The North Branch Park River Watershed Management Plan (2010) recommended CSO abatement through the Metropolitan District (MDC) CSO Long Term Control Plan to separate CSOs and construct new separate storm sewers that will carry stormwater runoff away from critical waterbodies. Installing green infrastructure around these stormwater outfalls will also promote stormwater runoff control. As the primary source of bacterial contamination, CSO elimination or reduction should be the focus of water quality improvement initiatives in the North Branch Park River (Fuss & O'Neill, 2010).

#### **2) Identify areas along the North Branch Park River to implement Best Management Practices (BMPs) to control stormwater runoff.**

As noted previously, the Towns of West Hartford and Bloomfield and the City of Hartford are MS4 communities regulated by the MS4 program. Since 52% of the watershed is considered urban and the area surrounding the impaired segments has an impervious cover greater than 16%, stormwater runoff is likely contributing bacteria to the waterbodies. The municipalities have already adopted new zoning regulations and Plans of Conservation and Development since 2009. These long-term municipal goals incorporate innovative stormwater management design, limit net increase in stormwater runoff as a result of development, explore the feasibility of a stormwater utility, and utilize green street concepts, BMPs, and LID practices in new or existing development.

The North Branch Park River Watershed Management Plan (2010) made specific recommendations to reduce the impacts of stormwater runoff on water quality ([http://www.ct.gov/dep/lib/dep/water/watershed\\_management/wm\\_plans/nbparkr/nbpr\\_wbp.pdf](http://www.ct.gov/dep/lib/dep/water/watershed_management/wm_plans/nbparkr/nbpr_wbp.pdf)). The plan recommended forming an urban watershed stewardship organization, developing local regulations for LID and green infrastructure, conducting illicit discharge inspections, and reducing or eliminating CSO discharges. The plan also highlighted multiple areas to install structural BMPs. The suggested BMPs within the watershed towns are listed in Table 11. In addition, the watershed municipalities should conduct follow up illicit discharge investigations at priority outfall locations.

To identify other areas that are contributing bacteria to the impaired segments, the towns should continue to conduct wet-weather sampling at stormwater outfalls that discharge directly to North Branch Park River. To treat stormwater runoff, the towns should install the recommended BMPs to encourage stormwater to infiltrate the ground before entering North Branch Park River. 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.

**Table 11: Recommended structural BMPs from the 2010 North Branch Park River Watershed Management Plan**

Location	Town	Recommended BMPs
Bloomfield Town Hall	Bloomfield	Install LID retrofits to reduce runoff and pollutants and serve as public demonstration site.
Laurel School on Filley Street	Bloomfield	Reduce area of existing parking lot and consider permeable pavement for future site improvements; install a stormwater basin or bioretention system at parking lot; plant native trees and shrubs around school.
Filley Park	Bloomfield	Implement goose management plan, stabilize banks around impoundment, and restore riparian buffer.
Bloomfield Avenue and Cottage Grove Road	Bloomfield	Reduce sediment load, protect infrastructure, and provide bank stabilization.
Hartford Seminary between Sherman Street and Girard Avenue	Hartford	Retrofit site with bioretention systems to treat stormwater from parking lot and lawn.
Connecticut Historical Society at the Veeder Estate south of the intersection of Elizabeth Street and Asylum Avenue	Hartford	Install a rooftop leader disconnection and bioretention areas to collect stormwater from existing parking areas and driveways. Also opportunities for a constructed wetland and permeable pavement.
Adams Street and similar	Hartford	Install various green street retrofit projects, including stormwater collectors, roadway catch basins, roof leader downspout disconnections, rain gardens, stormwater swales, stormwater curb extensions, and traffic calming techniques.
Woodland Drive	Hartford	Install a constructed wetland and use LID techniques for planned Park River Greenway Trail to treat stormwater runoff.
Asylum Avenue and Farmington Avenue	Hartford	Reduce impervious surface, restore riparian habitat, and improve public access.
UConn Law School Athletic Field	Hartford	Reduce impacts of CSOs, reduce stormwater volume, and increase groundwater infiltration.

### 3) Continue monitoring of permitted sources.

Previous sampling of industrial discharges and MS4 outfalls has shown elevated levels of bacteria, an indicator of bacterial pollution (Tables 6 and 7). 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 12 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 North Branch Park River 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 12. Bacteria (e.coli) TMDLs, WLAs, and LAs for Recreational Use**

Class	Bacteria Source	Instantaneous <i>E. coli</i> (#/100mL)						Geometric Mean <i>E. coli</i> (#/100mL)	
		WLA <sup>6</sup>			LA <sup>6</sup>			WLA <sup>6</sup>	LA <sup>6</sup>
		1	2	3	1	2	3	All	All
	<b>Recreational Use</b>							<b>All</b>	<b>All</b>
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 <sup>7</sup>	410 <sup>7</sup>	576 <sup>7</sup>				126 <sup>7</sup>	
	Stormwater (non-MS4)				235 <sup>7</sup>	410 <sup>7</sup>	576 <sup>7</sup>		126 <sup>7</sup>
	Wildlife direct discharge				235 <sup>7</sup>	410 <sup>7</sup>	576 <sup>7</sup>		126 <sup>7</sup>
	Human or domestic animal direct discharge <sup>5</sup>				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.

#### **4) Develop a system to monitor septic systems.**

Portions of the impaired segments rely on septic systems (Figure 6). If not already in place, West Hartford should establish a program to ensure that existing septic systems are properly operated and maintained. For instance, communities can 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 could also be adopted. Towns can develop programs to assist citizens with the replacement and repair of older and failing systems.

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

As most of the North Branch Park River watershed is developed, any education and outreach program should highlight the importance of not feeding waterfowl and wildlife and managing waste from horses, dogs, and other pets. Municipalities and residents can take measures to minimize waterfowl-related impacts such as allowing tall, coarse vegetation to grow in the riparian areas of North Branch Park River 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 North Branch Park River 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.

#### **6) Ensure there are sufficient buffers on agricultural lands along North Branch Park River.**

Although agricultural land use represents 11% of the North Branch Park River watershed upstream of the impaired segments, it may still be a concern for water quality, especially with an identified cattle farm and agricultural waste site along nearby tributaries (Figure 6). 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.

## BACTERIA DATA AND PERCENT REDUCTIONS TO MEET THE TMDL

Table 13: North Branch Park River (Segment 2) Bacteria Data

**Waterbody ID:** CT4404-00\_02**Characteristics:** Freshwater, Class A, Potential Public Drinking Water Supply, Habitat for Fish and other Aquatic Life and Wildlife, Recreation, 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: **92%**Single Sample: **98%****Data:** 2008-2010 from CT DEEP targeted sampling efforts, 2012 TMDL Cycle**Single sample *E. coli* (colonies/100 mL) data from all monitoring stations on North Branch Park River (Segment 2) with annual geometric means calculated**

Station Name	Station Location	Date	Result	Wet/Dry	Geomean
2274	Behind #19 Woodland Street	6/16/2008	635 <sup>†</sup>	wet	548
2274	Behind #19 Woodland Street	7/1/2008	330	wet	
2274	Behind #19 Woodland Street	7/10/2008	370	dry	
2274	Behind #19 Woodland Street	7/17/2008	440	dry	
2274	Behind #19 Woodland Street	7/23/2008	400	wet	
2274	Behind #19 Woodland Street	8/7/2008	4600	wet	
2274	Behind #19 Woodland Street	8/12/2008	5500	wet	
2274	Behind #19 Woodland Street	8/21/2008	190	dry	
2274	Behind #19 Woodland Street	8/28/2008	410	dry	
2274	Behind #19 Woodland Street	9/2/2008	190	dry	
2274	Behind #19 Woodland Street	9/12/2008	330	wet	
2274	Behind #19 Woodland Street	9/15/2008	440	wet	

Single sample *E. coli* (colonies/100 mL) data from all monitoring stations on North Branch Park River (Segment 2) with annual geometric means calculated (continued)

Station Name	Station Location	Date	Result	Wet/Dry	Geomean
2274	Behind #19 Woodland Street	6/29/2009	350	dry	501
2274	Behind #19 Woodland Street	7/10/2009	470	dry	
2274	Behind #19 Woodland Street	7/15/2009	310	dry	
2274	Behind #19 Woodland Street	7/24/2009	14000	wet	
2274	Behind #19 Woodland Street	8/5/2009	300	dry	
2274	Behind #19 Woodland Street	8/14/2009	1900	dry	
2274	Behind #19 Woodland Street	8/28/2009	440	wet	
2274	Behind #19 Woodland Street	9/4/2009	190	dry	
2274	Behind #19 Woodland Street	9/8/2009	360	dry	
2274	Behind #19 Woodland Street	9/15/2009	270	dry	
2274	Behind #19 Woodland Street	9/25/2009	150	dry	
2274	Behind #19 Woodland Street	5/7/2010	320	dry	
2274	Behind #19 Woodland Street	5/12/2010	1400	wet	
2274	Behind #19 Woodland Street	5/20/2010	680	dry	
2274	Behind #19 Woodland Street	5/25/2010	2300	dry	
2274	Behind #19 Woodland Street	5/27/2010	24001* (98%)	wet	
2274	Behind #19 Woodland Street	6/8/2010	790	dry	
6142	NW corner of Lot C at the University of Hartford	5/20/2010	330	dry	824
6142	NW corner of Lot C at the University of Hartford	5/25/2010	190	dry	
6142	NW corner of Lot C at the University of Hartford	5/27/2010	16000	wet	
6142	NW corner of Lot C at the University of Hartford	6/8/2010	460	dry	
2741	Sunny Reach Drive	5/12/2010	770	wet	776
2741	Sunny Reach Drive	5/20/2010	400	dry	
2741	Sunny Reach Drive	5/25/2010	190	dry	
2741	Sunny Reach Drive	5/27/2010	13000	wet	
2741	Sunny Reach Drive	6/8/2010	370	dry	
<b>Shaded cells indicate an exceedance of water quality criteria</b>					
† Average of two duplicate samples					
** Weather conditions for selected data taken from Hartford because local station had missing data					
*Indicates single sample and geometric mean values used to calculate the percent reduction					



**Wet and dry weather *E. coli* (colonies/100 mL) geometric mean values for all monitoring stations on North Branch Park River (Segment 2)**

Station Name	Station Location	Years Sampled	Number of Samples		Geometric Mean		
			Wet	Dry	All	Wet	Dry
2274	Behind #19 Woodland Street	2008-2010	11	18	656	1459	402
6142	NW corner of Lot C at the University of Hartford	2010	1	3	824	NA	307
2741	Sunny Reach Drive	2010	2	3	776	3164	304
<p><b>Shaded cells indicate an exceedance of water quality criteria</b></p> <p><b>Weather condition determined from rain gage at Hartford Bradley International Airport.</b></p>							

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