Attachment 4:

No Discharges from MassDOT Outfalls Assessments

List of Impaired Waterbodies

	Waterbody ID	Waterbody Name	TMDL
1	MA34040	Leaping Well Reservoir	-
2	MA34066	Oxbow	-
3	MA35018	Depot Pond	Phosphorus (CN 123.2)
4	MA51142	Salisbury Pond	Phosphorus (CN 114.0)
5	MA62001	Ames Long Pond	-
6	MA51003	Arcade Pond	-
7	MA82B-01	Assabet River	Phosphorous (CN 201.0)
8	MA82004	Assabet River Reservoir	Mercury (NEHgTMDL), Phosphorus (CN 201.0)
9	MA51-07	Beaver Brook	-
10	MA72-12	Beaver Brook	-
11	MA71005	Blacks Nook	-
12	MA73005	Bolivar Pond	-
13	MA92004	Brackett Pond	-
14	MA83003	Butterfield Pond	-
15	MA52004	Cargill Pond	-
16	MA72016	Cedar Swamp Pond	-
17	MA81-33	Chaffins Brook	-
18	MA53-13	Clear Run Brook	Bacteria (CN 182.0)
19	MA92010	Collins Pond	-
20	MA74-01	Crooked Meadow River	-
21	MA92013	Crystal Pond	-
22	MA92015	Devils Dishfull Pond	-
23	MA73-05	East Branch	Bacteria (CN 121.0)
24	MA82B-12	Elizabeth Brook	-
25	MA71014	Ell Pond	-
26	MA72037	Factory Pond	-
27	MA93023	Flax Pond	-
28	MA34024	Forge Pond	-
29	MA73020	Forge Pond	-
30	MA93-36	Frost Fish Brook	-
31	MA41017	Glen Echo Lake	-
32	MA93-05	Goldthwait Brook	-
33	MA51056	Green Hill Pond	Phosphorus (CN 070.1)
34	MA51060	Hayes Pond	-

	Waterbody ID	Waterbody Name	TMDL
35	MA82059	Heart Pond	-
36	MA95-10	Hiller Cove	Pathogens (CN 251.1)
37	MA62090	Hobart Pond	-
38	MA82061	Hopkinton Reservoir	-
39	MA71019	Horn Pond	-
40	MA72050	Houghton Pond	-
41	MA51071	Howe Reservoirs	Phosphorus (CN 070.1)
42	MA94-04	Indian Head River	-
43	MA92-15	Ipswich River	-
44	MA62094	Island Grove Pond	-
45	MA71021	Judkins Pond	-
46	MA74013	Lake Holbrook	-
47	MA72092	Lake Pearl	-
48	MA81122	Lake Shirley	-
49	MA93039	Lily Pond	-
50	MA81-29	Malagasco Brook	-
51	MA42035	McKinstry Pond	Phosphorus (CN 110.0)
52	MA72-15	Mill River	-
53	MA81-28	Muddy Brook	-
54	MA81-09	Nashua River	-
55	MA34058	Noonan Cove	-
56	MA92-11	Norris Brook	-
57	MA82088	Nutting Lake	Mercury (NEHgTMDL)
58	MA70-11	Pleasure Bay	-
59	MA34073	Porter Lake	-
60	MA34072	Porter Lake West	-
61	MA51134	Riley Pond	-
62	MA42047	Robinson Pond	Phosphorus (CN 110.0)
63	MA82104	Stearns Mill Pond	-
64	MA84B-03	Stony Brook	-
65	MA72-10	Stop River	Pathogens (CN 156.0)
66	MA52-01	Ten Mile River	-
67	MA73059	Turners Pond	-
68	MA62-48	Unnamed Tributary	-
69	MA73-32	Unnamed Tributary	-
70	MA81-35	Unnamed Tributary	-
71	MA82A-17	Unnamed Tributary	-

	Waterbody ID	Waterbody Name	TMDL
72	MA81-34	Unnamed Tributary (Boylston Brook)	-
73	MA34128	Upper Van Horn Park Pond	-
74	MA53-06	Warren River Pond	Pathogens (CN 351.0)
75	MA34099	Watershops Pond	-
76	MA71045	Wedge Pond	-
77	MA51176	Welsh Pond	-
78	MA93089	West Pond	-
79	MA74-05	Weymouth Back River	-
80	MA82120	Whitehall Reservoir	Mercury (NEHgTMDL)
81	MA62220	Woods Pond	-
82	MA51186	Woolshop Pond	-
83	MA72-17	Waban Brook	Nutrients (CN 272.0), Pathogens (CN 156.0)
84	MA72-21	Rock Meadow Brook	Nutrients (CN 272.0), Pathogens (CN 156.0)
85	MA72-22	Alder Brook	Nutrients (CN 272.0), Pathogens (CN 156.0)
86	MA72-23	Sawmill Brook	Nutrients (CN 272.0), Pathogens (CN 156.0)
87	MA72-30	Unnamed Tributary “Laundry Brook”	Nutrients (CN 301.0), Pathogens (CN 156.0)
88	MA72-32	Unnamed Tributary “Sawins Brook”	Nutrients (CN 301.0), Pathogens (CN 156.0)
89	MA72011	Bulloughs Pond	Nutrients (CN 301.0), Pathogens (CN 156.0)
90	MA72017	Chandler Pond	Nutrients (CN 272.0), Pathogens (CN 156.0)
91	MA72052	Jamaica Pond	Nutrients (CN 301.0), Pathogens (CN 156.0)
	De Minimus:		
1	MA72-05	Charles River	Nutrients (CN 272.0), Pathogens (CN 156.0)
2	MA72-18	Fuller Brook	Nutrients (CN 272.0), Pathogens (CN 156.0)

Impaired Waters Assessment for Leaping Well Reservoir (MA34040)

Impaired Waterbody

Name: Leaping Well Reservoir

Location: South Hadley, MA

Water Body ID: MA34040

Impairments

Final *Massachusetts Year 2008 Integrated List of Waters* (MassDEP, 2008b):

- Non-native aquatic plants
- Excess algal growth

Final *Massachusetts Year 2010 Integrated List of Waters* (MassDEP, 2011):

- Non-native aquatic plants
- Excess algal growth

Leaping Well Reservoir (MA34040) is listed under Category 5, "Waters Requiring a TMDL", on both MassDEP's final *Massachusetts Year 2008* and final *Massachusetts Year 2010 Integrated List of Waters*. According to MassDEP's *Connecticut River Watershed 2003 Water Quality Assessment Report* (MassDEP, 2008a), Leaping Well Reservoir is impaired for noxious plants; however, not all uses have been assessed.

Relevant Water Quality Standards

Water body Classification: Class B

Applicable State Regulations:

- *314 CMR 4.05 (5) (a) Aesthetics*. All surface waters shall be free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life.
- *314 CMR 4.05 (5) (c) Nutrients*. Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses. Human activities that result in the nonpoint source discharge of

nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control.

Site Description

Leaping Well Reservoir is a water body in South Hadley, MA that covers approximately 8.8 acres adjacent to Route 202, or Granby Road. The reservoir drains under Route 202 and forms Leaping Well Brook, which is not identified as having impairments. Leaping Well Brook flows approximately 1.4 miles before joining with Stony Brook (MA34-19). Figure 1 depicts the locations of the water body, its watershed and subwatershed, which are identical, and Route 202.

Assessment under BMP 7U for No Discharge Determination

Based on a site visit on February 15th, 2012 it was determined that MassDOT does not contribute runoff to Leaping Well Reservoir (MA34040). The nearest MassDOT-owned urban roadway is Route 202. The storm water system for this roadway conveys storm water to an unimpaired stream segment approximately 380 feet northeast of the reservoir that drains away from the reservoir. The unimpaired stream joins Leaping Well Brook a few hundred feet downstream of the discharge point.

Conclusions

Because MassDOT urban property does not directly contribute storm water runoff to Leaping Well Reservoir, further assessment of this water body is not warranted under the Impaired Waters program.

MassDOT will continue to implement the measures outlined in its Stormwater Management Plan (SWMP) to minimize the impacts of storm water from its property.

References

Massachusetts Department of Environmental Protection (MassDEP). (2008a). Connecticut River Watershed 2003 Water Quality Assessment Report. Retrieved from: http://www.mass.gov/dep/water/resources/34wqar07.pdf

Massachusetts Department of Environmental Protection (MassDEP). (2008b). Massachusetts Year 2008 Integrated List of Waters - Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 303(d) and 305(b) of the Clean Water Act. Retrieved from: http://www.mass.gov/dep/water/resources/08list2.pdf

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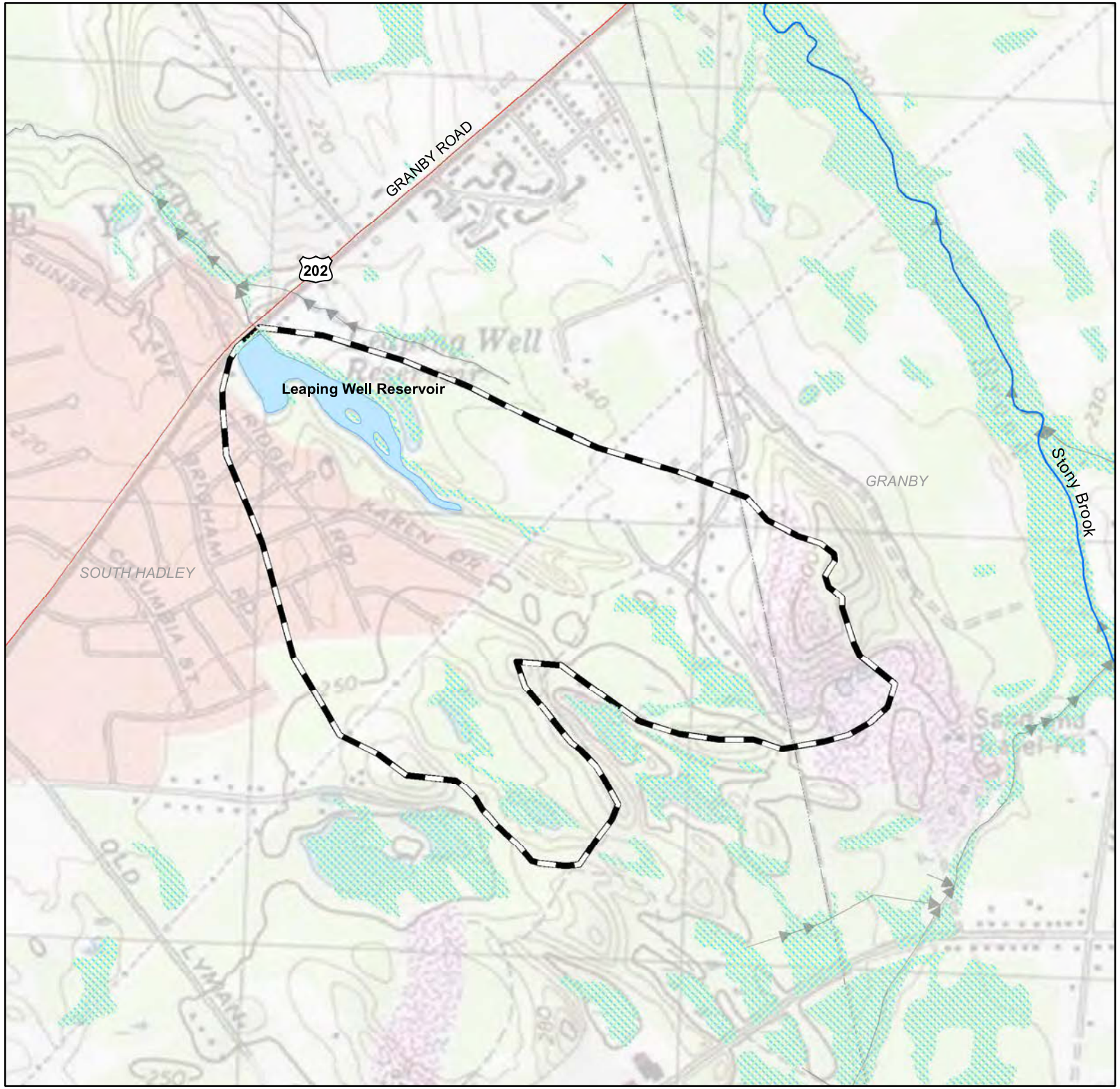

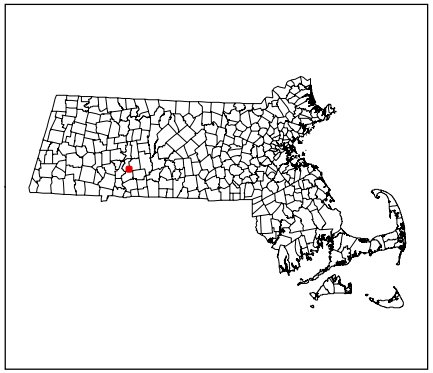

Leaping Well Reservoir Watershed

Leaping Well Reservoir

Impaired Stream Segment

Non-Impaired Stream Segment

NWI Wetland Areas

MassDOT Roads in Urban Areas

MassDOT Roads

Town Boundaries

N

0 500 1,000 1,500 Feet

1 in = 1,000 feet

Figure 1

Leaping Well Reservoir Watershed/Subwatershed MA34040

March 2012

Moving Massachusetts Forward. massDOT

Impaired Waters Assessment for Oxbow (MA34066)

Impaired Waterbody

Name: Oxbow

Location: Northampton, MA

Water Body ID: MA34066

Impairments

Final *Massachusetts Year 2008 Integrated List of Waters* (MassDEP, 2008):

- Non-native aquatic plants
- Turbidity

Final *Massachusetts Year 2010 Integrated List of Waters* (MassDEP, 2011):

- Non-native aquatic plants
- Turbidity

Oxbow (MA34066) is listed under Category 5, "Waters Requiring a TMDL", on both MassDEP's final *Massachusetts Year 2008* and the final *Massachusetts Year 2010 Integrated List of Waters*. According to MassDEP's *Connecticut River Watershed 2003 Water Quality Assessment Report* (MassDEP, 2008), Oxbow is listed as a Category 5 Waters because of turbidity. The report states that there has been a substantial population of the non-native aquatic macrophyte *Trapa natans* in the Oxbow.

Relevant Water Quality Standards

Water Body Classification: Class B

Applicable State Regulations:

- *314 CMR 4.05 (3)(b) 6 Color and Turbidity. These waters shall be free from color and turbidity in concentrations or combinations that are aesthetically objectionable or would impair any use assigned to this class.*

Site Description

Oxbow is the waterbody located west of Route 91 in Northampton/Easthampton, MA. The waterbody covers approximately 148 acres (MassDEP, 2011). See Figure 1 for the location of Oxbow.

Assessment under BMP 7U for No Discharge Determination

Based on desktop analysis, it was determined that MassDOT does not directly contribute urban stormwater runoff to Oxbow (MA34066). The nearest MassDOT-owned urban roadways are Interstate 91 and Route 10. Route 10 discharges stormwater runoff to the non-impaired Mill River and surrounding wetlands prior to discharging to Oxbow. The urban section of Interstate 91 discharges stormwater runoff to the Manhan River which is downstream of Oxbow. The Manhan River will be reviewed separately.

Conclusions

Because MassDOT urban property does not directly contribute stormwater runoff to Oxbow, further assessment of this water body is not warranted under the Impaired Waters program.

MassDOT will continue to implement the measures outlined in its Stormwater Management Plan (SWMP) to minimize the impacts of storm water from its property.

References

Massachusetts Department of Environmental Protection (MassDEP). (2008). Connecticut River 2003 Water Quality Assessment Report. Retrieved from: http://www.mass.gov/dep/water/resources/34wqar07.pdf .

Massachusetts Department of Environmental Protection (MassDEP). (2008). Massachusetts Year 2008 Integrated List of Waters - Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 303(d) and 305(b) of the Clean Water Act. Retrieved from: http://www.mass.gov/dep/water/resources/08list2.pdf

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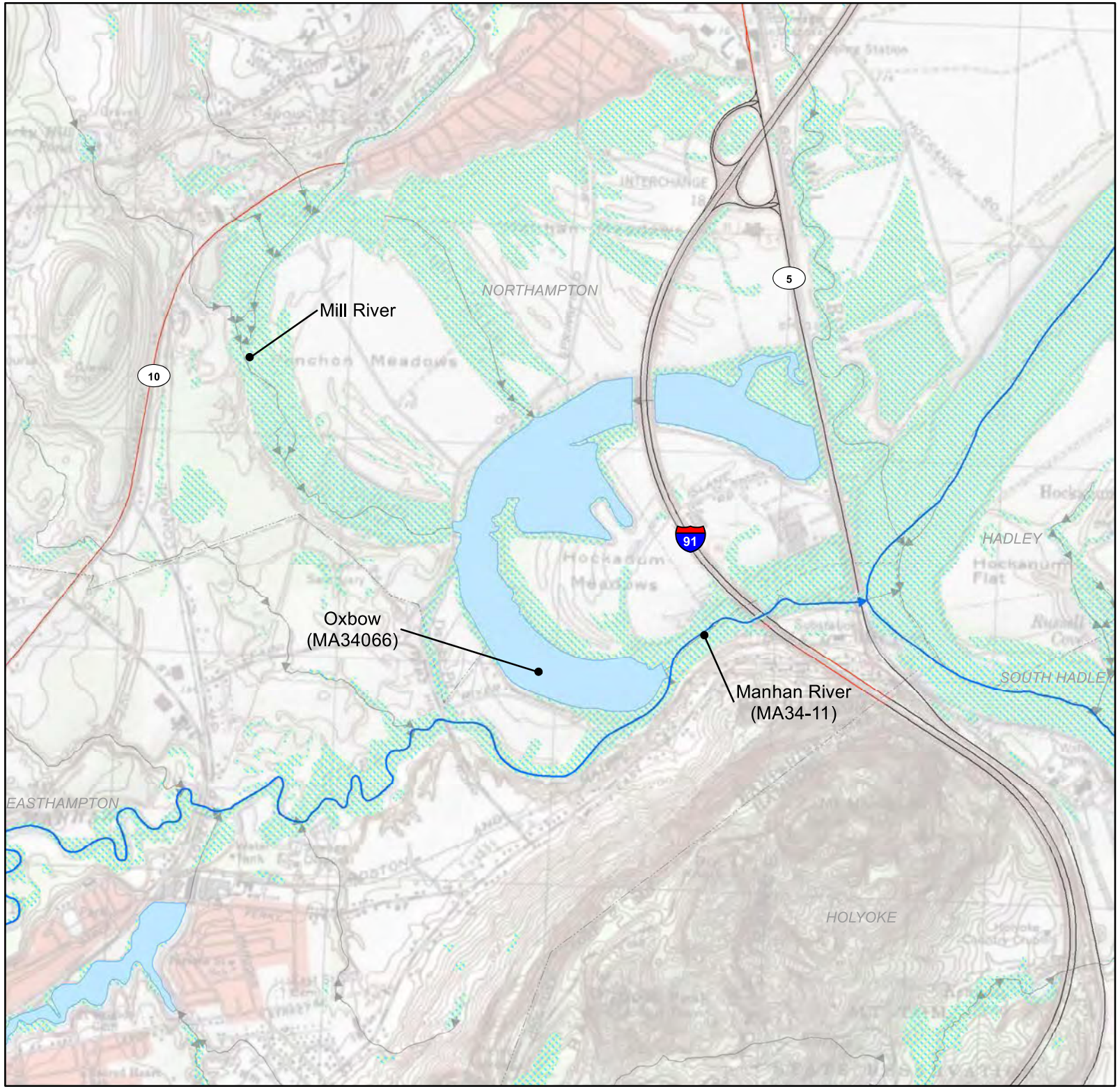

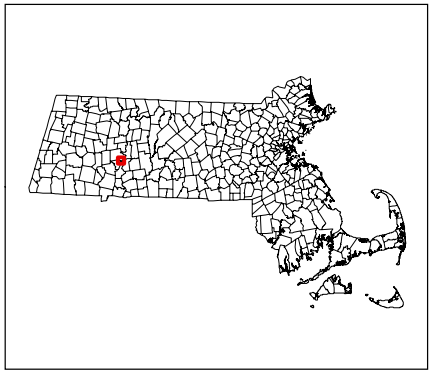

Impaired Stream Segment

Impaired Water Bodies

Non-Impaired Stream Segment

NWI Wetland Areas

MassDOT Roads in Urban Areas

MassDOT Roads

Town Boundaries

N

0 500 1,000 2,000 3,000 4,000 Feet

1 in = 2,000 ft

Figure 1

Oxbow
MA34066
No Discharge

February 2012

Moving Massachusetts Forward. massDOT

Impaired Waters Assessment for Depot Pond (MA35018)

Impaired Waterbody

Name: Depot Pond

Location: Templeton, MA

Water Body ID: MA35018

Impairments

Final *Massachusetts Year 2008 Integrated List of Waters* (MassDEP, 2008):

- Noxious Aquatic Plans

Final *Massachusetts Year 2010 Integrated List of Waters* (MassDEP, 2011):

- Aquatic Plants (Macrophytes)

Depot Pond (MA35018) is listed under Category 4a, "TMDL is Completed," on both MassDEP's final *Massachusetts Year 2008* and the final *Massachusetts Year 2010 Integrated List of Waters*. A TMDL entitled *Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes* was developed and approved for Depot Pond in 2003 [CN123.2] (MassDEP, 2003). The TMDL analyzed the impairment of noxious aquatic plants for Depot Pond and provided a target TP load allocation of 20 kg/year (a reduction of 53%).

Relevant Water Quality Standards

Water Body Classification: Unknown

Applicable State Regulations:

- *314 CMR 4.05 (5) (a) Aesthetics.* All surface waters shall be free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life.

Site Description

Depot Pond (MA35018) is located north of State Road and east of the railroad tracks in Templeton, Massachusetts. The waterbody covers approximately 15.2 acres and has a seven foot dam. The contributing watershed is approximately 218 acres with 7% impervious cover, and the dominant landuse in the watershed is forest and rural and agricultural landuse. See Figure 1.

Assessment under BMP 7R for No Discharge Determination

Based on desktop analysis, it was determined that MassDOT property does not directly contribute runoff to Depot Pond (MA35018). Drainage from MassDOT-owned roadway Route 68 (State Road) discharges directly to a culvert downstream of Depot Pond. The culvert drains Depot Pond and flows to Otter River (MA 35-08). This conclusion was based on a review of DOT plans. MassDOT drainage sheet 10 of 10 from Contract No. 2552 (RP 738 0010.TIF) shows that catch basins on Route 68 near Depot Pond collect stormwater and drain directly into the culvert downstream of the pond. The location of the catch basins on Route 68 was confirmed on the aerial map.

Conclusions

Because MassDOT property does not directly contribute storm water runoff to Depot Pond, further assessment of this water body is not warranted under the Impaired Waters program.

MassDOT will continue to implement the measures outlined in its Stormwater Management Plan (SWMP) to minimize the impacts of storm water from its property.

References

Massachusetts Department of Environmental Protection (MassDEP). (2003). Total Maximum Daily Loads of Phosphorus for Selected Millers Basin Lakes. CN 123.2. Retrieved from: http://www.mass.gov/dep/water/resources/millers.pdf

Massachusetts Department of Environmental Protection (MassDEP). (2008). Massachusetts Year 2008 Integrated List of Waters - Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 303(d) and 305(b) of the Clean Water Act. Retrieved from: http://www.mass.gov/dep/water/resources/08list2.pdf

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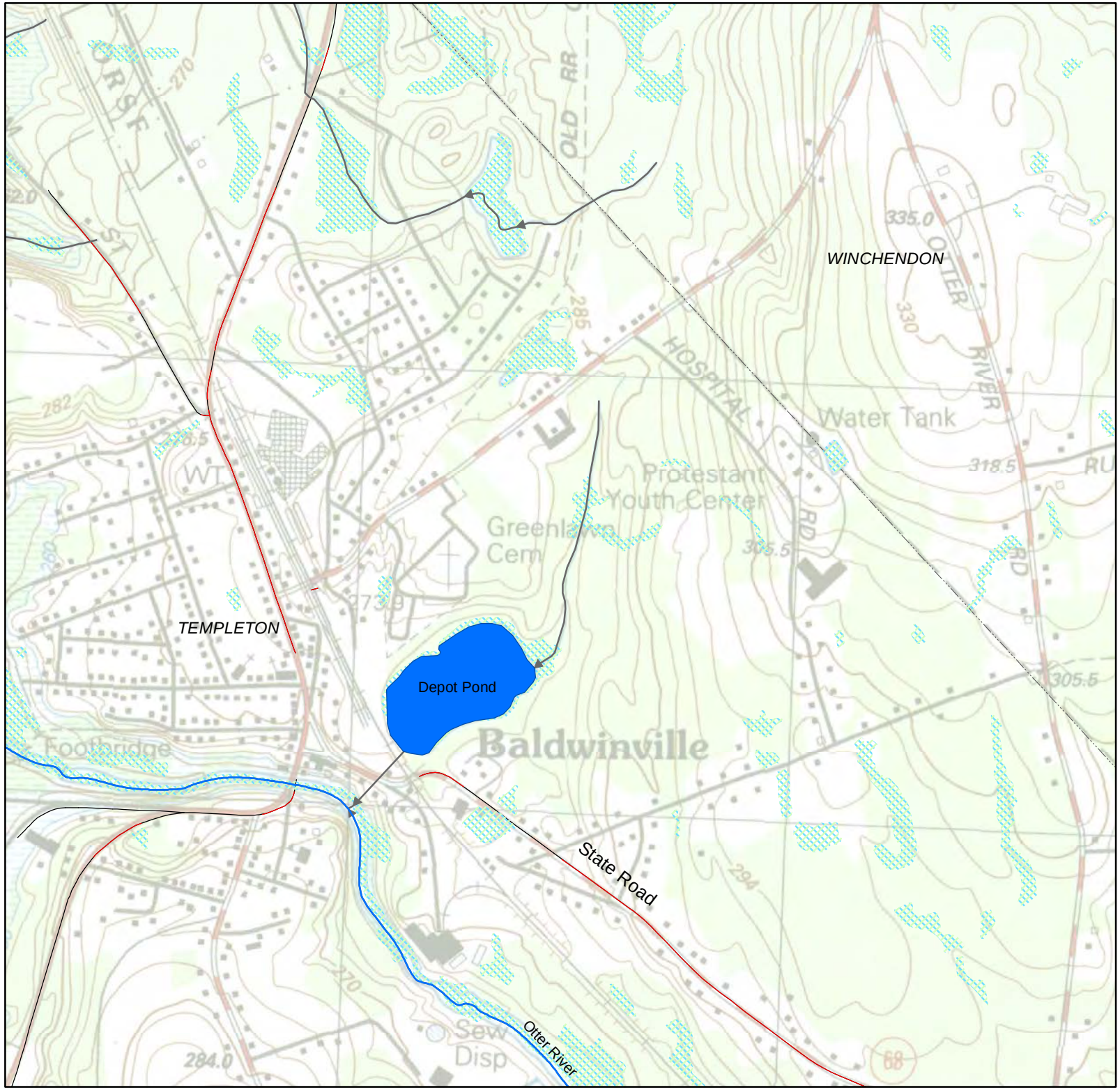

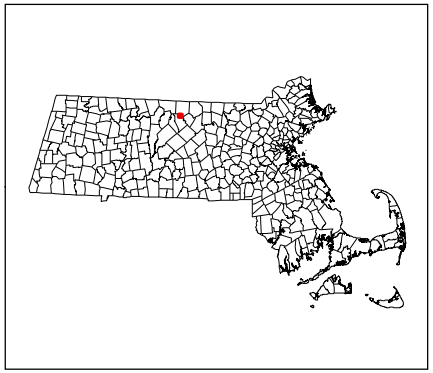

Depot Pond

Impaired Stream Segments

Non-Impaired Stream Segments

NWI Wetland Areas

MassDOT Urban Area Road

MassDOT Road

Town Boundaries

N

0 500 1,000 2,000

Feet

Figure 1
Depot Pond
No Discharge
MA35018

January 2012

Moving Massachusetts Forward. massDOT

Impaired Waters Assessment for Salisbury Pond (MA51142)

Impaired Waterbody

Name: Salisbury Pond

Location: Worcester, MA

Water Body ID: MA51142

Impairments

Final *Massachusetts Year 2008 Integrated List of Waters* (MassDEP, 2008):

- Taste
- Odor and color
- Noxious aquatic plants
- Turbidity

Final *Massachusetts Year 2010 Integrated List of Waters* (MassDEP, 2011):

- Not listed because Salisbury Pond is included in Segment MA51-08 (Unnamed Tributary)

Salisbury Pond (MA51142) is listed as a Category 5 water body on MassDEP's final *Massachusetts Year 2008 Integrated List of Waters* and is covered by MassDEP's *Total Maximum Daily Loads of Phosphorus for Salisbury Pond* [CN 114.0] (MassDEP, 2002).

MassDEP's *Blackstone River Watershed 2003-2007 Water Quality Assessment Report* (MassDEP, 2010) states that the approximately 13-acre Salisbury Pond is listed as impaired due to taste, odor and color, noxious aquatic plants, turbidity and that Salisbury Pond will no longer be assessed as an independent lake segment but instead will be considered part of segment MA51-08 (Unnamed Tributary). The MassDOT assessment for the Unnamed Tributary includes consideration of the entire Unnamed Tributary as defined in the *Massachusetts Year 2010 Integrated List of Waters* (MassDEP, 2011); therefore that assessment includes consideration of Salisbury Pond as previously defined. However, Salisbury Pond is analyzed in this separate impaired assessment to be consistent with the final *Year 2008 Integrated List of Waters*. Because Salisbury Pond has a TMDL, Salisbury Pond was assessed using BMP 7R (TMDL method) to determine the required load reduction to meet the TMDL in this assessment. The assessment for Unnamed Tributary (MA51-08) uses BMP 7U (Impervious Cover (IC) method) to determine the required effective IC reduction and is documented in a separate assessment.

Relevant Water Quality Standards

Water Body Classification: Class B

Applicable State Regulations:

- *314 CMR 4.05 (3)(b) 8 Taste and Odor*. None in such concentrations or combinations that are aesthetically objectionable, that would impair any use assigned to this Class, or that would cause tainting or undesirable flavors in the edible portions of aquatic life.

- *314 CMR 4.05 (5) (a) Aesthetics*. All surface waters shall be free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life.
- *314 CMR 4.05 (3)(b) 6 Color and Turbidity*. These waters shall be free from color and turbidity in concentrations or combinations that are aesthetically objectionable or would impair any use assigned to this class.

Site Description

Salisbury Pond (MA51142) is a municipally-owned pond located in Institute Park, adjacent to Worcester Polytechnic Institute in the town of Worcester, MA. The water body has a surface area of approximately 13 acres with a contributing watershed area of approximately 4,500 acres (MassDEP, 2002). The pond lays midstream of Unnamed Tributary (Mill Brook), approximately 1.8 miles downstream of the start of Unnamed Tributary. The water body lies between Park Ave, Salisbury Street, and Grove Street in Worcester, MA. After passing through Salisbury Pond, Unnamed Tributary continues another 3.4 miles before merging with Blackstone River (MA51-03).

MassDOT owns Interstate-290 (I-290) which runs north-south to the east of Salisbury Pond. In the vicinity of Salisbury Pond, I-290 is a four-lane roadway in both directions with an impervious median. The roadway and median has an impervious width of approximately 140 feet. In the vicinity of Salisbury Pond, along I-290, stormwater runoff drains to catch basins and in to a trunk line that discharges to Unnamed Tributary at three locations (see Figure 1).

Assessment under BMP 7R (TMDL Method)

During a site visit performed on November 22, 2011, it was confirmed that stormwater runoff from MassDOT property does not directly discharge to Salisbury Pond. Along the stretch of I-290 adjacent to Salisbury Pond, systems of catch basins located on the shoulders of both roadways collect and discharge stormwater to a 72-inch reinforced concrete trunk line which flows directly to Unnamed Tributary via direct connection to the underground, culverted brook (see Figure 1). The TMDL report for phosphorus for Salisbury Pond (MassDEP, 2002) confirms MassDOT's determination that no storm water from MassDOT-owned roadway discharges directly to Salisbury Pond. Therefore, it was determined that runoff from I-290 does not directly discharge to Salisbury Pond and further assessment of this water body is not required under the Impaired Waters Program.

However, conceptual BMPs were proposed in a memorandum prepared for Programmed Project # 605588, the resurfacing of I-190 northbound in Worcester. Seven of the BMPs address MassDOT's direct discharges to Unnamed Tributary and are summarized in the "Impaired Waters Assessment for Unnamed Tributary (MA51-08)" (MassDOT, 2012). See Figure 2 for the locations of the seven proposed BMPs. The BMPs are located near the upstream end of Unnamed Tributary which is also upstream of Salisbury Pond, and therefore, the BMPs will have a load reduction impact on Salisbury Pond. The load reduction is documented in this assessment and is shown in Table 1, attached. The proposed BMPs provide a TP removal of 24.4 lb/year from MassDOT's impervious surfaces which is a 91% reduction in total phosphorus. The TMDL states the current TP load to Salisbury Pond is estimated to be 10,243 lb/yr and the target TP load is 2,385 lb/yr. This requires a TP removal of 7,858 lb/yr (77% reduction for the contributing watershed area). The estimated current TP load is very high and can be attributed to sewage contamination, as described in the TMDL report. The final TMDL target is based on the assumption that sewage contamination would be eliminated, and TP loading from land sources to the pond would be reduced. The remaining non-point source pollution may be reduced 10-20 percent through public education and erosion control

(MassDEP, 2002). The proposed BMPs for the I-190 resurfacing project will reduce the TP loading to Salisbury Pond and help the pond reach its TMDL TP target.

Conclusions

Because MassDOT property does not directly contribute stormwater runoff to Salisbury Pond, further assessment of this water body is not required under the Impaired Waters program. MassDOT proposed BMPs as part of the Unnamed Tributary Impaired Assessment which will positively impact Salisbury Pond which lays midstream of Unnamed Tributary.

References

Massachusetts Department of Environmental Protection (MassDEP). (2002). Total Maximum Daily Loads of Phosphorus for Salisbury Pond Worcester, MA. CN 114.0. Retrieved from: http://www.mass.gov/dep/water/resources/salisbur.pdf

Massachusetts Department of Environmental Protection (MassDEP). (2008). Massachusetts Year 2008 Integrated List of Waters - Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 303(d) and 305(b) of the Clean Water Act. Retrieved from: http://www.mass.gov/dep/water/resources/08list2.pdf

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Massachusetts Department of Transportation (MassDOT) (2011a). Description of MassDOT's Application of Impervious Cover Method in BMP 7U (MassDOT Application of IC Method).

Massachusetts Department of Transportation (MassDOT) (2012). Impaired Waters Assessment for Unnamed Tributary (MA51-08).

Table 1: Estimated Effectiveness of Proposed BMPs within Directly Contributing Watershed to Unnamed Tributary

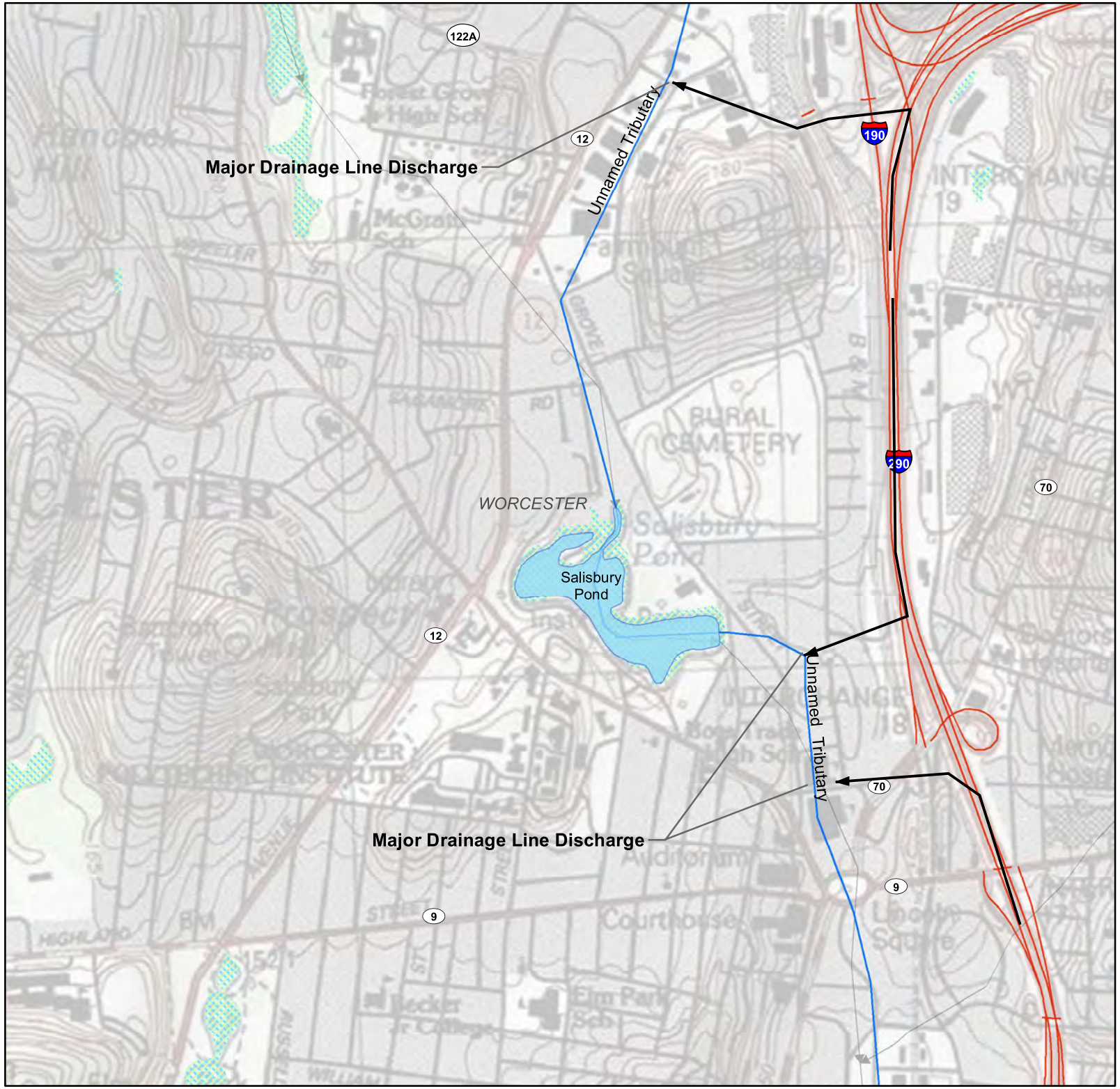
BMP Identifier	BMP Type	TP Reduction Effectiveness	MassDOT Catchment Area (acres)		Pre-BMP Load (lb/yr)	Reduction Achieved (lb/yr)	Final Load (lb/yr)
			Impervious	Pervious*			
Proposed							
Pr-BMP-1*	Infiltration Swale	36%	0.8	0.0	1.4	0.5	0.9
Pr-BMP-2*	Infiltration Basin	99%	6.6	0.0	11.8	11.7	0.1
Pr-BMP-3	Infiltration Basin	99%	0.7	0.0	1.3	1.3	0.0
Pr-BMP-4	Infiltration Basin	99%	1.2	0.0	2.1	2.1	0.0
Pr-BMP-5	Infiltration Basin	99%	0.3	0.0	0.5	0.5	0.0
Pr-BMP-6	Infiltration Basin	99%	4.7	0.0	8.0	7.9	0.1
Pr-BMP-7	Infiltration Swale	24%	1.0	0.0	1.6	0.4	1.2
Total		91%	15.2	0.0	26.7	24.4	2.3

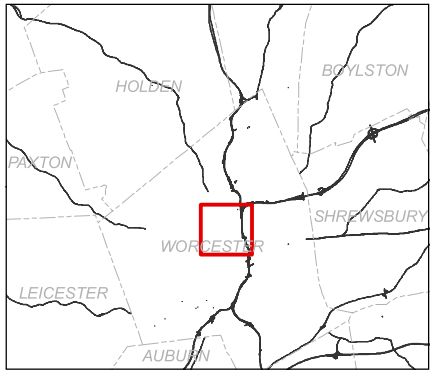
Notes:

- Reduction Effectivness is derived from EPA (March 2010) and MassDEP (*Massachusetts Stormwater Handbook* , 2008).

- Values listed for Reduction Effectiveness assume highway surfaces are equivalent to the "commercial land use" used in EPA's report "Stormwater Best Management Practices (BMP) Performance Study" (Revised March 2010) and assume a Water Quality Volume of 1.0 inches. TP Reduction Effectiveness for infiltration BMPs is based on estimated soil infiltration rates corresponding to each of the four soil groups defined by the Soil Conservation Service (SCS).

- Pervious catchment area was assessed due to no discharge determiniation. Impervious catchment areas taken from analysis completed for I-190 Resurfacing Memo





Impaired Water Body
Impaired Stream Segment
Non-Impaired Stream Segment
NWI Wetland Areas
MassDOT Roads in Urban Areas
MassDOT Roads
Town Boundaries

N

0 500 1,000 2,000

Feet

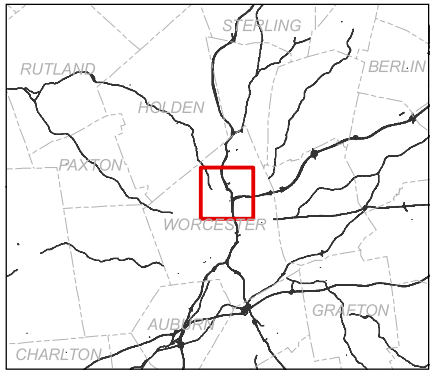
1 in = 1,000 feet

Figure 1

Salisbury Pond (MA51142)
Worcester, MA

January 2012

Moving Massachusetts Forward. massDOT



- Proposed BMP - Swale
- Proposed BMP - Basin
- Impaired Stream Segment
- Impaired Water Bodies
- Non-Impaired Stream Segment
- NWI Wetland Areas
- MassDOT Roads in Urban Areas
- MassDOT Roads
- Town Boundaries

N

0 750 1,500 3,000

Feet

1 in = 1,650 feet

Figure 2

Proposed BMPs for Unnamed Tributary (MA51-08) Worcester, MA

January 2012

Moving Massachusetts Forward. massDOT

No MassDOT Discharge Review Under Step 2 of BMP 7U

Under Step 2 of BMP 7U, MassDOT committed to map the locations of MassDOT urban outfalls relative to 303(d) waters. This step included "*performing a desktop review of the sub-basin of the 303(d) water body to determine the specific locations of MassDOT outfalls and their receiving waters. This procedure will help determine whether MassDOT's outfalls in fact are potentially discharging in to the water body at issue, and will identify the number of outfalls that may need to be addressed through a mitigation plan. If MassDOT concludes based on its mapping that MassDOT's outfalls clearly are not discharging to the 303(d) water, it will document the basis for the conclusion and will conduct no further assessment of the water body at issue*." Step 2 of BMP 7R includes a similar desktop review.

Appendix L-1 of the June 8, 2010 submittal to the court, as part of the CLF vs. MassDOT lawsuit, identified waterbodies that potentially receive runoff from MassDOT urban roads and included Category 4a and 5 impaired waterbodies. In 2009, USGS published a new GIS datalayer of nested sub-basins[1]. These new more detailed sub-basins allowed AECOM to, in most cases, define the specific watershed to an individual impaired segment when developing Appendix L-1. In some cases the sub-basin continued to include more than one impaired waterbody (and other non-impaired waterbodies) and, therefore, AECOM has been reviewing these sub-basins to identify which of the sub-basin's receiving waters do potentially receive MassDOT discharge from *urban area roads* and which do not. AECOM reviewed each sub-basin in detail and identified waters that do not receive direct discharge from MassDOT. These were identified based on a visual examination of the location of the discharge and the location of the receiving water body. Note that in some cases these water bodies receive discharge from non-urban highways. MassDOT's NPDES storm water permit and MassDOT's impaired waters program covers urban areas. Storm water from non-urban areas is addressed under MassDOT's Programmed Project Initiative.

The figures in this section summarize the desktop review and those receiving waters that have been identified as not directly receiving MassDOT discharges during this more detailed review. The figures show the impaired waterbody segment being assessed in dark blue. The other impaired waterbody segments within the sub-basin are in bright blue. MassDOT urban area roads are indicated in red with the outfalls identified as green circles. The gray portions of MassDOT roadways are outside of urban areas and therefore not covered by the existing NPDES permit. These areas are not considered in this assessment.

The water bodies MassDOT has identified that do not receive discharge from MassDOT are listed in the table below and shown in the attached figures.

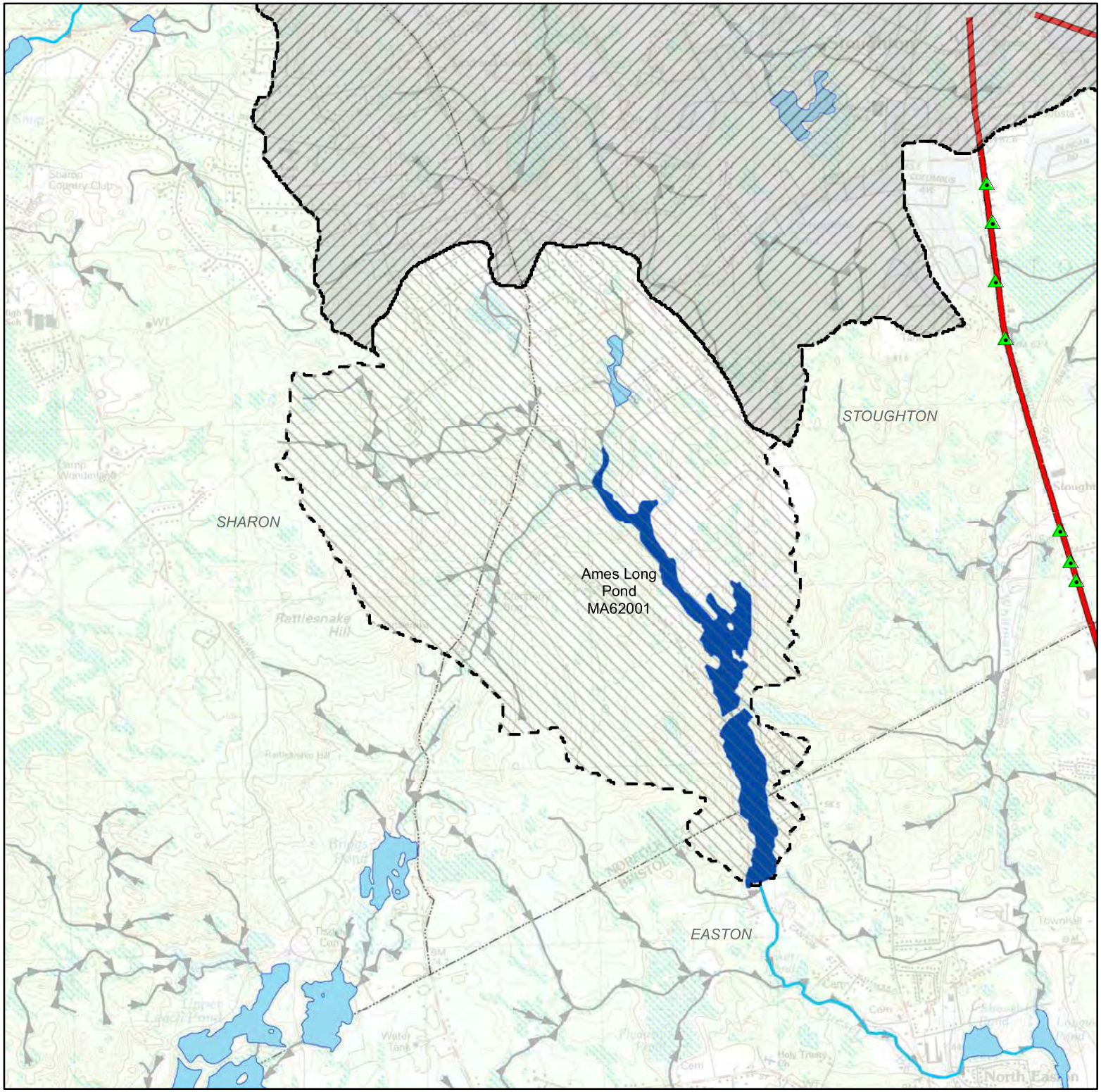
The attached figures show the subwatersheds of the water bodies listed in the table below. All subwatersheds are outlined in a thick, black, dashed line. Many of the subwatershed polygons share adjacent boundaries. In these cases, solid gray or parallel line hatching was used to distinguish the individual polygons. In instances where many of the assessment water bodies are located in the same watershed, there is overlapping of their subwatersheds. For these polygons, solid gray hatching was used to distinguish the largest subwatershed, or the subwatershed of the most downstream waterbody in the watershed. Next, parallel line hatching was used to emphasize subwatersheds of the water bodies upstream in the watershed. Different hatching angles were used to differentiate the individual subwatershed polygons.

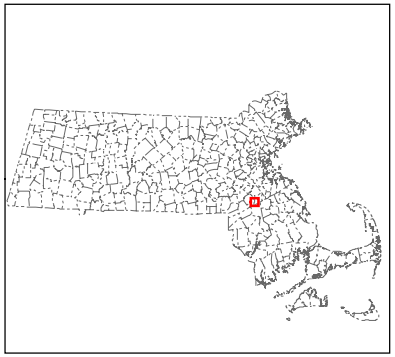
[1] MassGIS states the purpose of the datalayer as follows: "This data layer was created in cooperation with the Environmental Protection Agency (EPA) to assist local communities in environmental planning and stormwater runoff studies. The purpose of this data layer is to provide basin boundaries and impervious surface data at a more discretized scale than is available with current Watershed Boundary Dataset (WBD) subdivisions." The GIS layer is available at http://water.usgs.gov/GIS/metadata/usgswrd/XML/ds451_subbasins.xml.

Impaired Segments Where Assessment Identified No Discharges from MassDOT Outfalls to Water Body

Waterbody ID	Waterbody Name	Watershed Name	TMDL
MA62001	Ames Long Pond	Taunton	-
MA51003	Arcade Pond	Blackstone	-
MA82B-01	Assabet River	Concord	Phosphorous (CN 201.0)
MA82004	Assabet River Reservoir	Concord	Mercury (NEHgTMDL), Phosphorus (CN 201.0)
MA51-07	Beaver Brook	Blackstone	-
MA72-12	Beaver Brook	Charles	-
MA71005	Blacks Nook	Mystic	-
MA73005	Bolivar Pond	Neponset	-
MA92004	Brackett Pond	Ipswich	-
MA83003	Butterfield Pond	Shawsheen	-
MA52004	Cargill Pond	Ten Mile	-
MA72016	Cedar Swamp Pond	Charles	-
MA81-33	Chaffins Brook	Nashua	-
MA53-13	Clear Run Brook	Narragansett Bay	Bacteria (CN182.0)
MA92010	Collins Pond	Ipswich	-
MA74-01	Crooked Meadow River	Weymouth & Weir	-
MA92013	Crystal Pond	Ipswich	-
MA92015	Devils Dishfull Pond	Ipswich	-
MA73-05	East Branch	Neponset	Bacteria (CN 121.0)
MA82B-12	Elizabeth Brook	Concord	-
MA71014	Ell Pond	Mystic	-
MA72037	Factory Pond	Charles	-
MA93023	Flax Pond	No. Coastal	-
MA34024	Forge Pond	Connecticut	-
MA73020	Forge Pond	Neponset	-
MA93-36	Frost Fish Brook	No. Coastal	-
MA41017	Glen Echo Lake	Quinebaug	-
MA93-05	Goldthwait Brook	No. Coastal	-
MA51056	Green Hill Pond	Blackstone	Phosphorus (CN 070.1)
MA51060	Hayes Pond	Blackstone	-
MA82059	Heart Pond	Concord	-
MA95-10	Hiller Cove	Buzzards Bay	Pathogens (CN 251.1)
MA62090	Hobart Pond	Taunton	-
MA82061	Hopkinton Reservoir	Concord	-
MA71019	Horn Pond	Mystic	-
MA72050	Houghton Pond	Charles	-
MA51071	Howe Reservoirs	Blackstone	Phosphorus (CN 070.1)
MA94-04	Indian Head River	S. Coastal	-
MA92-15	Ipswich River	Ipswich	-
MA62094	Island Grove Pond	Taunton	-
MA71021	Judkins Pond	Mystic	-

Waterbody ID	Waterbody Name	Watershed Name	TMDL
MA74013	Lake Holbrook	Weymouth & Weir	-
MA72092	Lake Pearl	Charles	-
MA81122	Lake Shirley	Nashua	-
MA93039	Lily Pond	No. Coastal	-
MA81-29	Malagasco Brook	Nashua	-
MA42035	McKinstry Pond	French	Phosphorus (CN 110.0)
MA72-15	Mill River	Charles	-
MA81-28	Muddy Brook	Nashua	-
MA81-09	Nashua River	Nashua	-
MA34058	Noonan Cove	Connecticut	-
MA92-11	Norris Brook	Ipswich	-
MA82088	Nutting Lake	Concord	Mercury (NEHgTMDL)
MA70-11	Pleasure Bay	Boston Harbor	-
MA34073	Porter Lake	Connecticut	-
MA34072	Porter Lake West	Connecticut	-
MA51134	Riley Pond	Blackstone	-
MA42047	Robinson Pond	French	Phosphorus (CN 110.0)
MA82104	Stearns Mill Pond	Concord	-
MA84B-03	Stony Brook	Merrimack	-
MA72-10	Stop River	Charles	Pathogens (CN 156.0)
MA52-01	Ten Mile River	Ten Mile	-
MA73059	Turners Pond	Neponset	-
MA62-48	Unnamed Tributary	Taunton	-
MA73-32	Unnamed Tributary	Neponset	-
MA81-35	Unnamed Tributary	Nashua	-
MA82A-17	Unnamed Tributary	Concord	-
MA81-34	Unnamed Tributary (Boylston Brook)	Nashua	-
MA34128	Upper Van Horn Park Pond	Connecticut	-
MA53-06	Warren River Pond	Narragansett Bay	Pathogens (CN 351.0)
MA34099	Watershops Pond	Connecticut	-
MA71045	Wedge Pond	Mystic	-
MA51176	Welsh Pond	Blackstone	-
MA93089	West Pond	No. Coastal	-
MA74-05	Weymouth Back River	Weymouth & Weir	-
MA82120	Whitehall Reservoir	Concord	Mercury (NEHgTMDL)
MA62220	Woods Pond	Taunton	-
MA51186	Woolshop Pond	Blackstone	-





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

2,500 1,250 0 2,500

ft

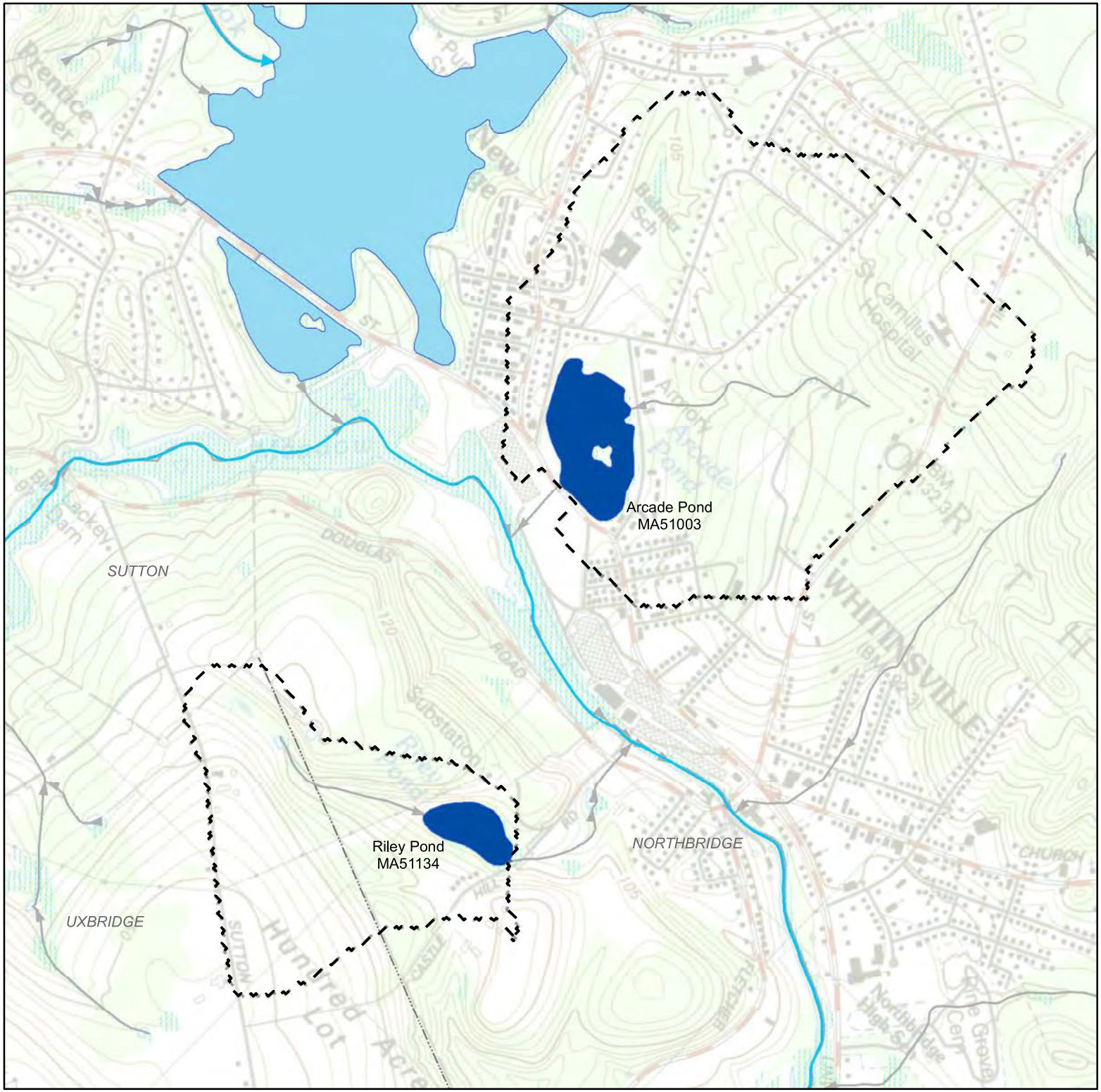
MA62001

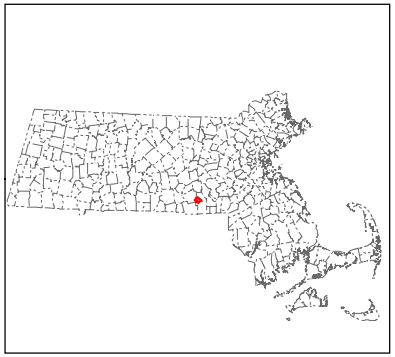
Ames Long Pond

Taunton

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed
Impaired Water Body
NWI Wetland Areas
Impaired Stream Being Assessed
Impaired Stream Segment
Non-Impaired Stream Segments
MA DOT Roads
MA DOT Urban Area Roads
Town Boundaries
Stormwater Outfalls

N

1,250 625 0 1,250 ft

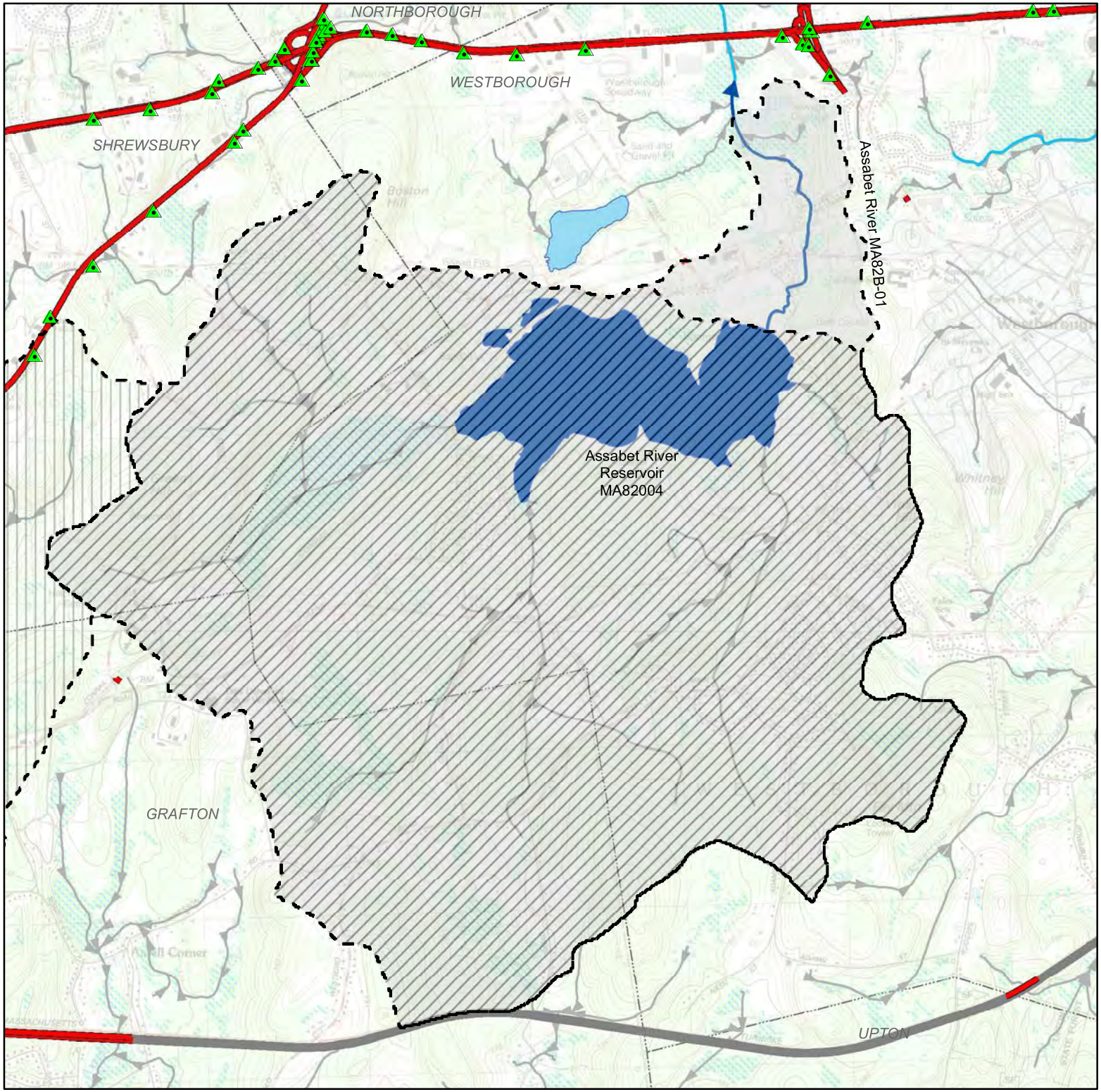
MA51003 and MA51134

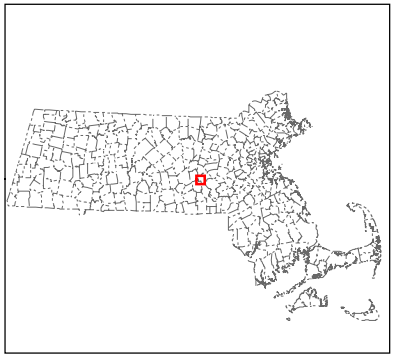
Arcade Pond and Riley Pond

Blackstone

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

2,750 1,375 0 2,750

ft

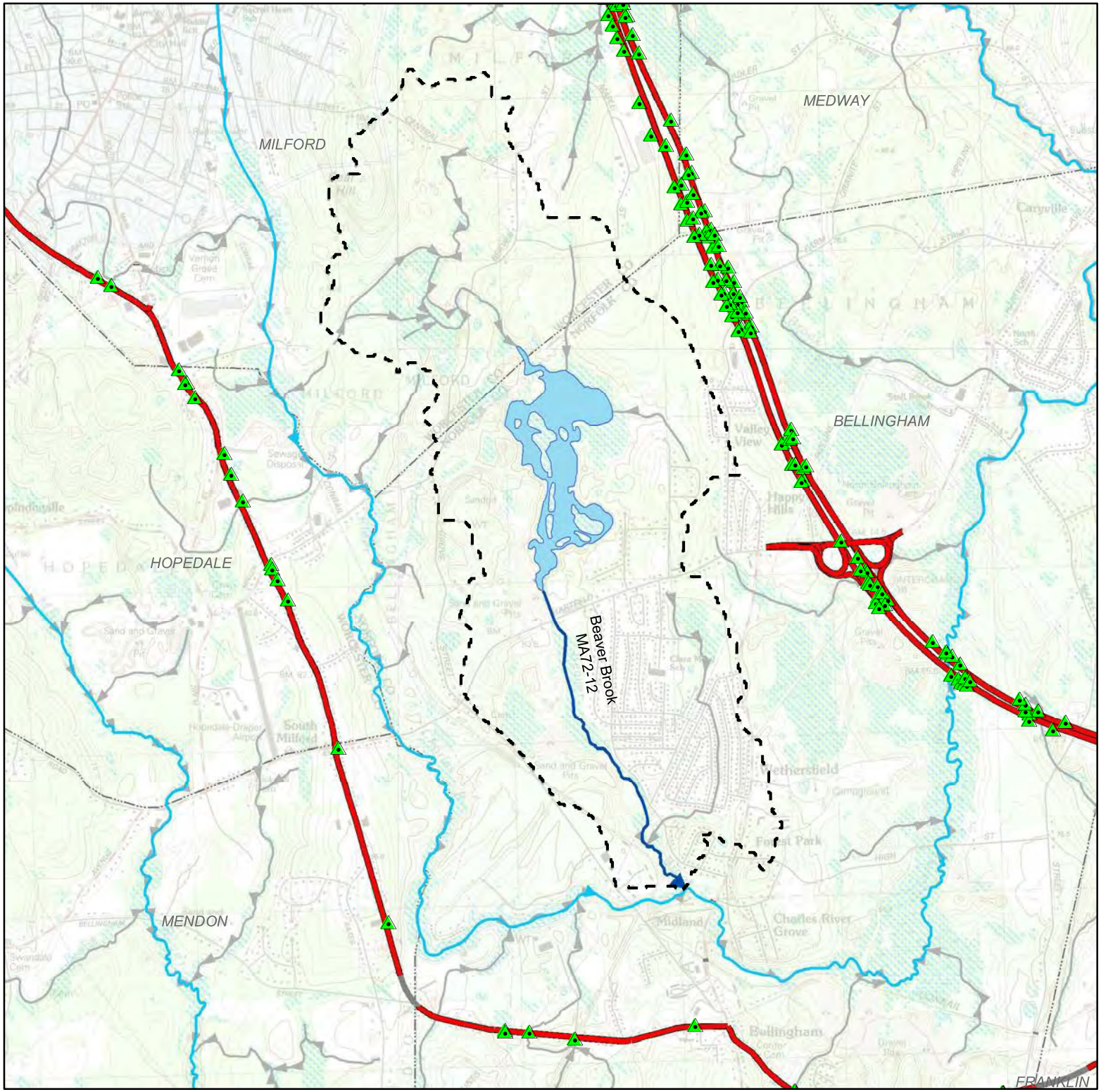
MA82004 and MA82B-01

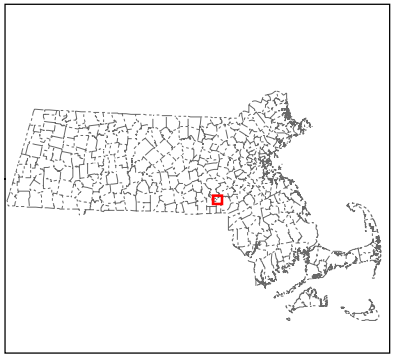
Assabet River Reservoir and Assabet River

Concord

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

2,750 1,375 0 2,750

ft

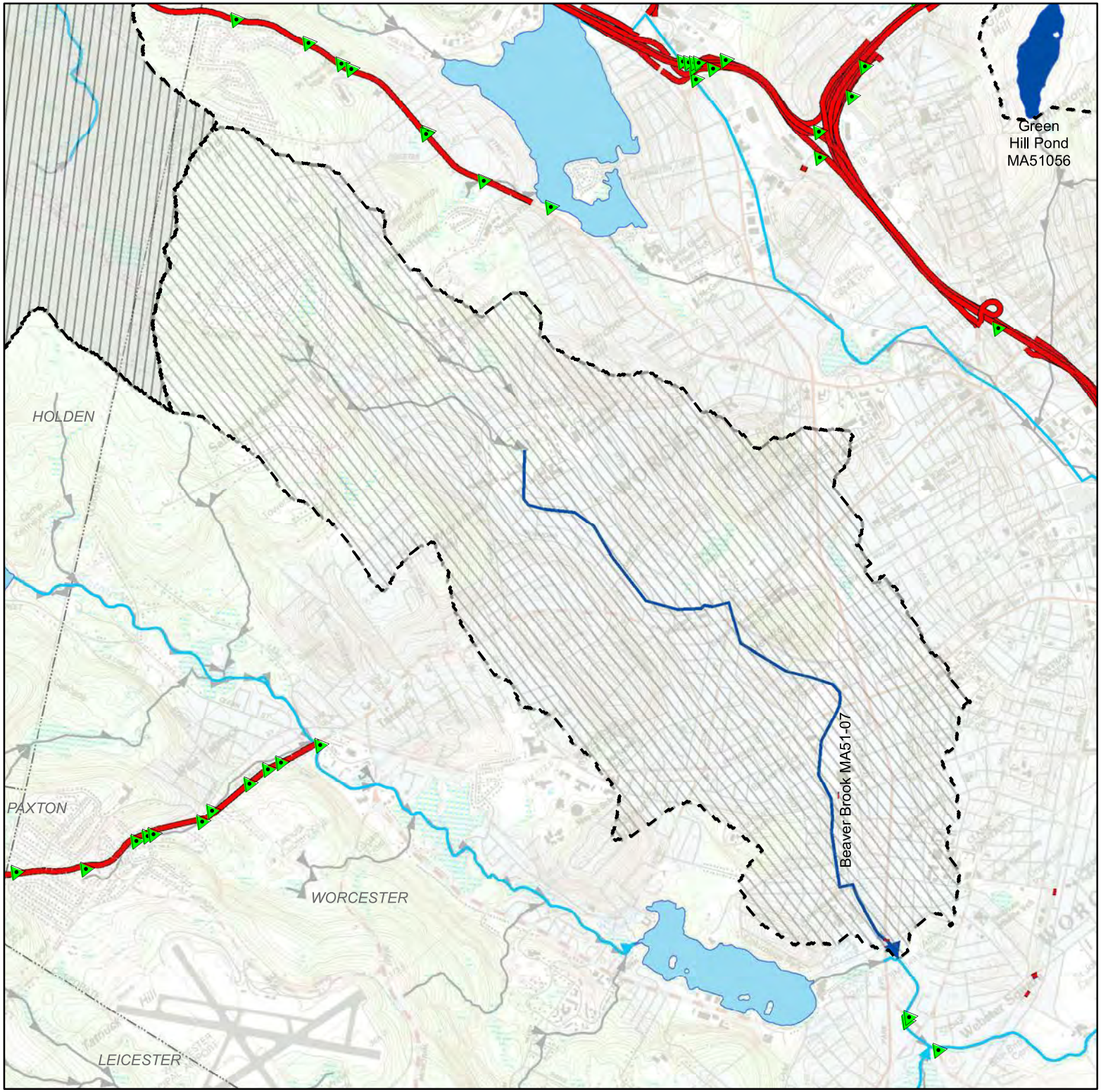
MA72-12

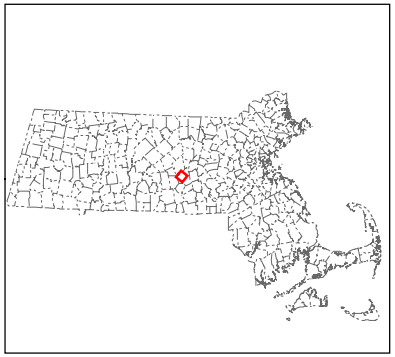
Beaver Brook

Charles

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

2,750 1,375 0 2,750

ft

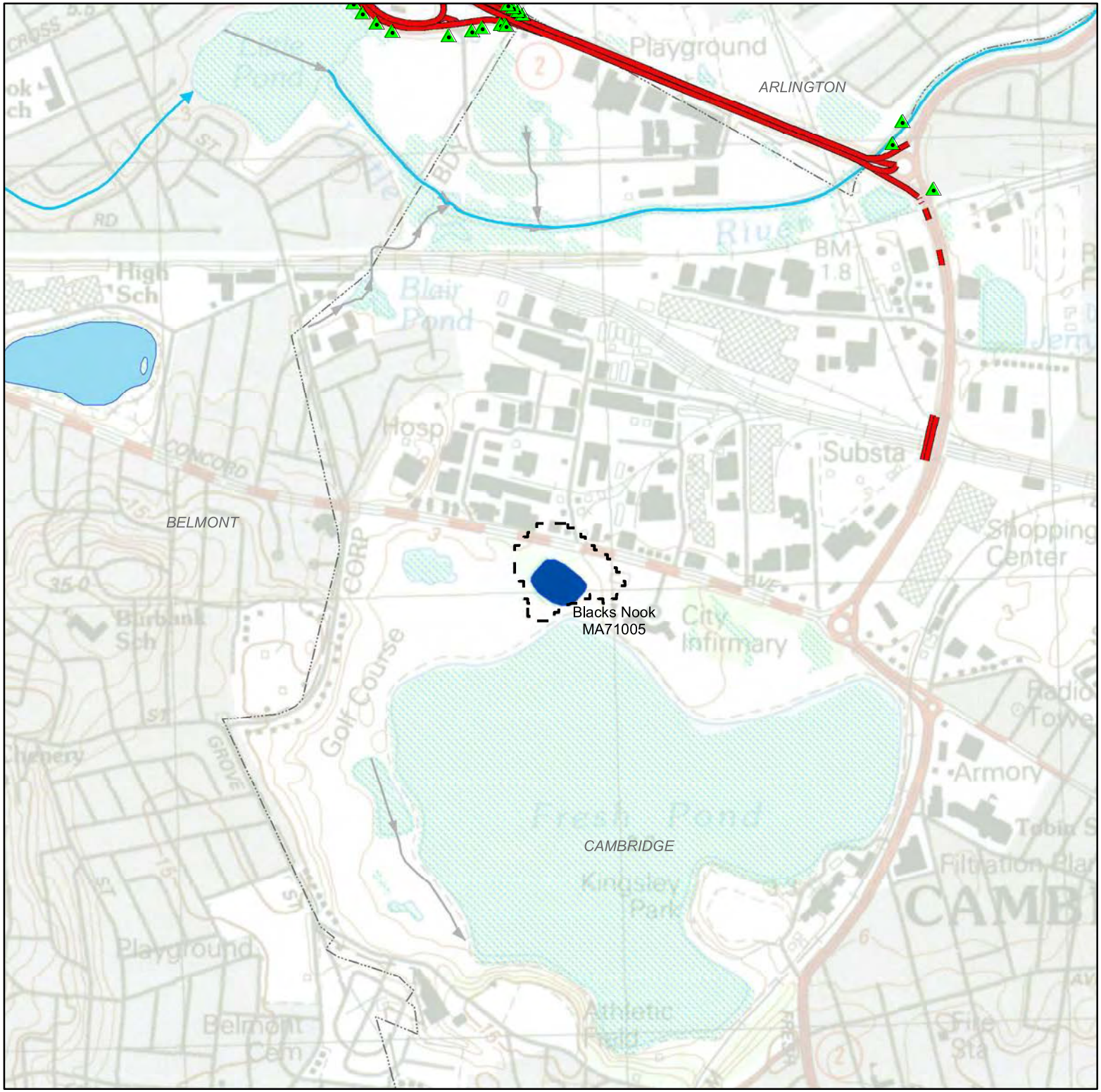
MA51-07

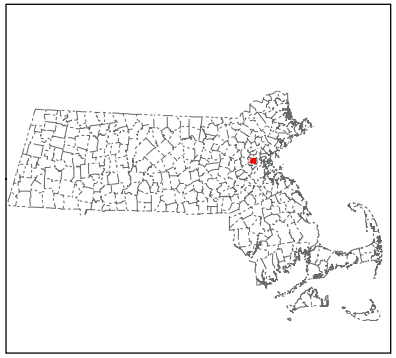
Beaver Brook

Blackstone

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,000 500 0 1,000 ft

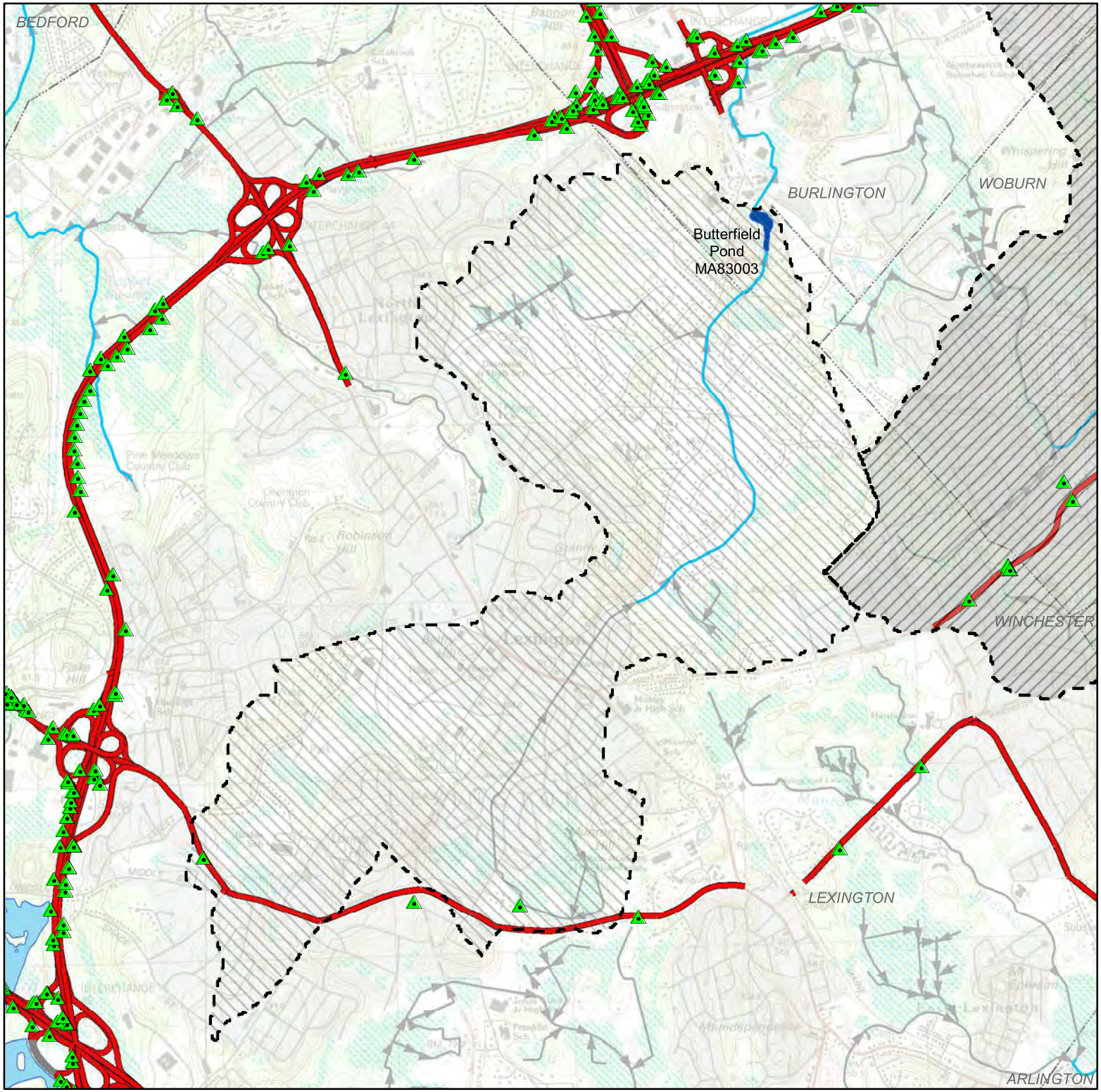
MA71005

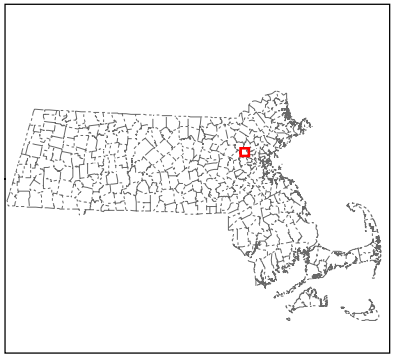
Blacks Nook

Boston Harbor: Mystic

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

2,500 1,250 0 2,500 ft

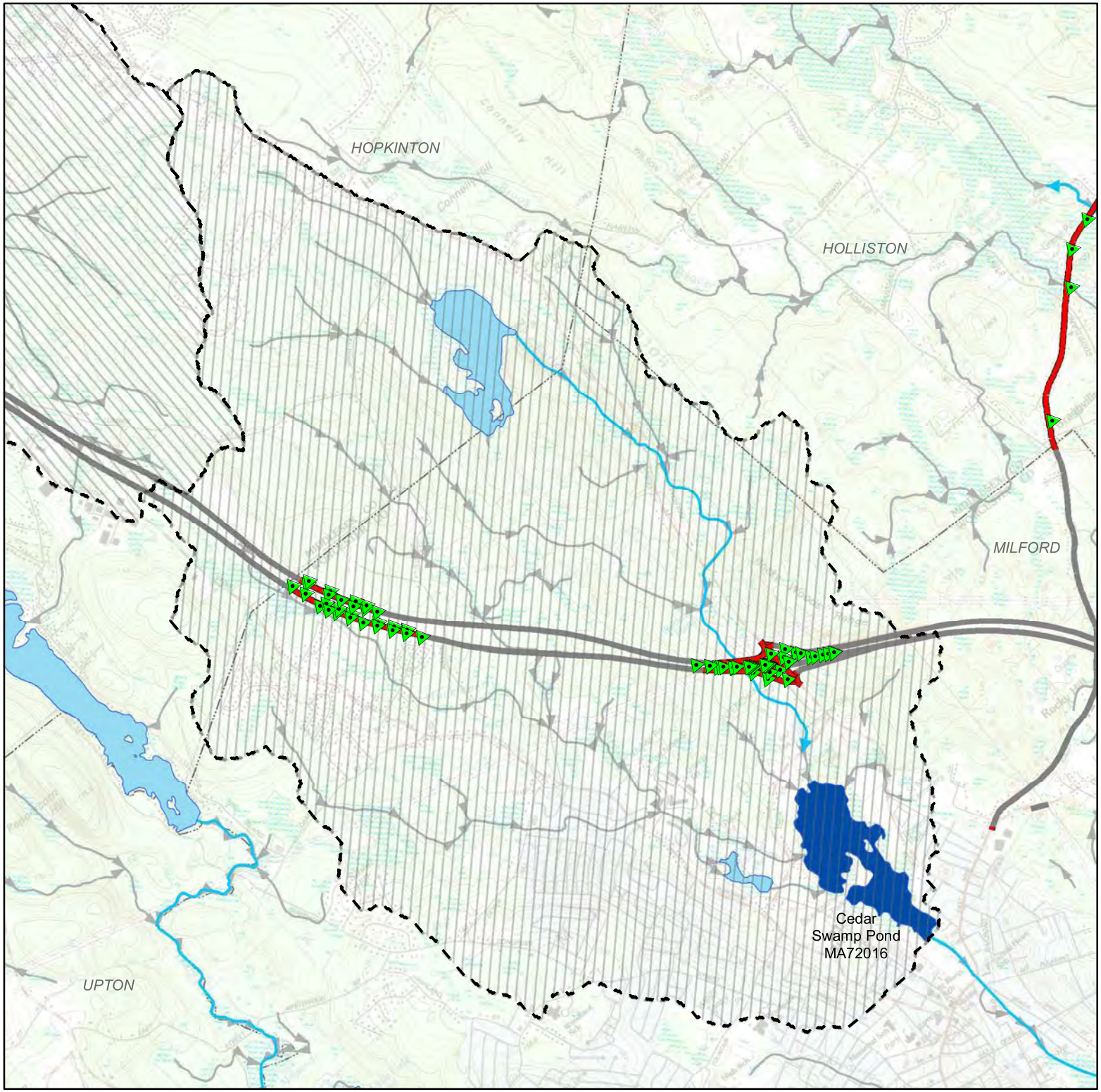
MA83003

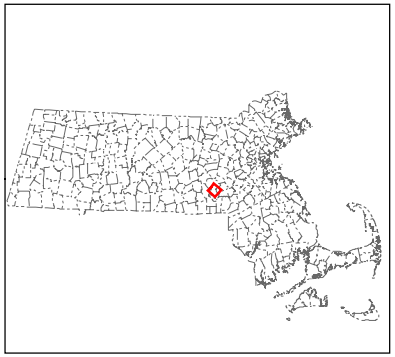
Butterfield Pond

Shawsheen

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

3,000 1,500 0 3,000 ft

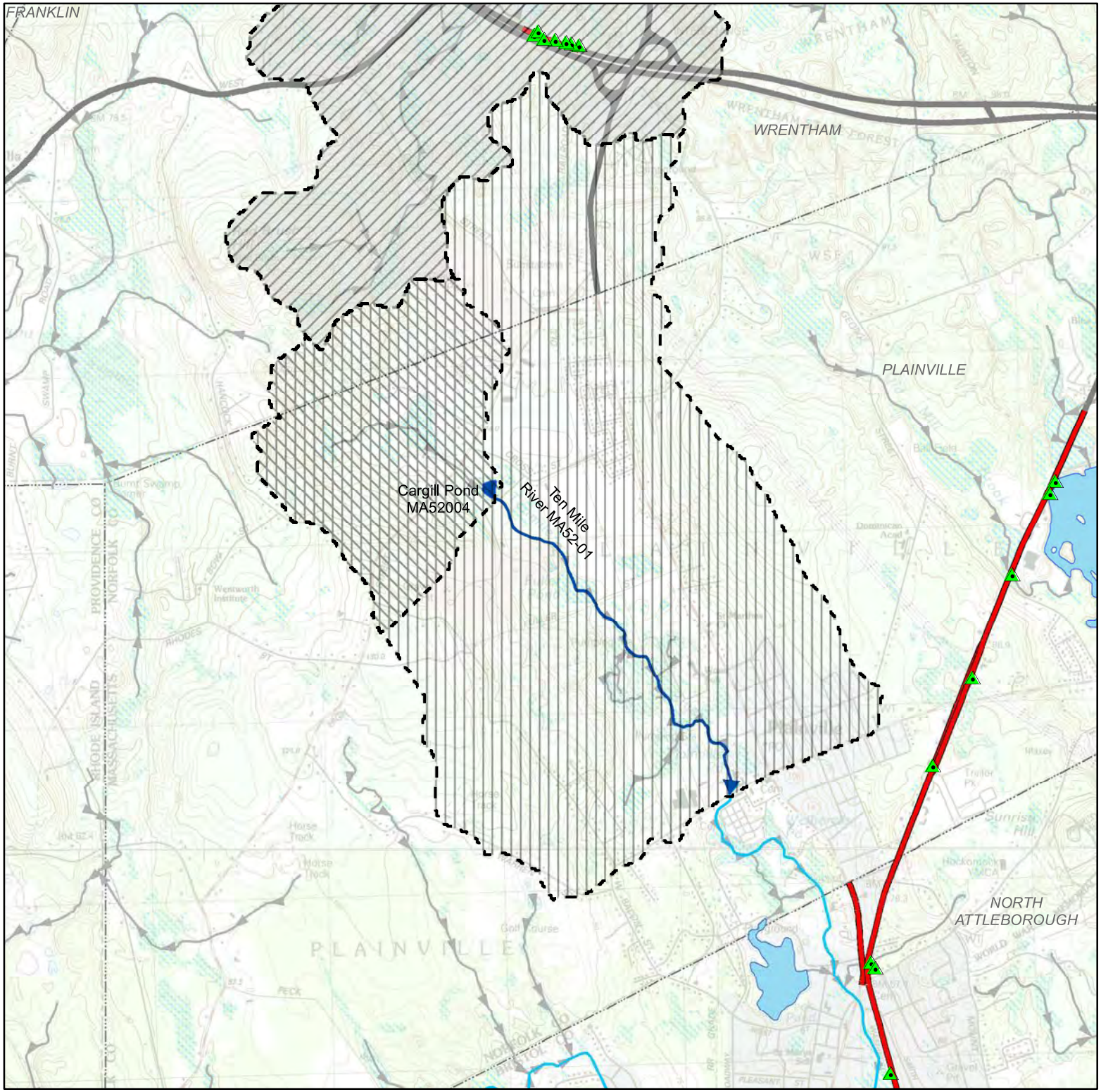
MA72016

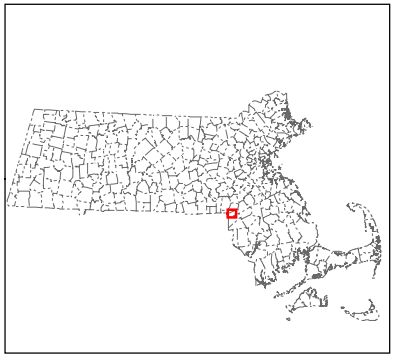
Cedar Swamp Pond

Charles

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

2,500 1,250 0 2,500 ft

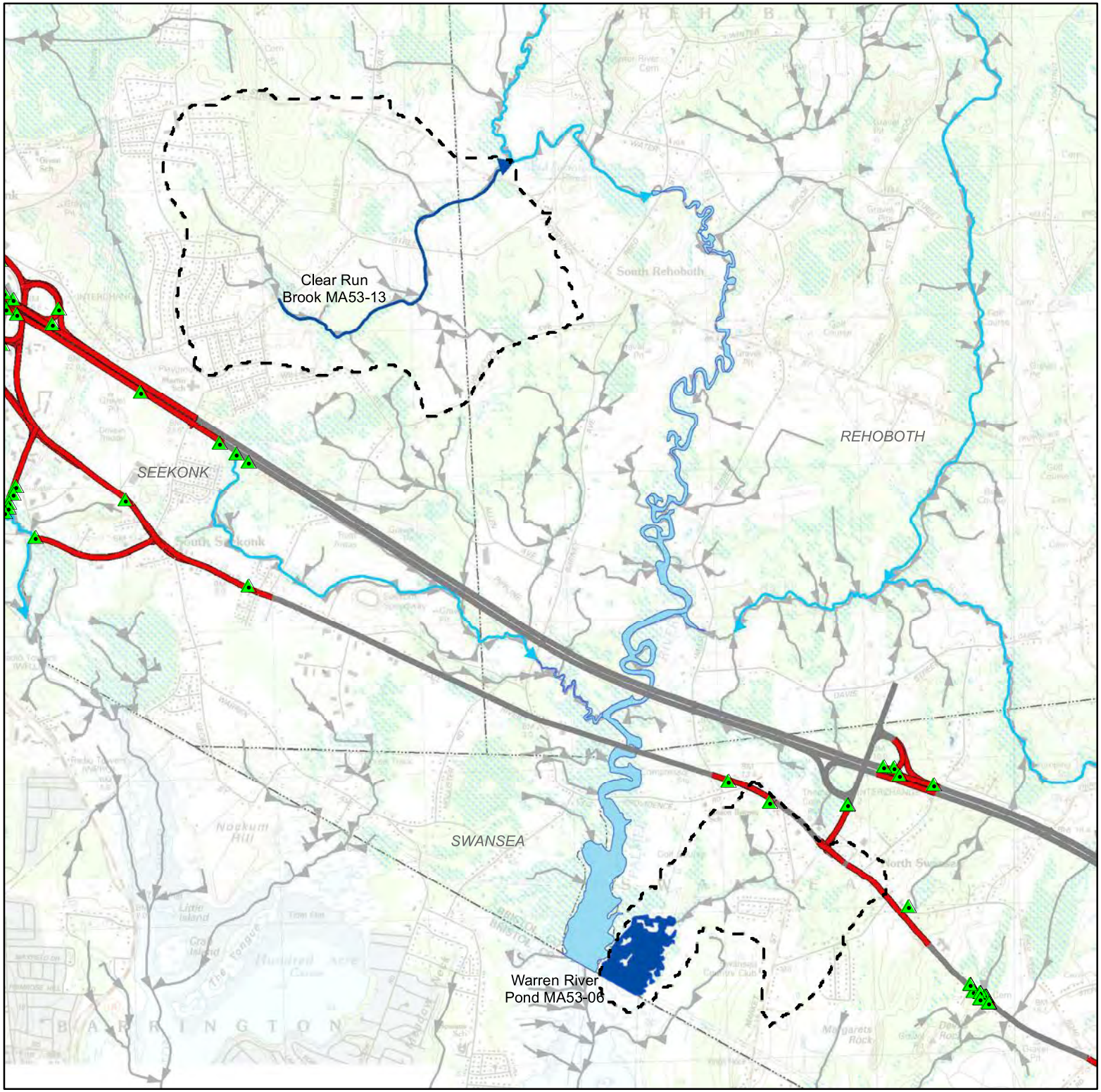
MA52004 and MA52-01

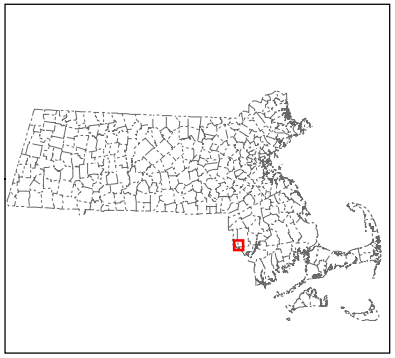
Clear Run Brook and Warren River Pond

Ten Mile

June 2012

massDOT Massachusetts Department of Transportation Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

3,000 1,500 0 3,000 ft

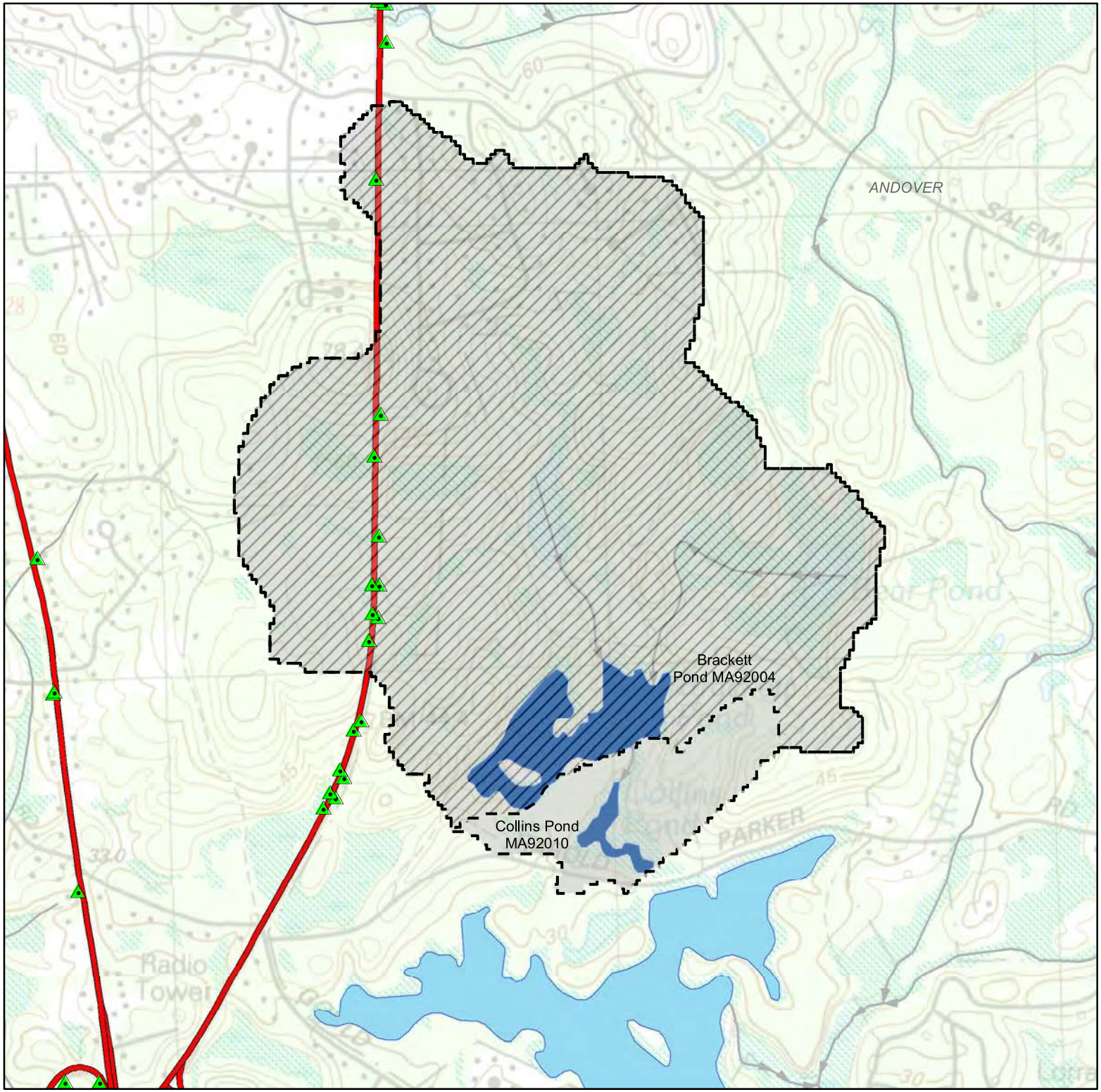
MA53-13 and MA53-06

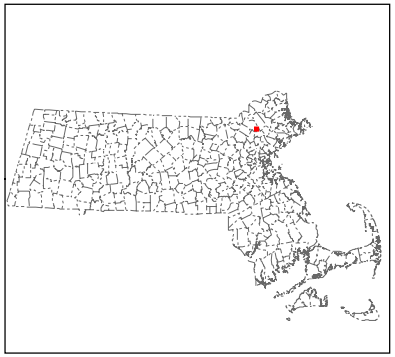
Clear Run Brook and Warren River Pond

Narragansett Bay (Shore)

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,000 500 0 1,000 ft

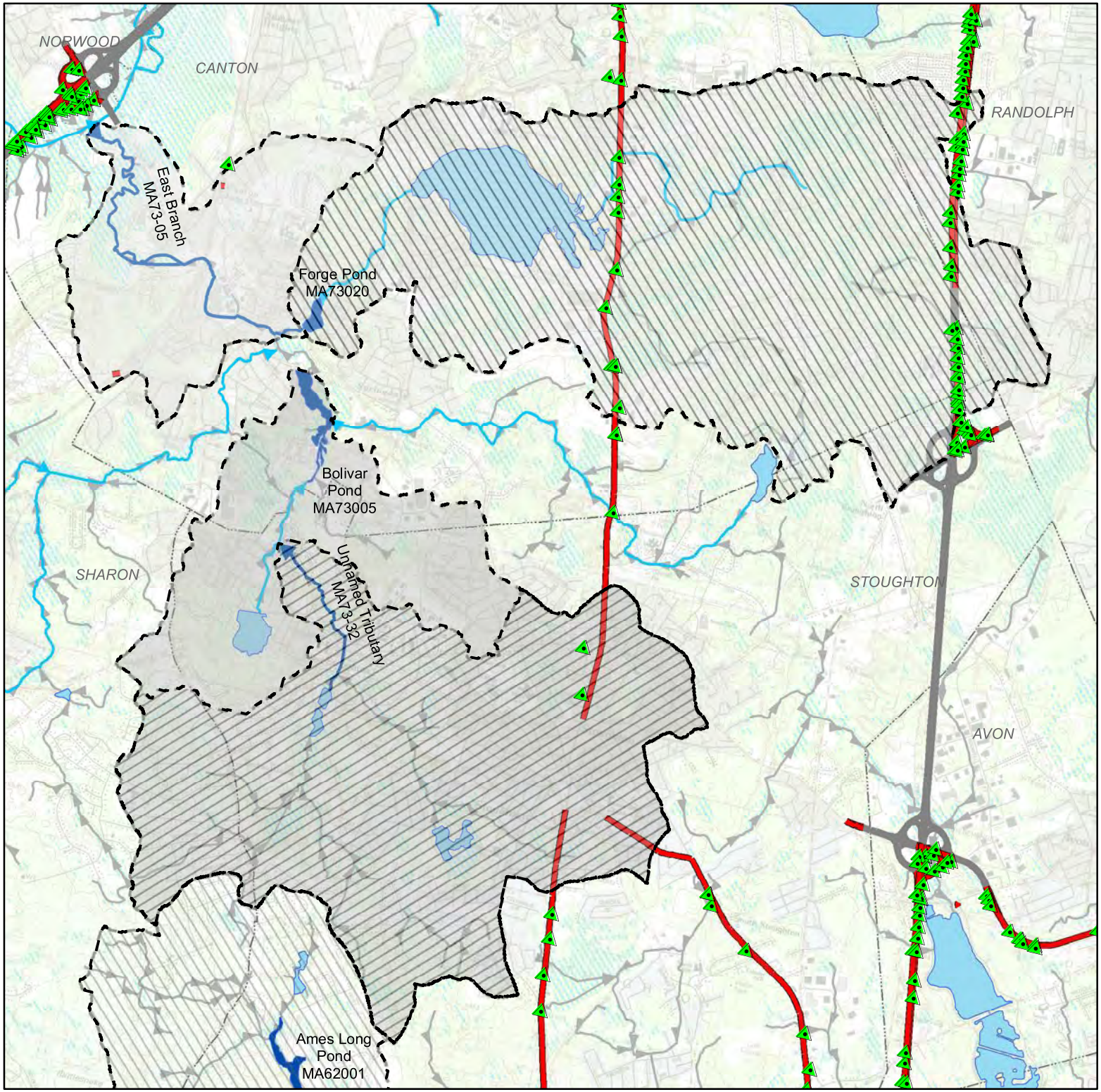
MA92010 and MA92004

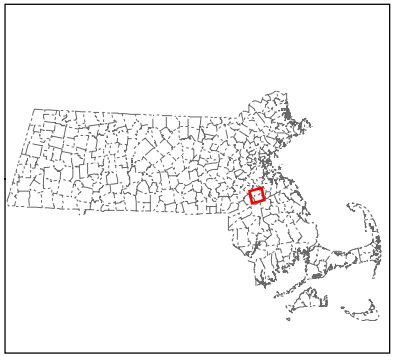
Collins Pond and Brackett Pond

Ipswich

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

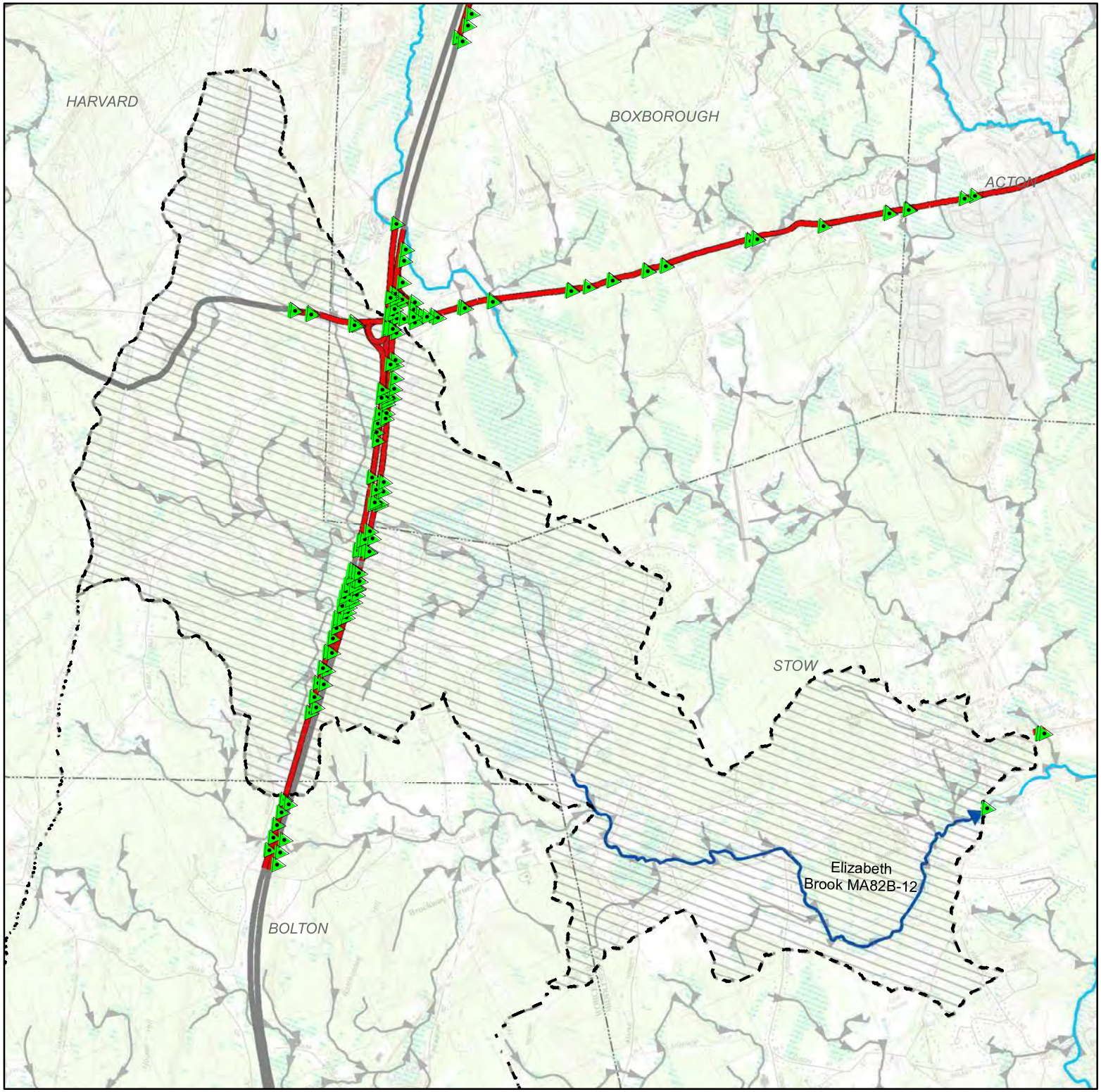
4,000 2,000 0 4,000 ft

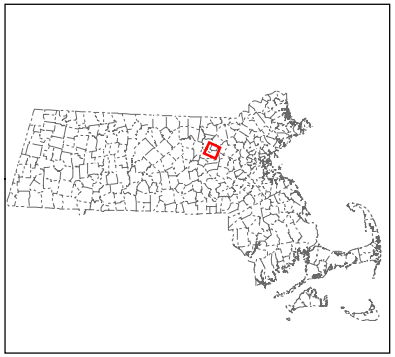
Ma73-05, MA73020, MA73005, MA73-32

East Branch, Forge Pond, Bolivar Pond, Unnamed Tributary
Boston Harbor: Neponset

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

4,000 2,000 0 4,000 ft

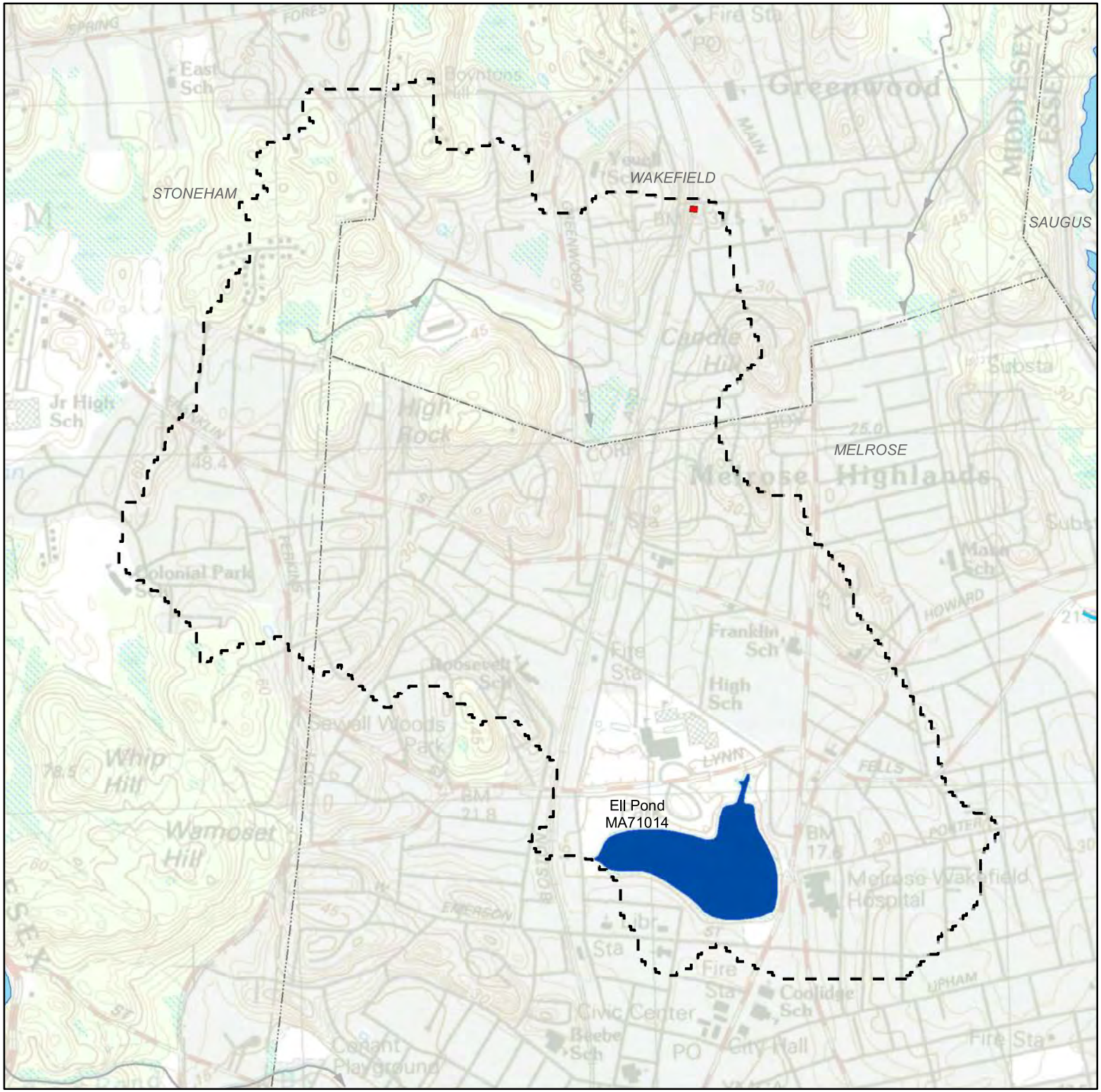
MA82B-12

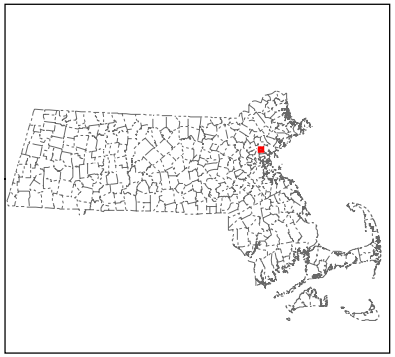
Elizabeth Brook

Concord

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,250 625 0 1,250 ft

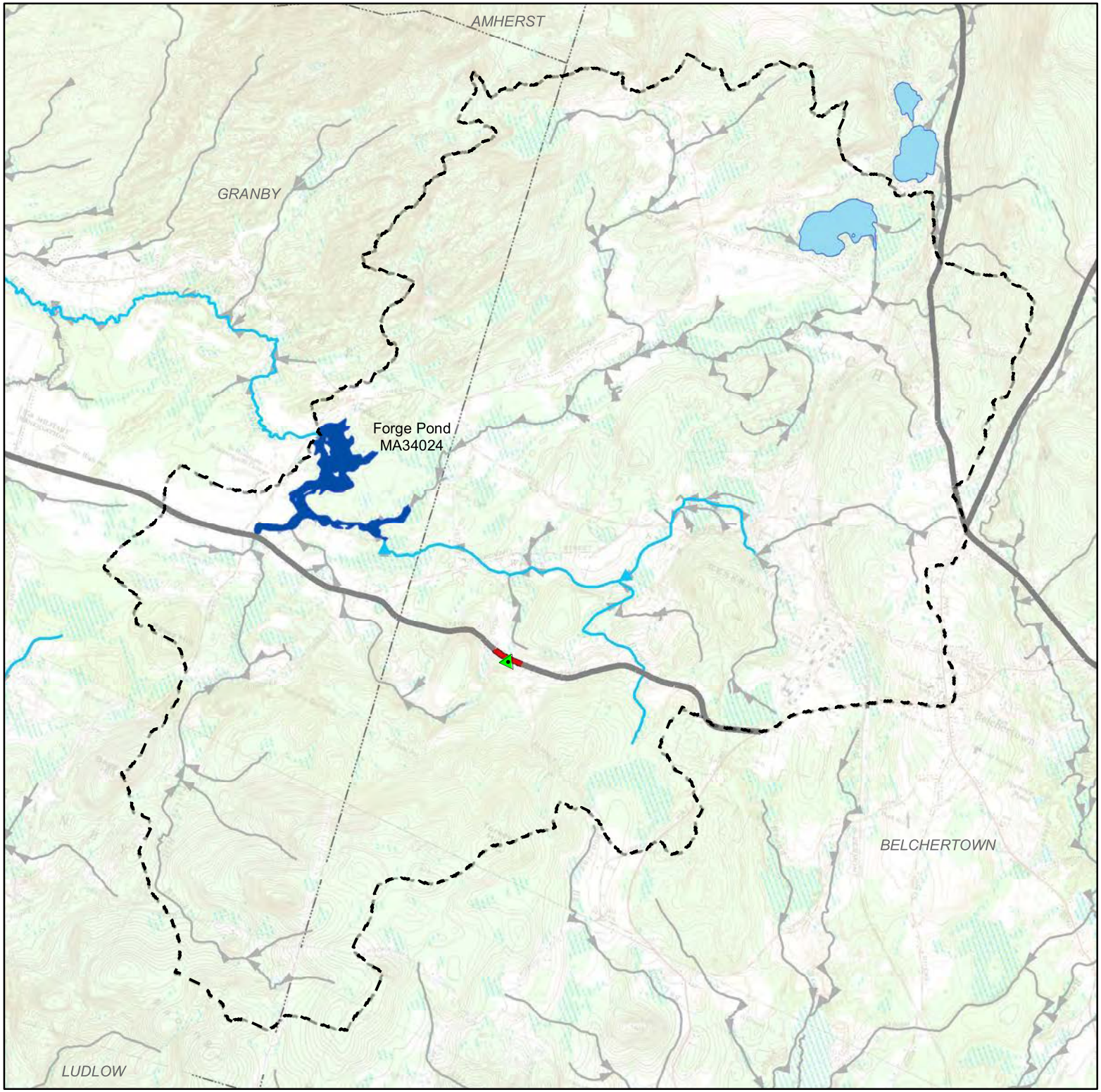
MA71014

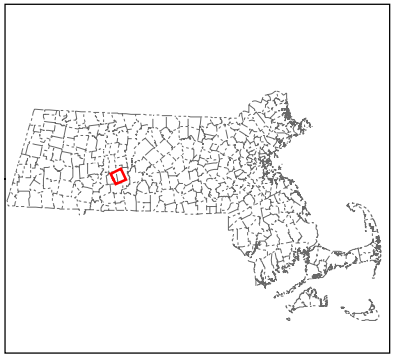
Ell Pond

Boston Harbor: Mystic

June 2012

massDOT Massachusetts Department of Transportation Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

3,750 1,875 0 3,750

ft

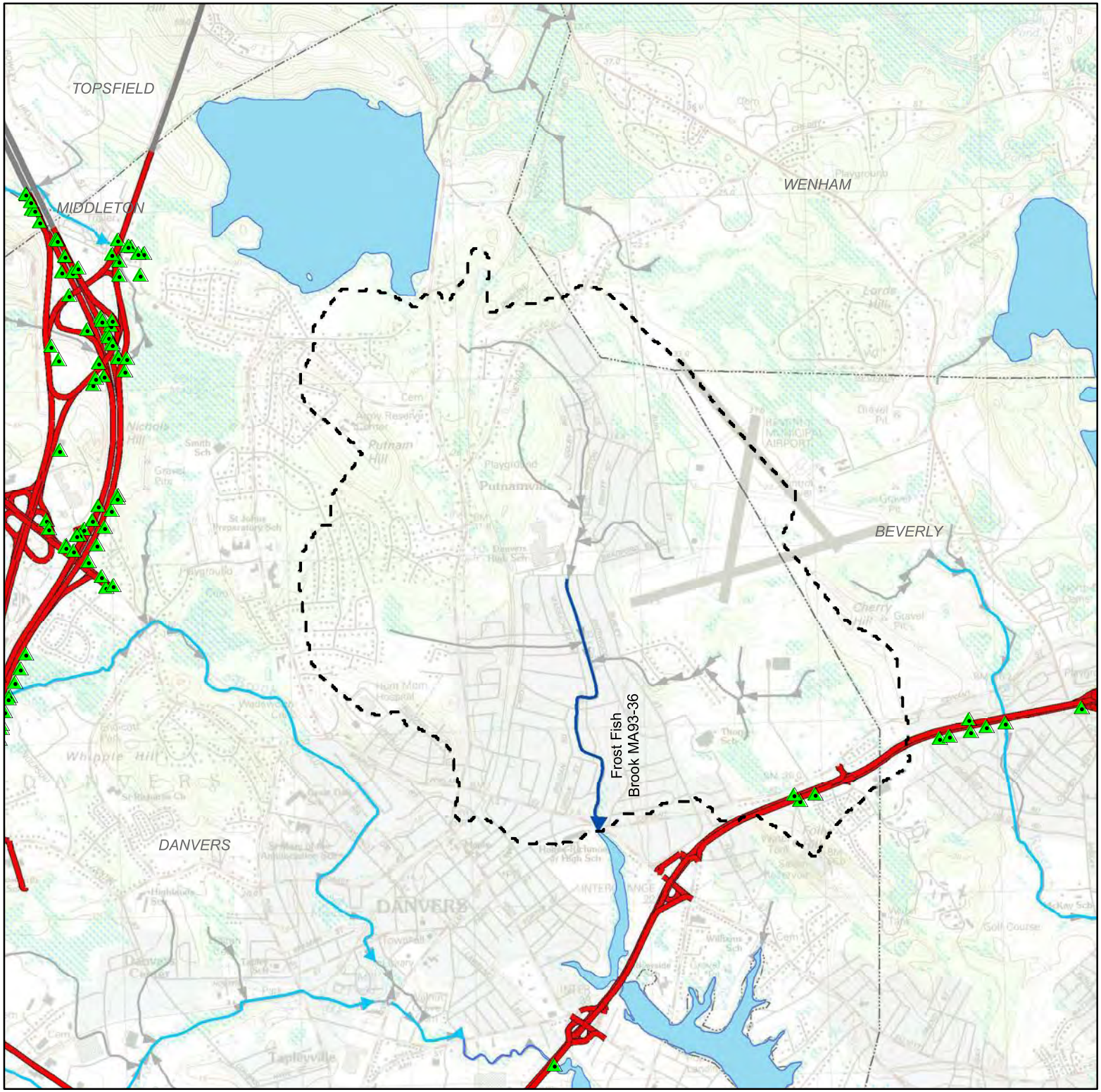
MA34024

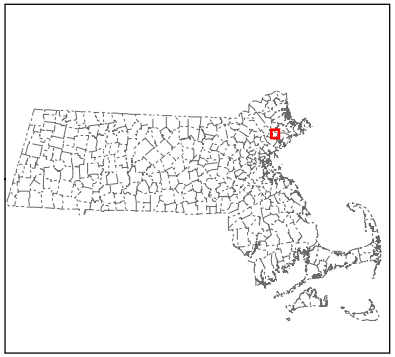
Forge Pond

Connecticut

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed
Impaired Water Body
NWI Wetland Areas
Impaired Stream Being Assessed
Impaired Stream Segment
Non-Impaired Stream Segments
MA DOT Roads
MA DOT Urban Area Roads
Town Boundaries
Stormwater Outfalls

N

2,500 1,250 0 2,500 ft

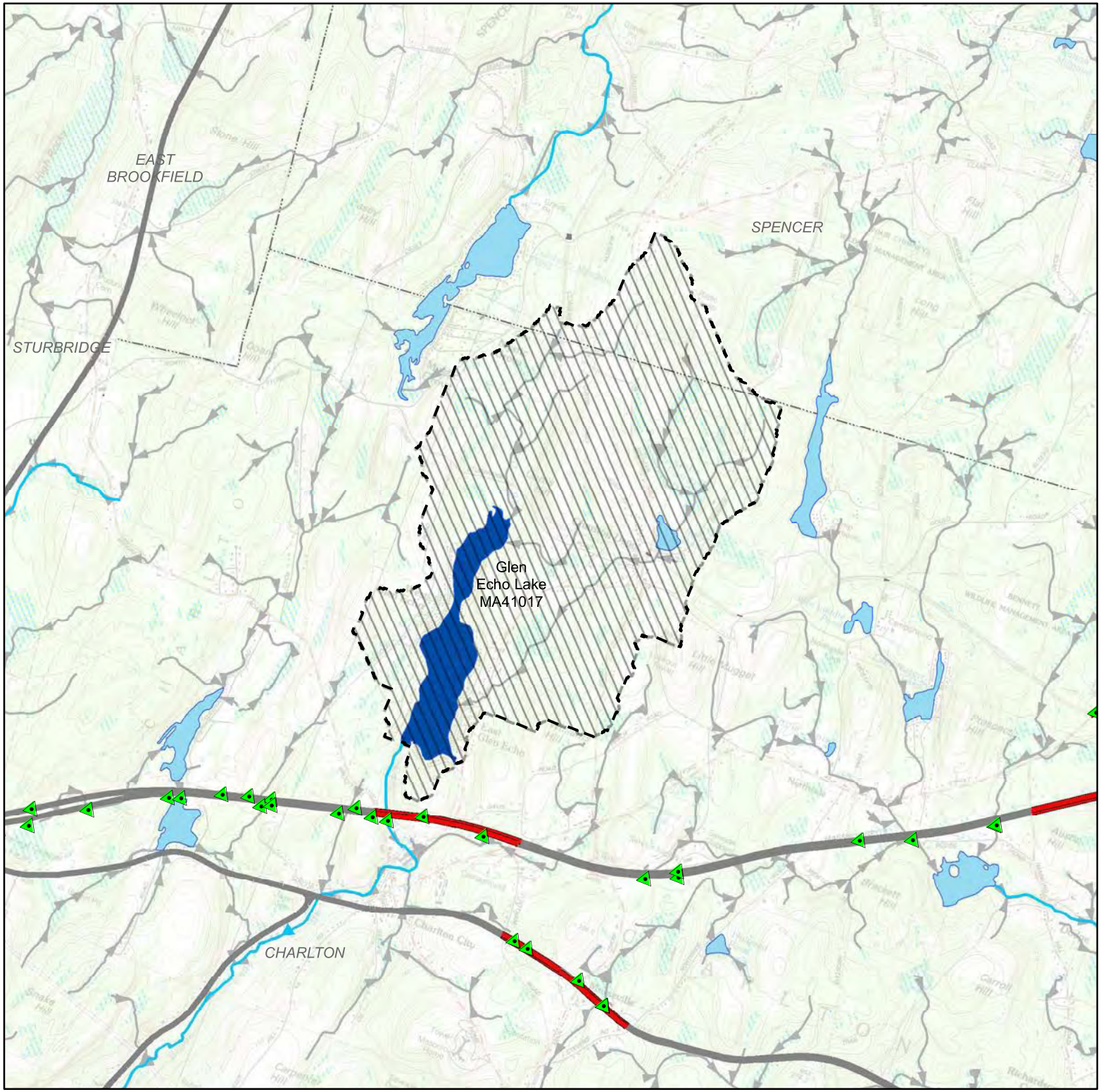
MA93-36

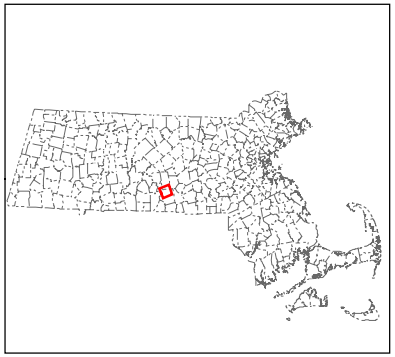
Frost Fish Brook

North Coastal

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

3,300 1,650 0 3,300

ft

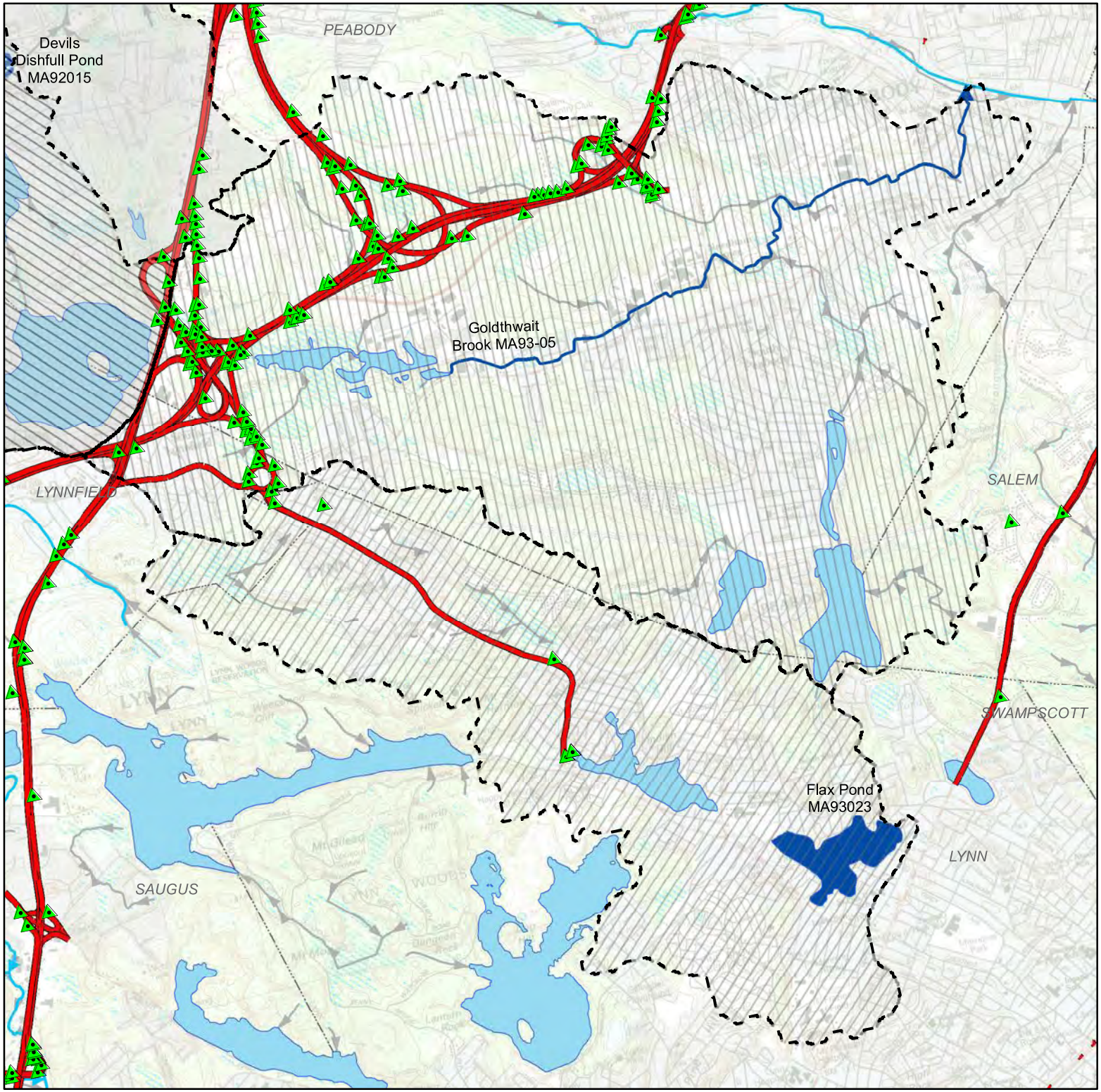
MA41017

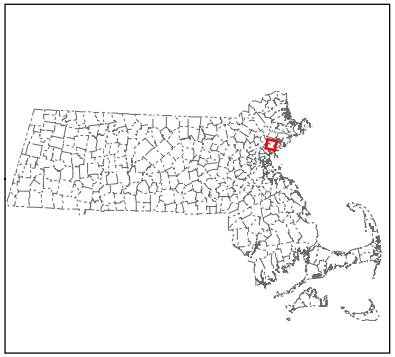
Glen Echo Lake

Quinebaug

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed
Impaired Water Body
NWI Wetland Areas
Impaired Stream Being Assessed
Impaired Stream Segment
Non-Impaired Stream Segments
MA DOT Roads
MA DOT Urban Area Roads
Town Boundaries
Stormwater Outfalls

N

3,000 1,500 0 3,000
ft

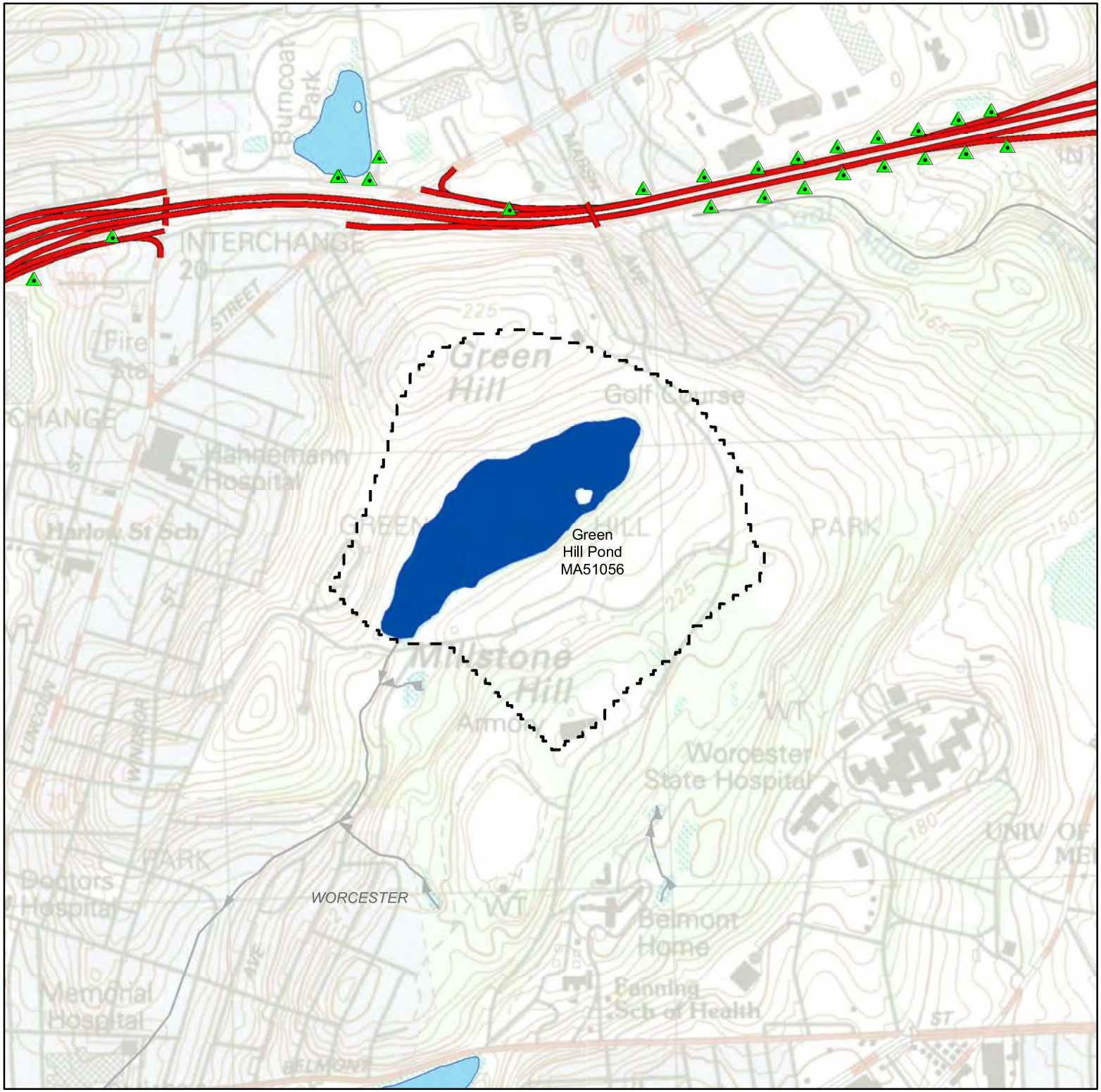
MA93-05 and MA93023

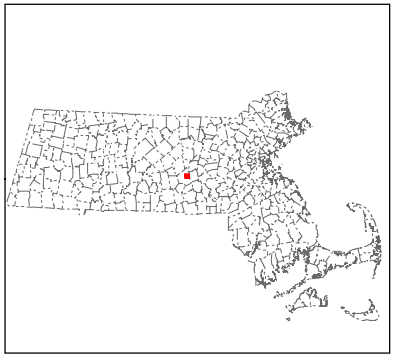
Goldthwait Brook and Flax Pond

North Coastal

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,000 500 0 1,000 ft

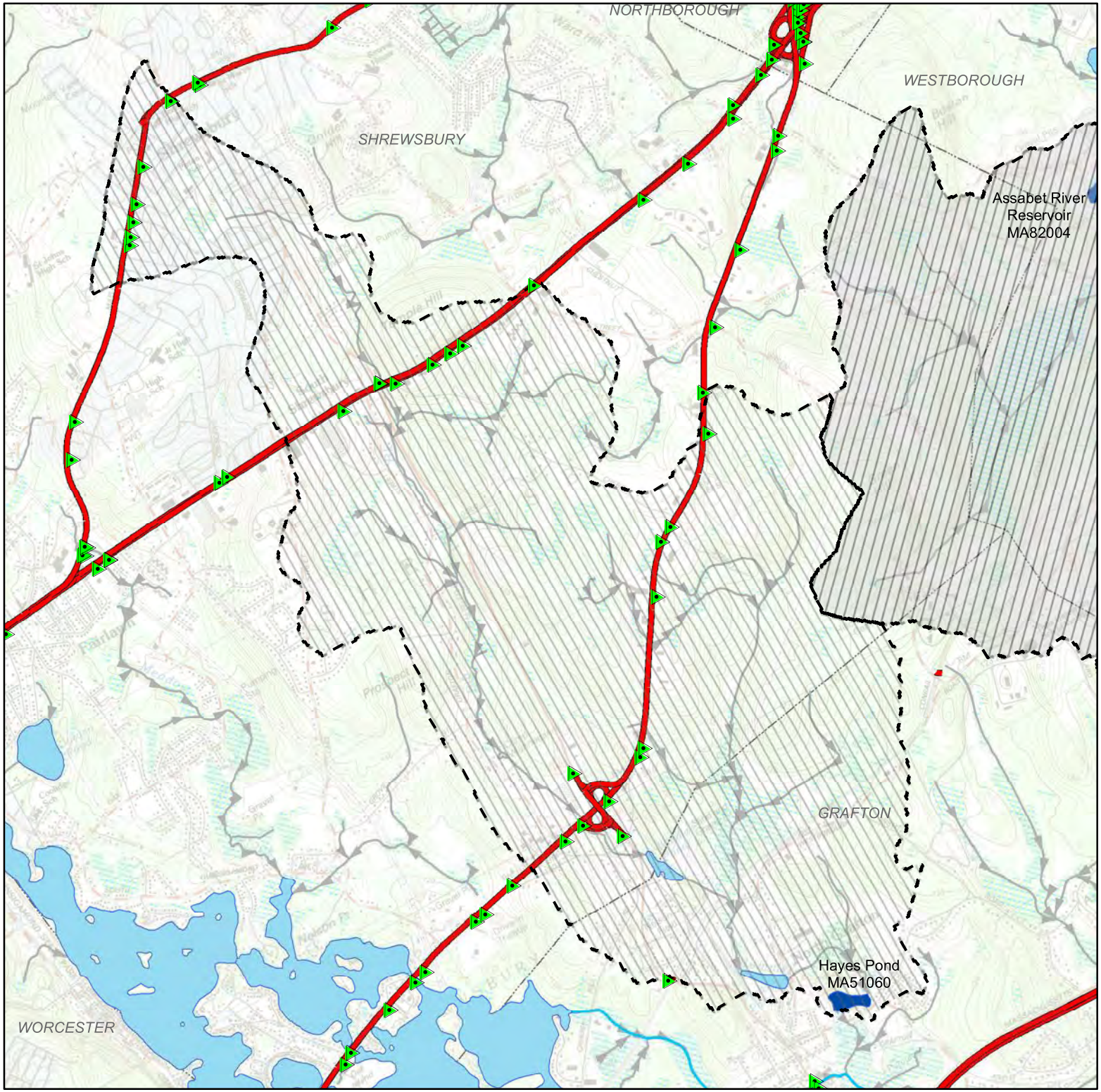
MA51056

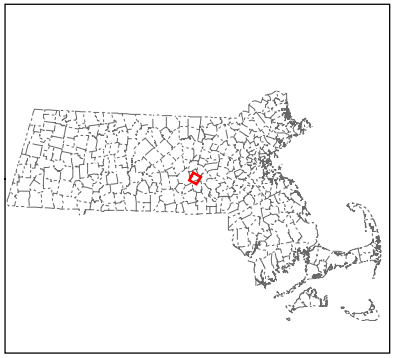
Green Hill Pond

Blackstone

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

2,750 1,375 0 2,750 ft

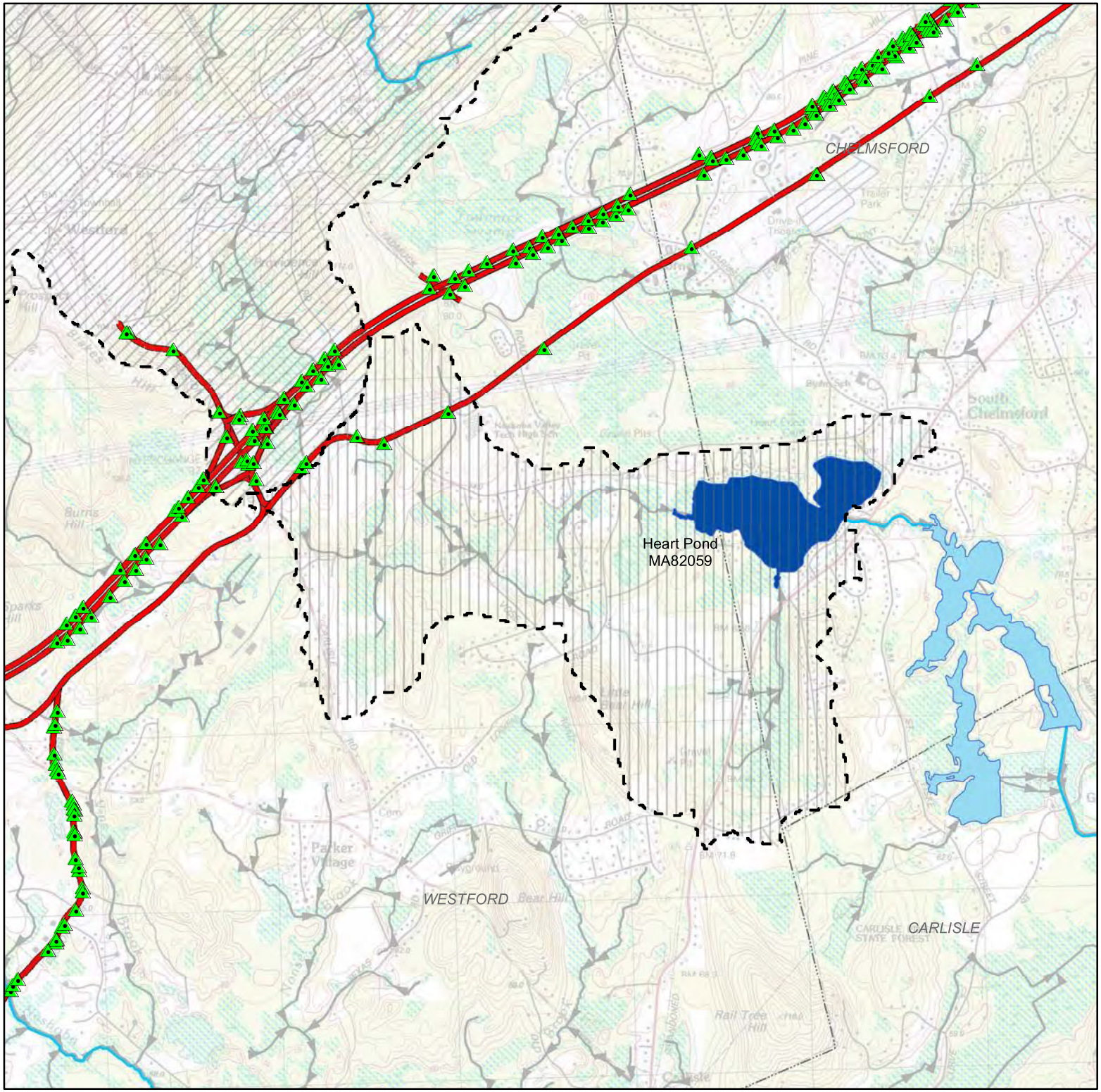
MA51060

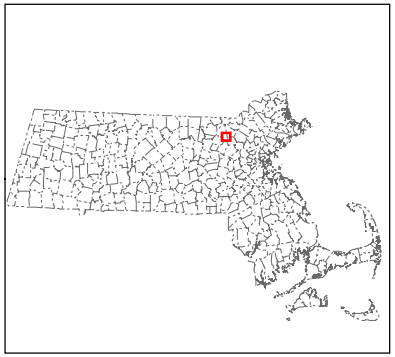
Hayes Pond

Blackstone

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

2,500 1,250 0 2,500 ft

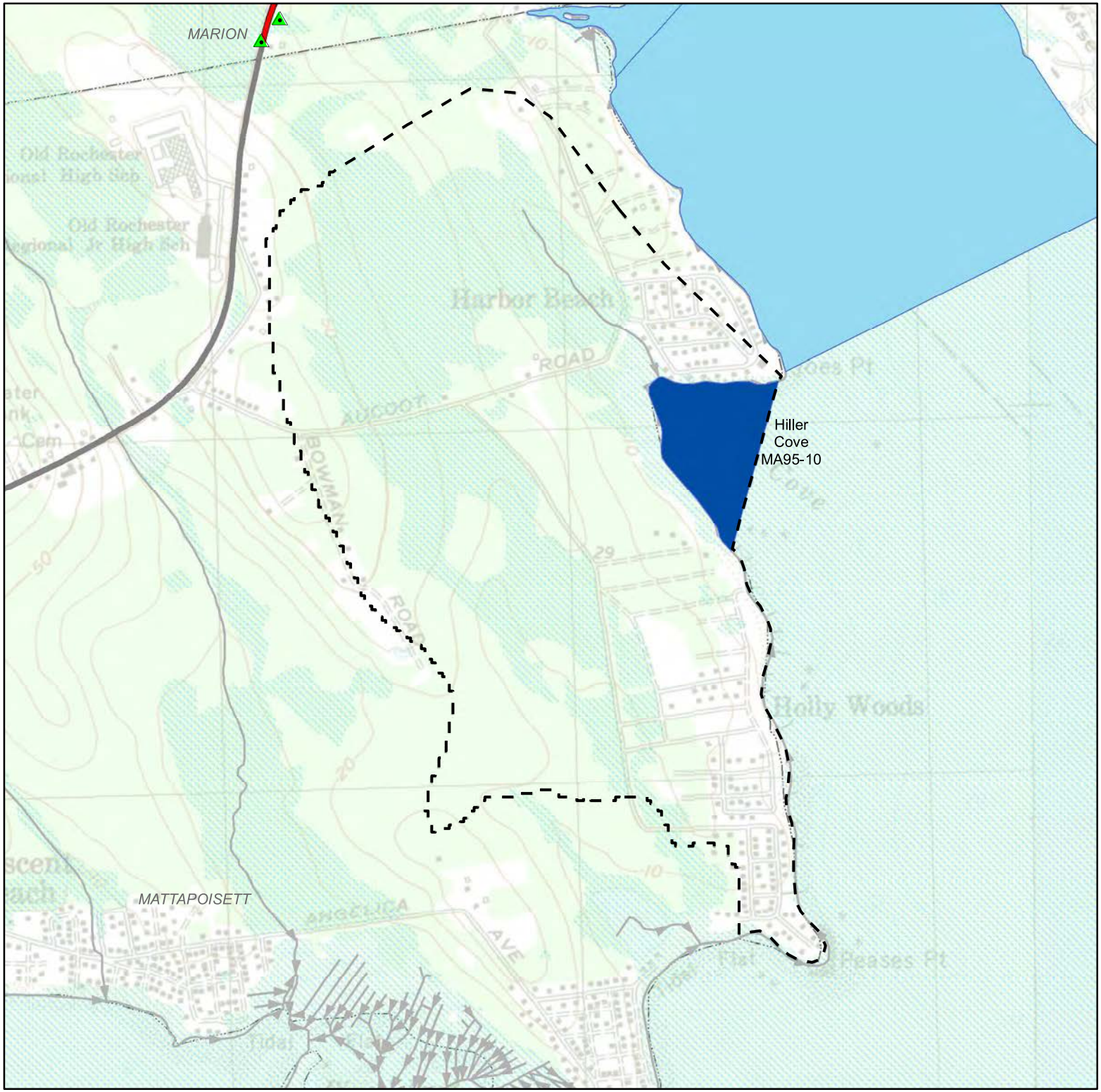
MA82059

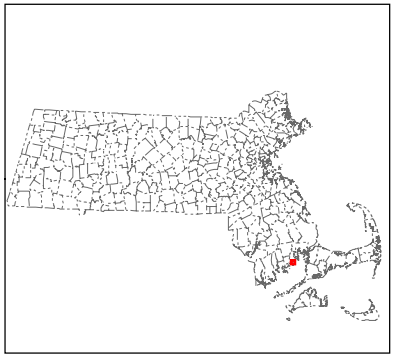
Heart Pond

Concord

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,250 625 0 1,250

ft

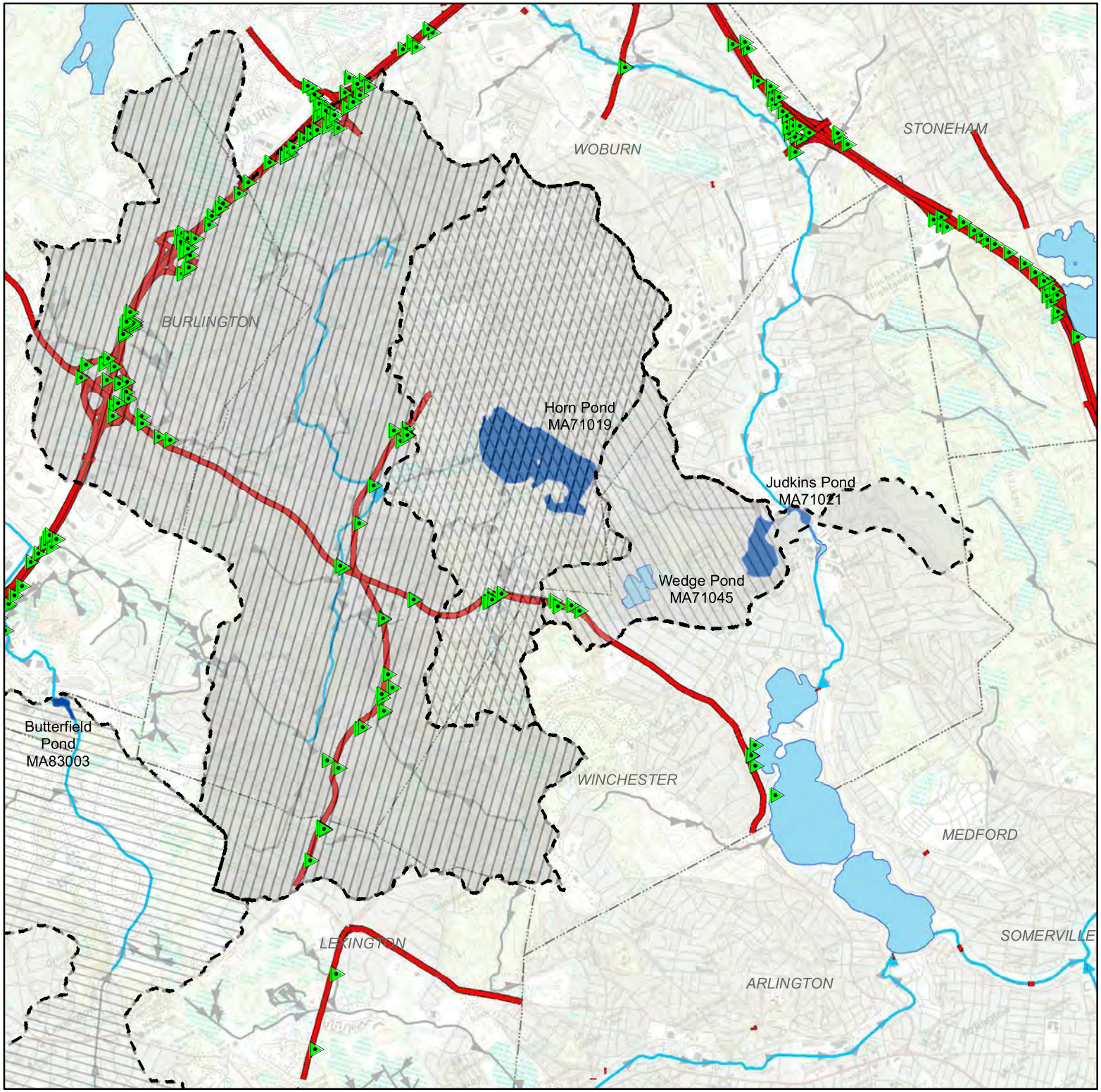
MA95-10

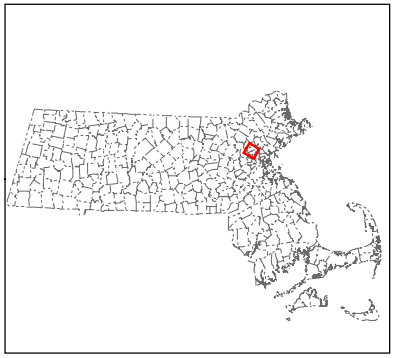
Hiller Cove

Buzzards Bay

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

3,750 1,875 0 3,750 ft

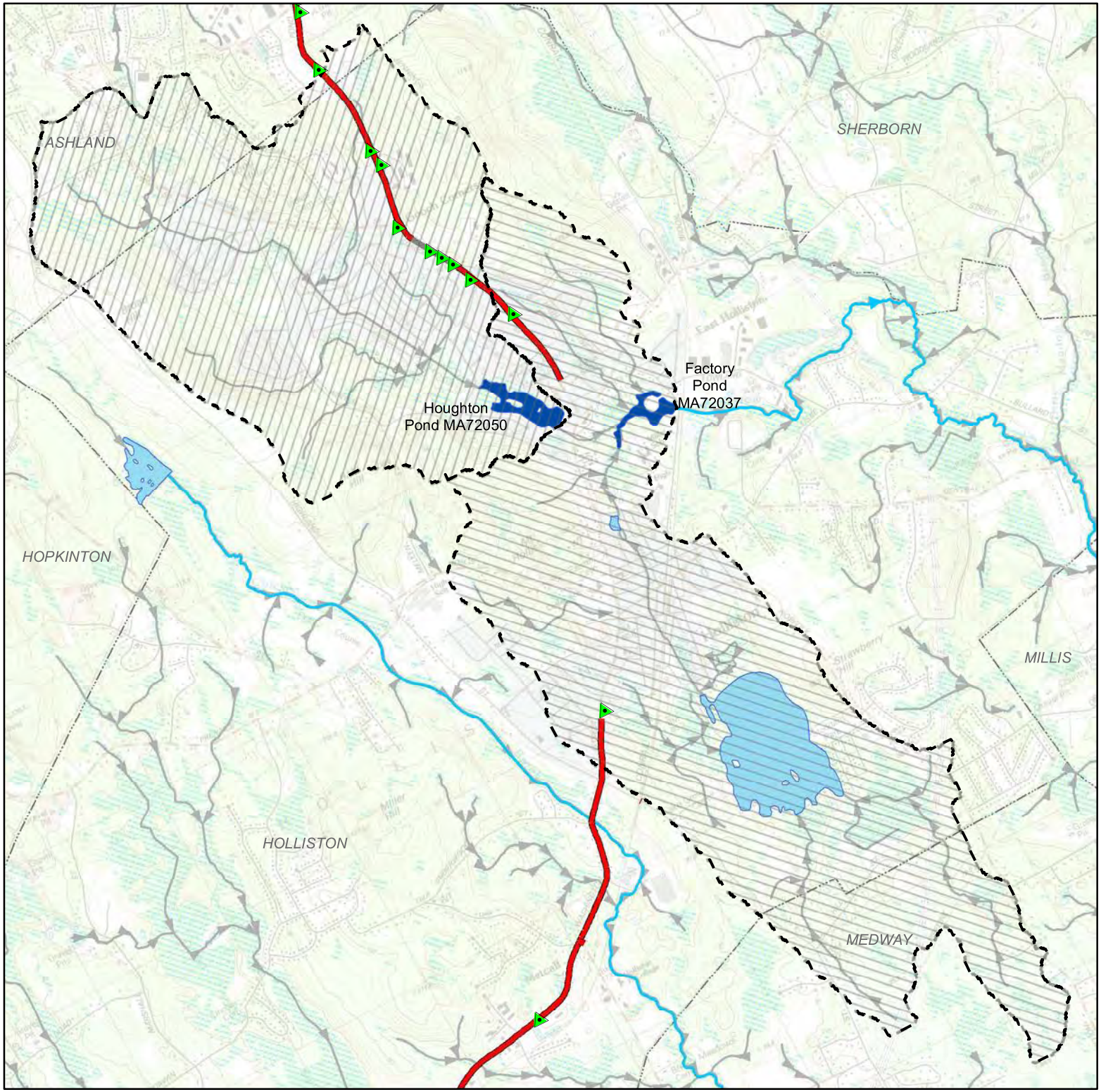
MA71019, MA71045, MA71021

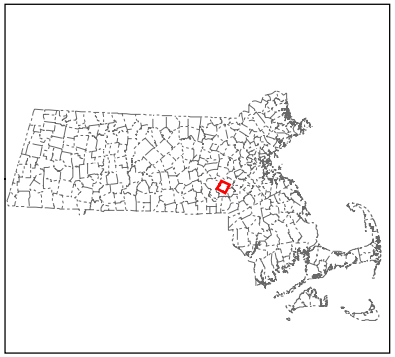
Horn Pond, Wedge Pond, Judkins Pond

Boston Harbor: Mystic

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

3,000 1,500 0 3,000 ft

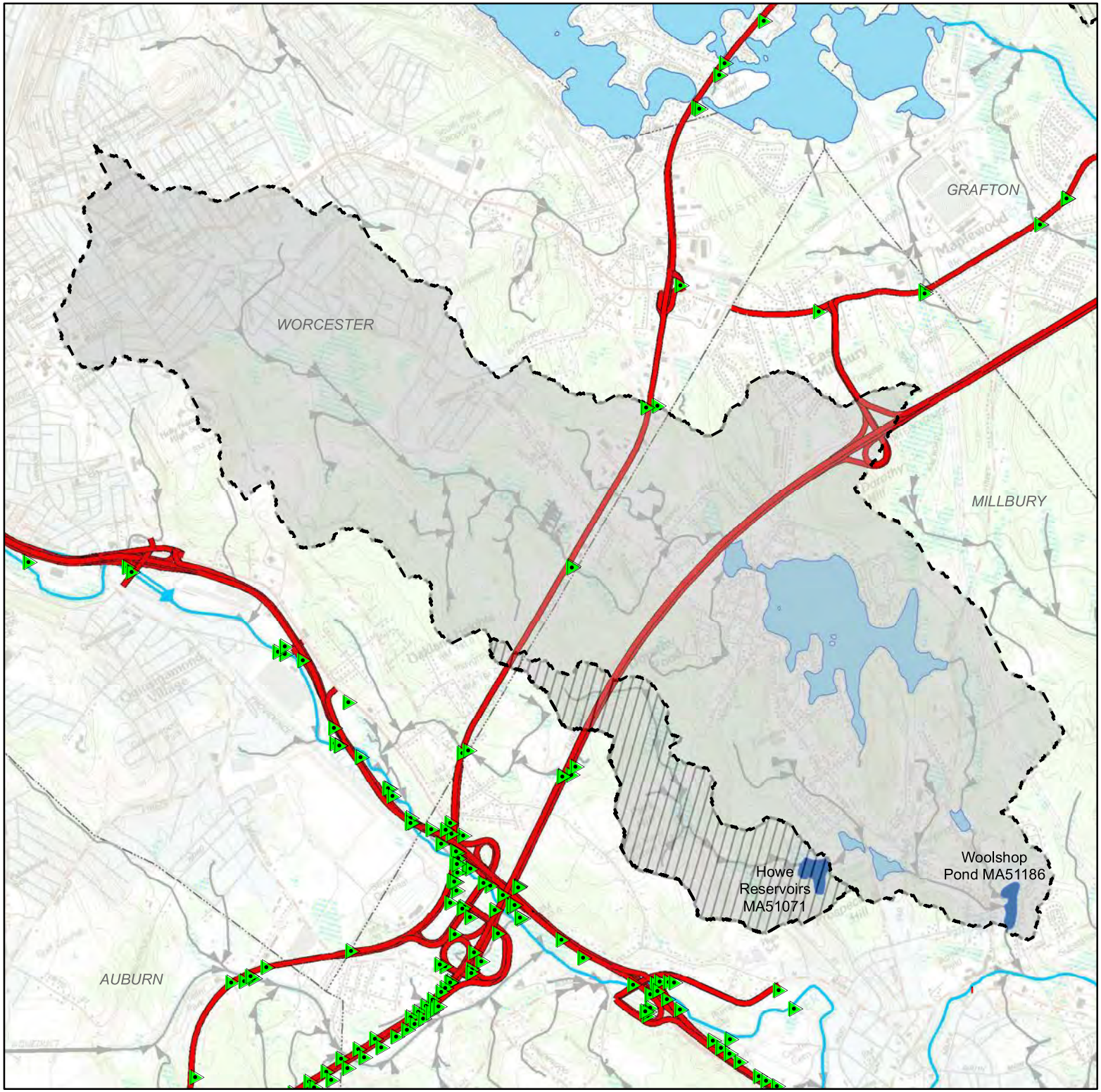
MA72050 and MA72037

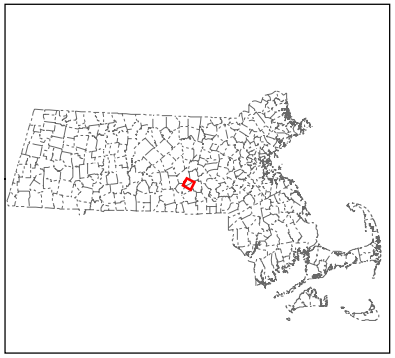
Houghton Pond and Factory Pond

Charles

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

2,750 1,375 0 2,750

ft

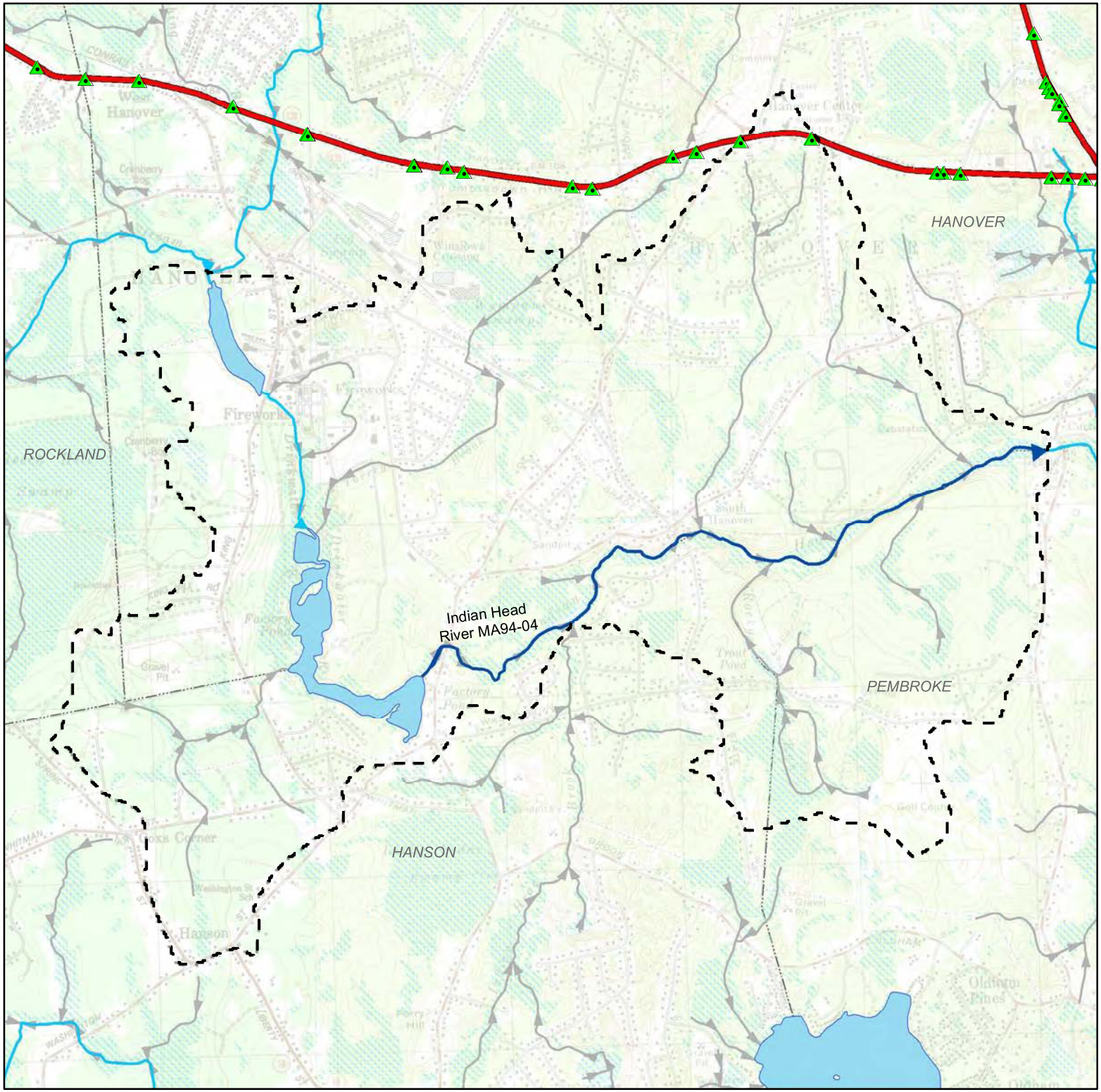
MA51071 and MA51186

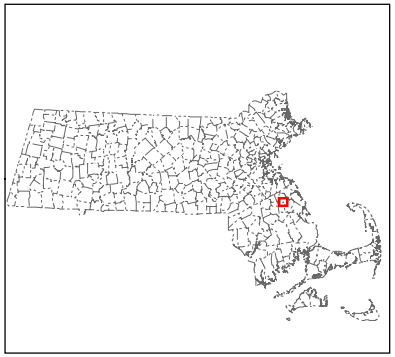
Howe Reservoirs and Woolshop Pond

Blackstone

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed
Impaired Water Body
NWI Wetland Areas
Impaired Stream Being Assessed
Impaired Stream Segment
Non-Impaired Stream Segments
MA DOT Roads
MA DOT Urban Area Roads
Town Boundaries
Stormwater Outfalls

N

2,500 1,250 0 2,500
ft

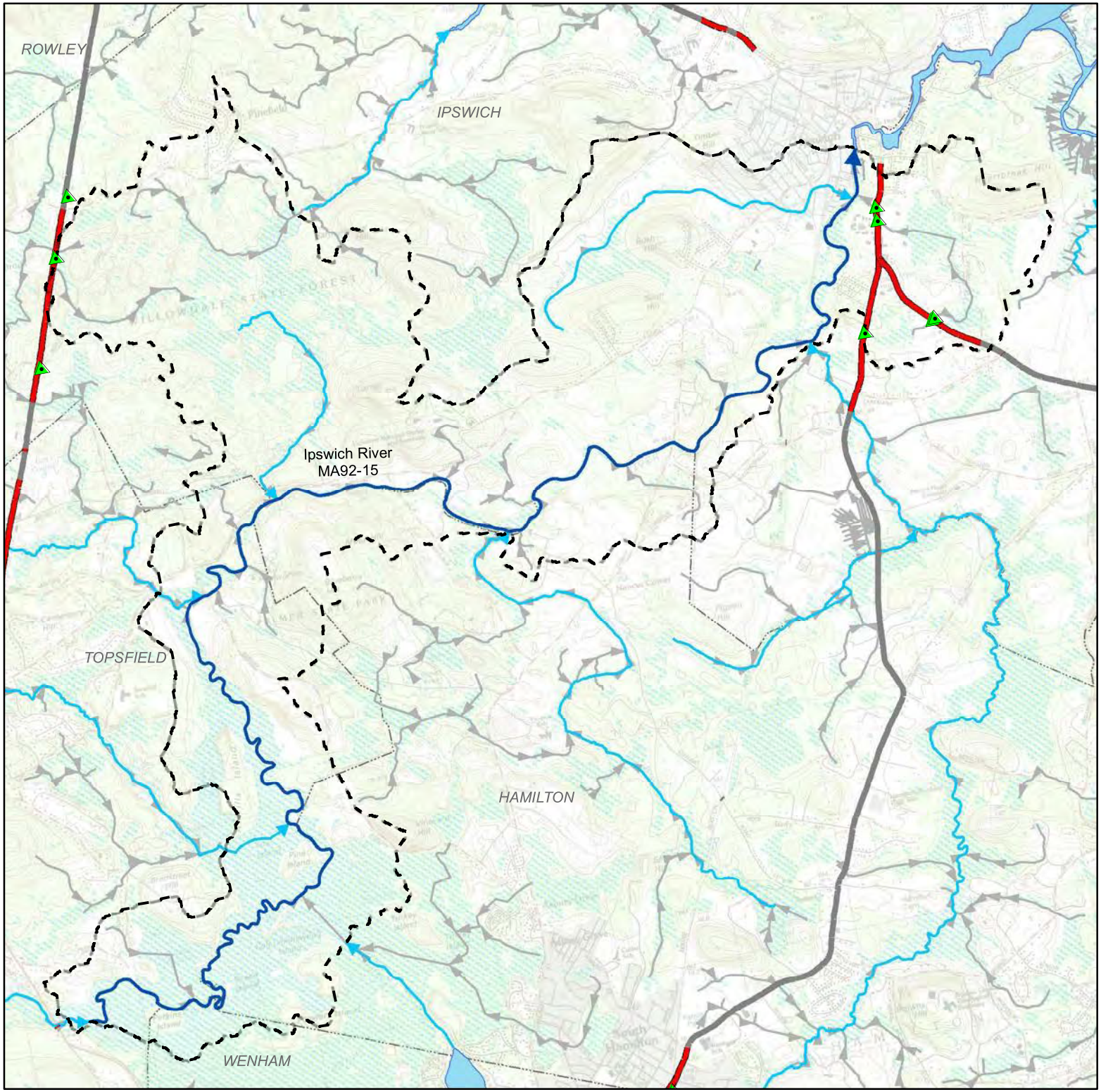
MA94-04

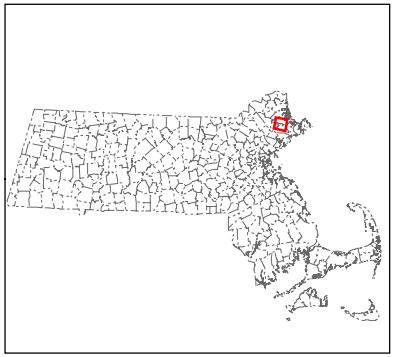
Indian Head River

South Coastal

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed
Impaired Water Body
NWI Wetland Areas
Impaired Stream Being Assessed
Impaired Stream Segment
Non-Impaired Stream Segments
MA DOT Roads
MA DOT Urban Area Roads
Town Boundaries
Stormwater Outfalls

N

3,750 1,875 0 3,750
ft

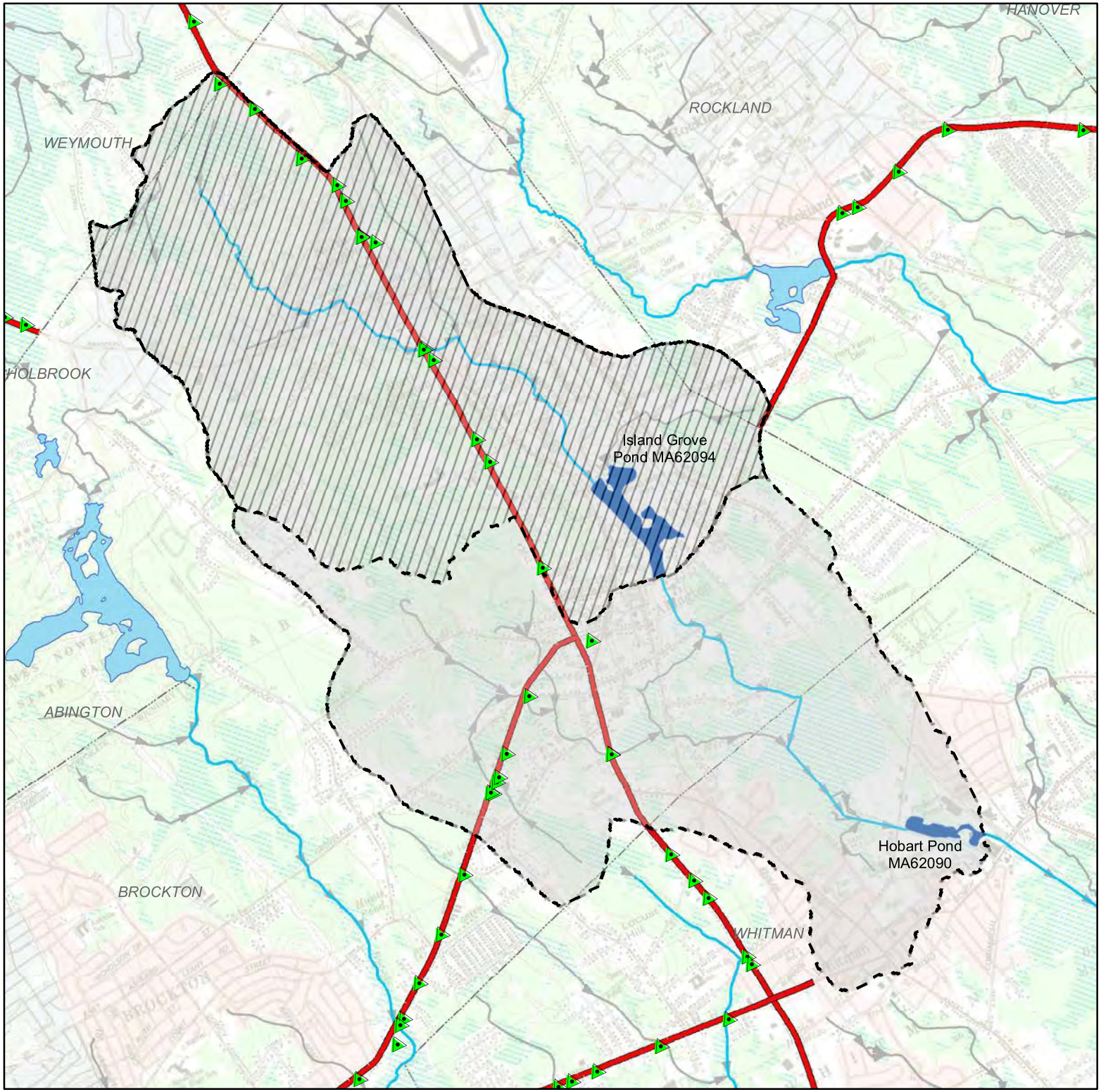
MA92-15

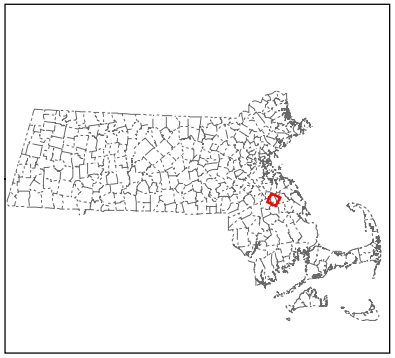
Ipswich River

Ipswich

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

3,000 1,500 0 3,000 ft

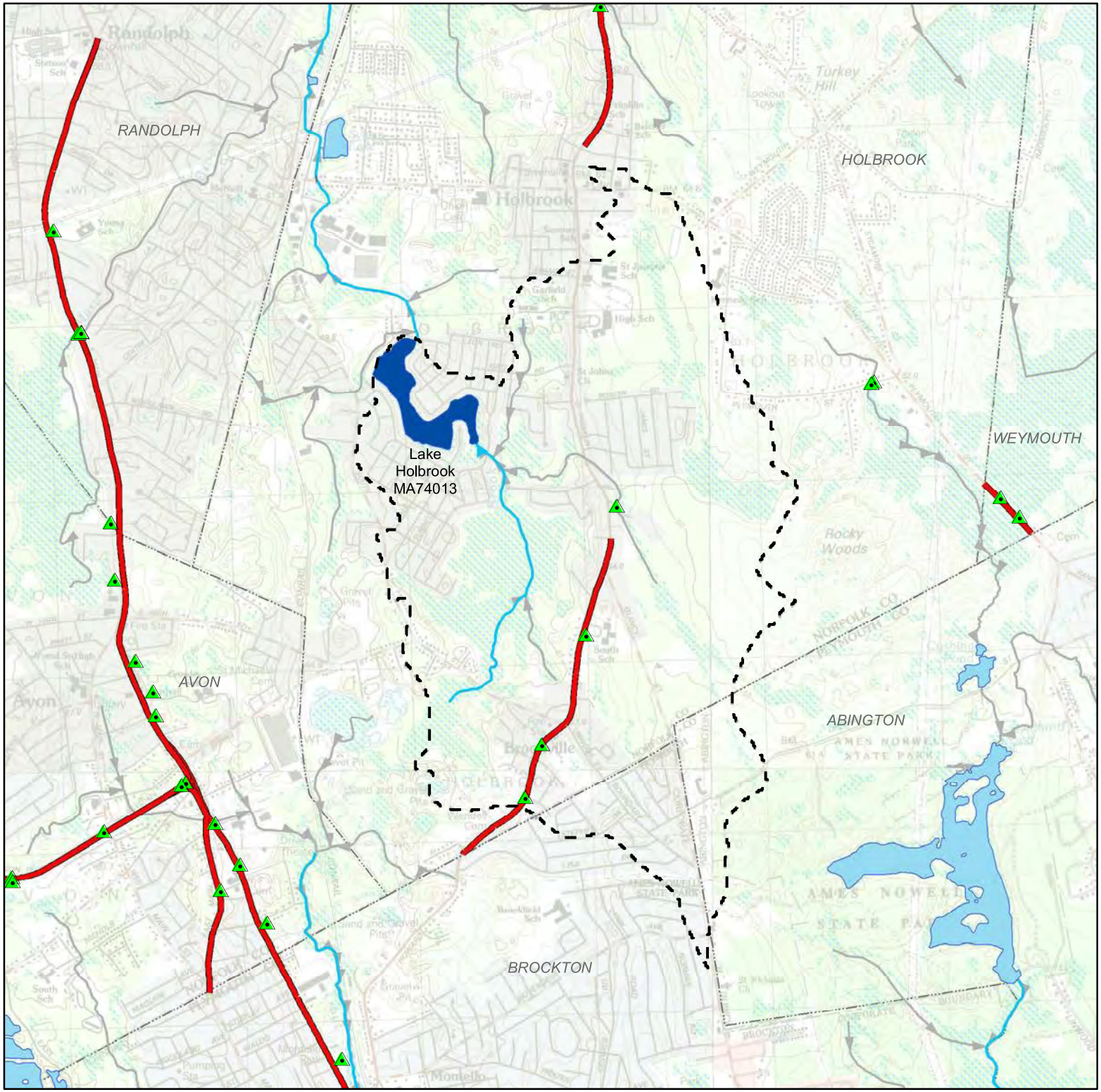
MA62094 and MA62090

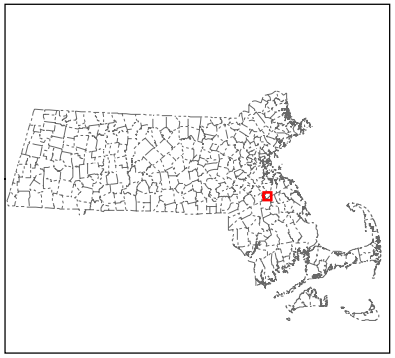
Island Grove Pond and Hobart Pond

Taunton

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

2,500 1,250 0 2,500 ft

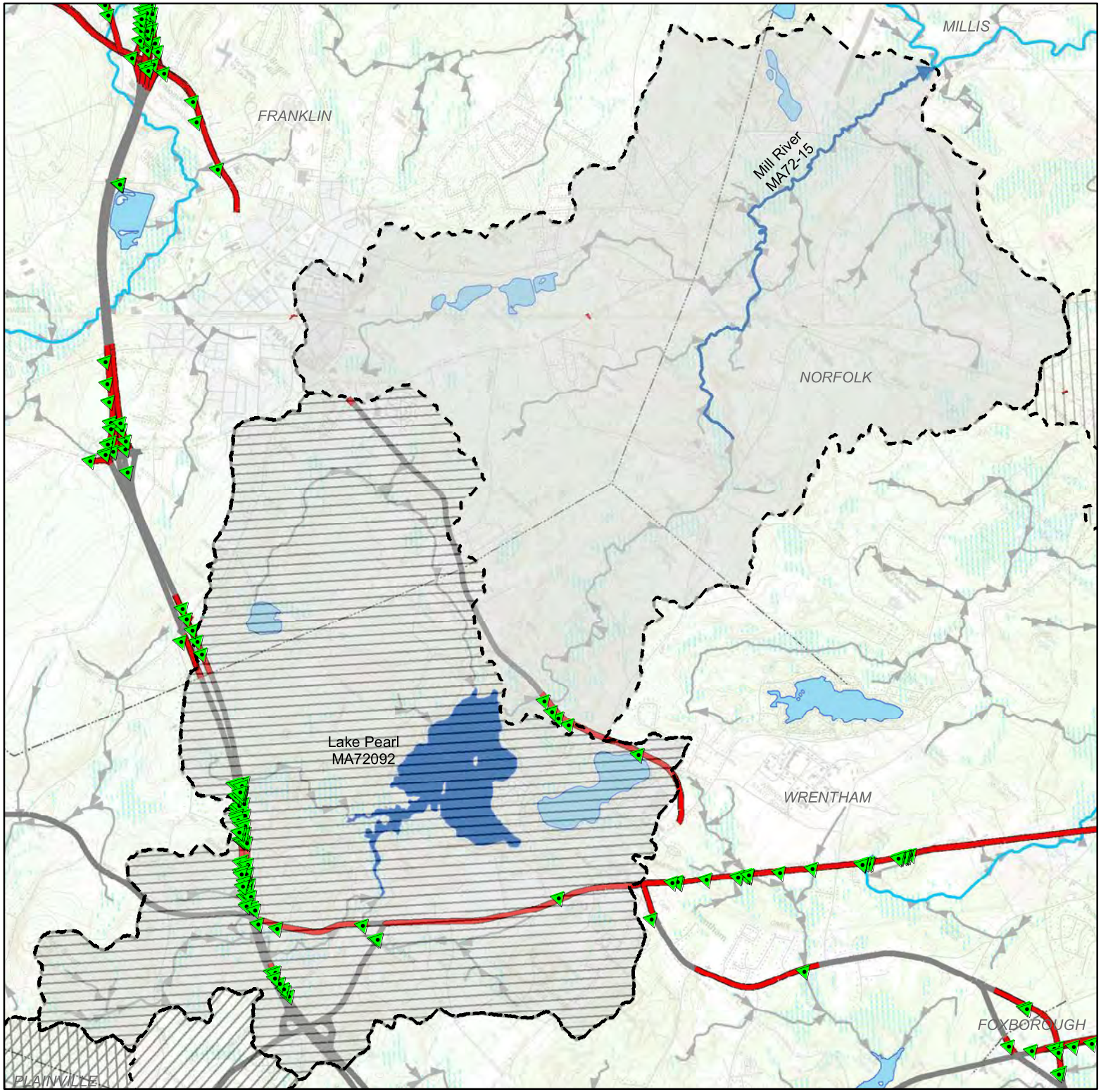
MA74013

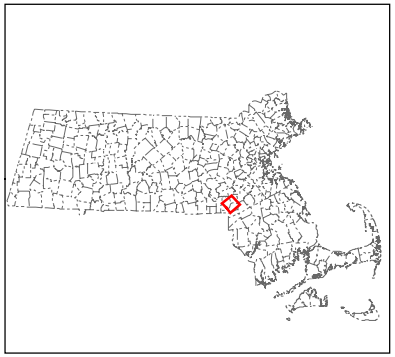
Lake Holbrook

Boston Harbor: Weymouth & Weir

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

4,000 2,000 0 4,000 ft

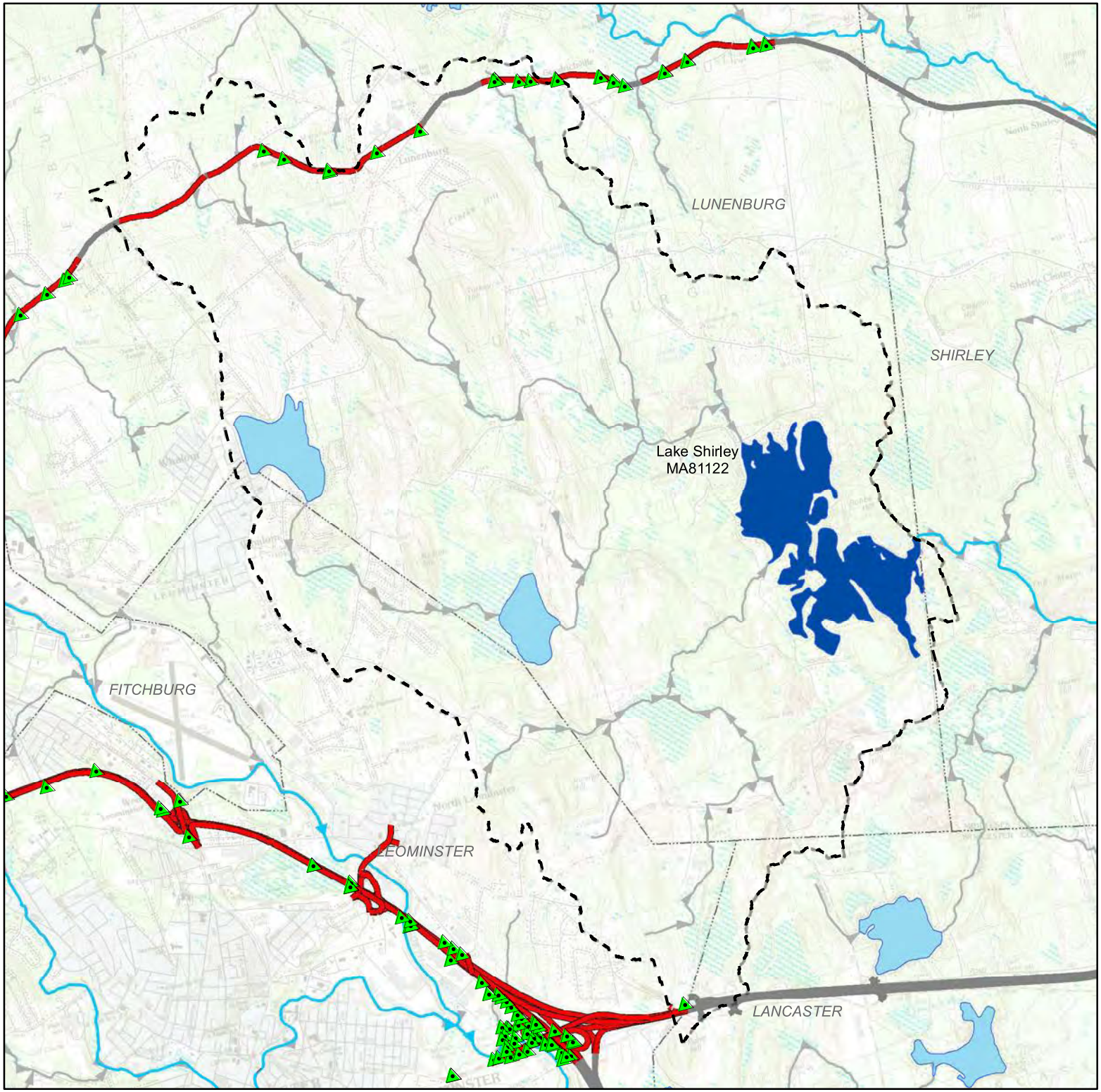
MA72092 and MA72-15

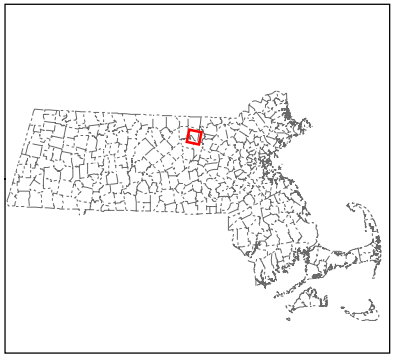
Lake Pearl and Mill River

Charles

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed
Impaired Water Body
NWI Wetland Areas
Impaired Stream Being Assessed
Impaired Stream Segment
Non-Impaired Stream Segments
MA DOT Roads
MA DOT Urban Area Roads
Town Boundaries
Stormwater Outfalls

N

4,000 2,000 0 4,000 ft

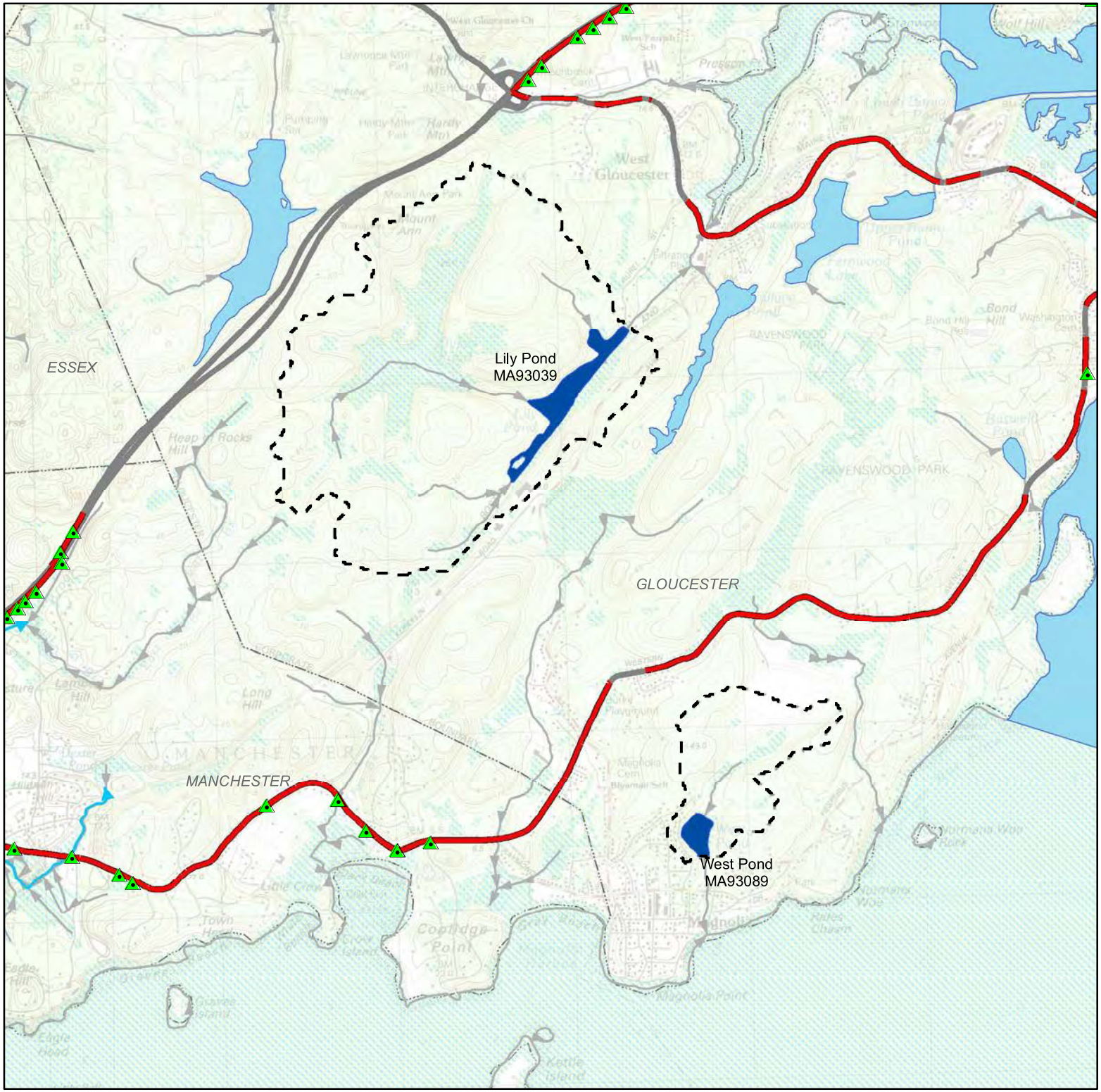
MA81122

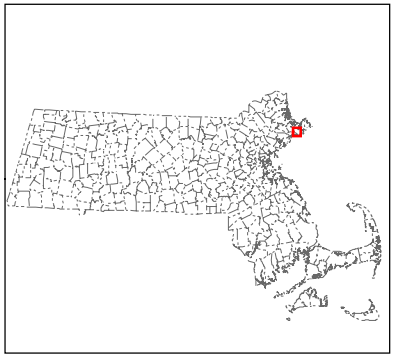
Lake Shirley

Nashua

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

2,500 1,250 0 2,500

ft

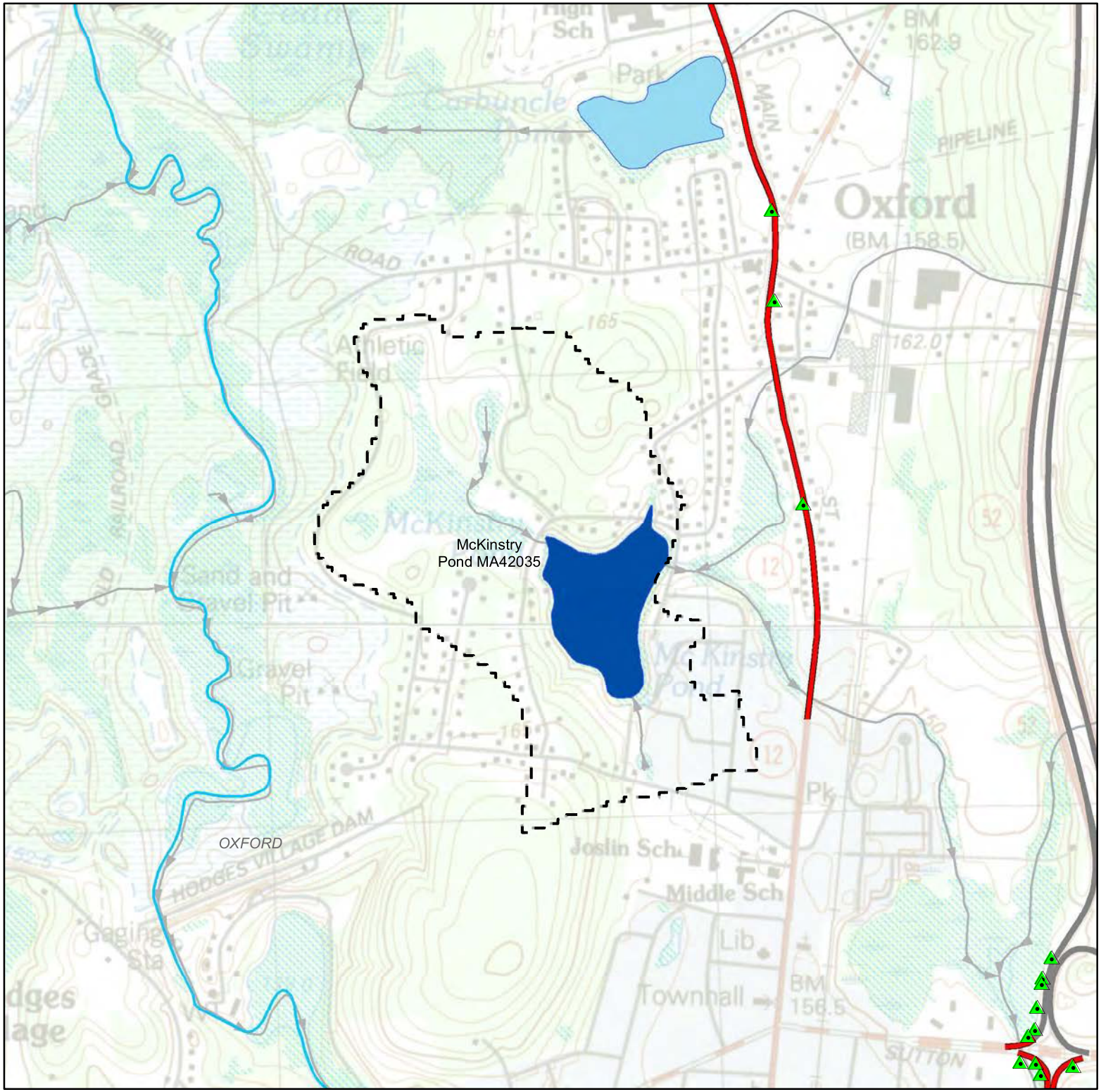
MA93039 and MA93089

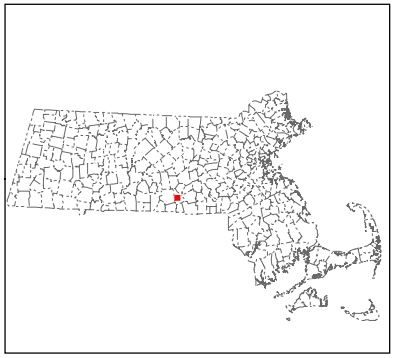
Lily Pond and West Pond

North Coastal

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,000 500 0 1,000

ft

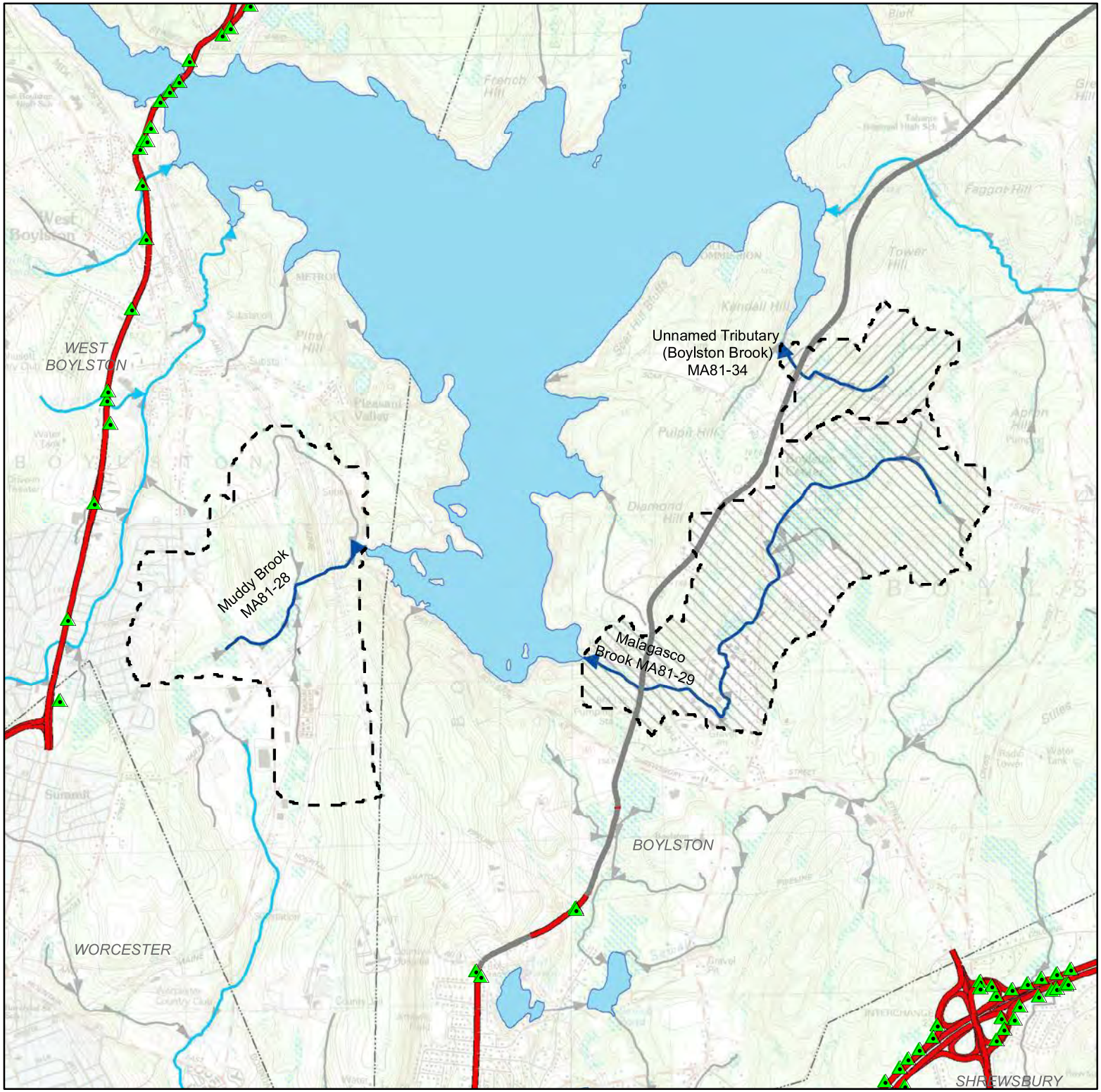
MA42035

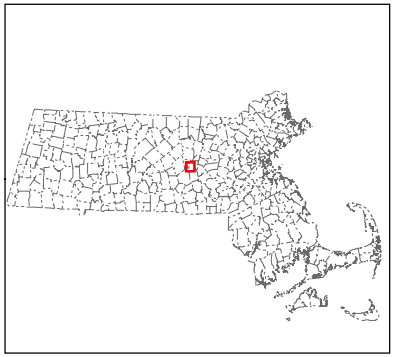
McKinstry Pond

French

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

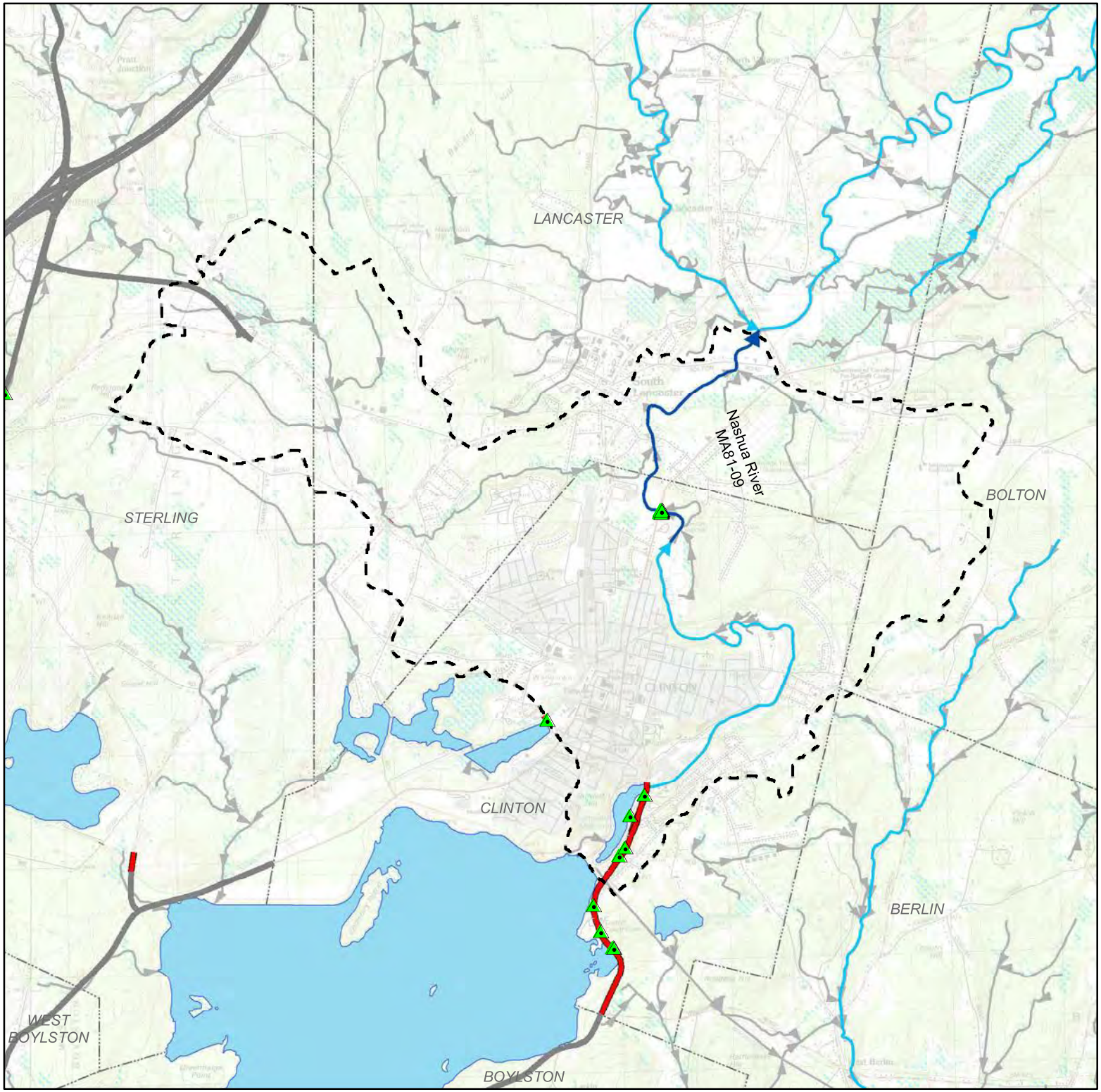
2,750 1,375 0 2,750 ft

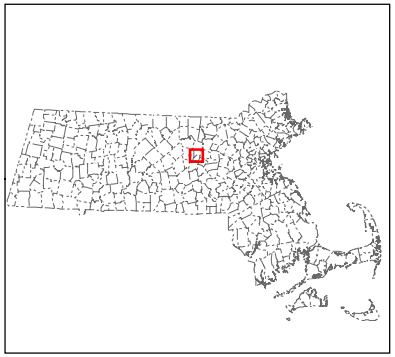
MA81-28, MA81-29, MA81-34

Muddy Brook, Malagasco Brook, Unnamed Tributary (Boylston Brook)
Nashua

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed
Impaired Water Body
NWI Wetland Areas
Impaired Stream Being Assessed
Impaired Stream Segment
Non-Impaired Stream Segments
MA DOT Roads
MA DOT Urban Area Roads
Town Boundaries
Stormwater Outfalls

N

4,000 2,000 0 4,000 ft

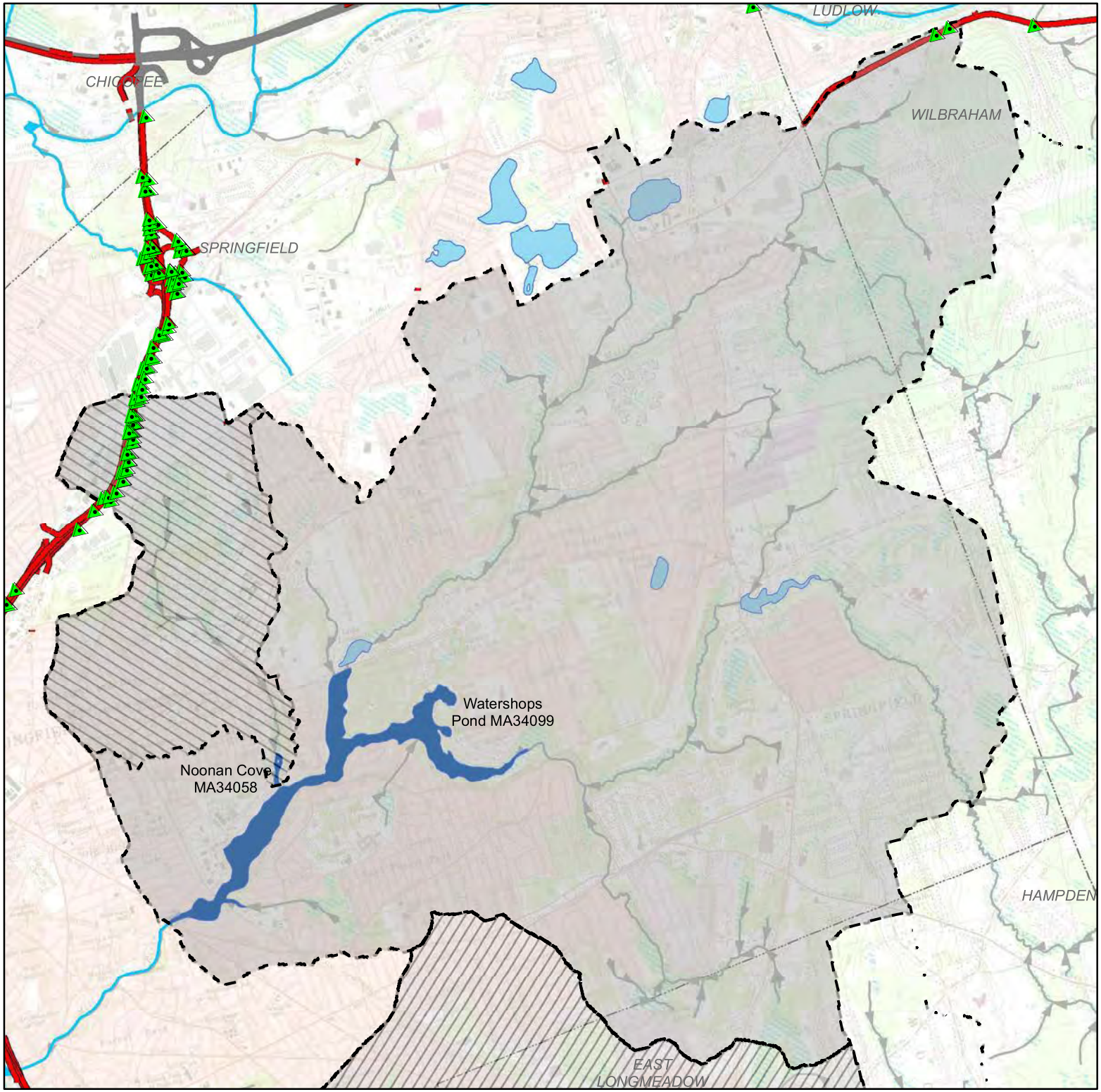
MA81-09

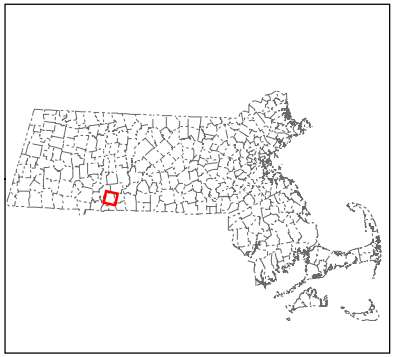
Nashua River

Nashua

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

3,750 1,875 0 3,750

ft

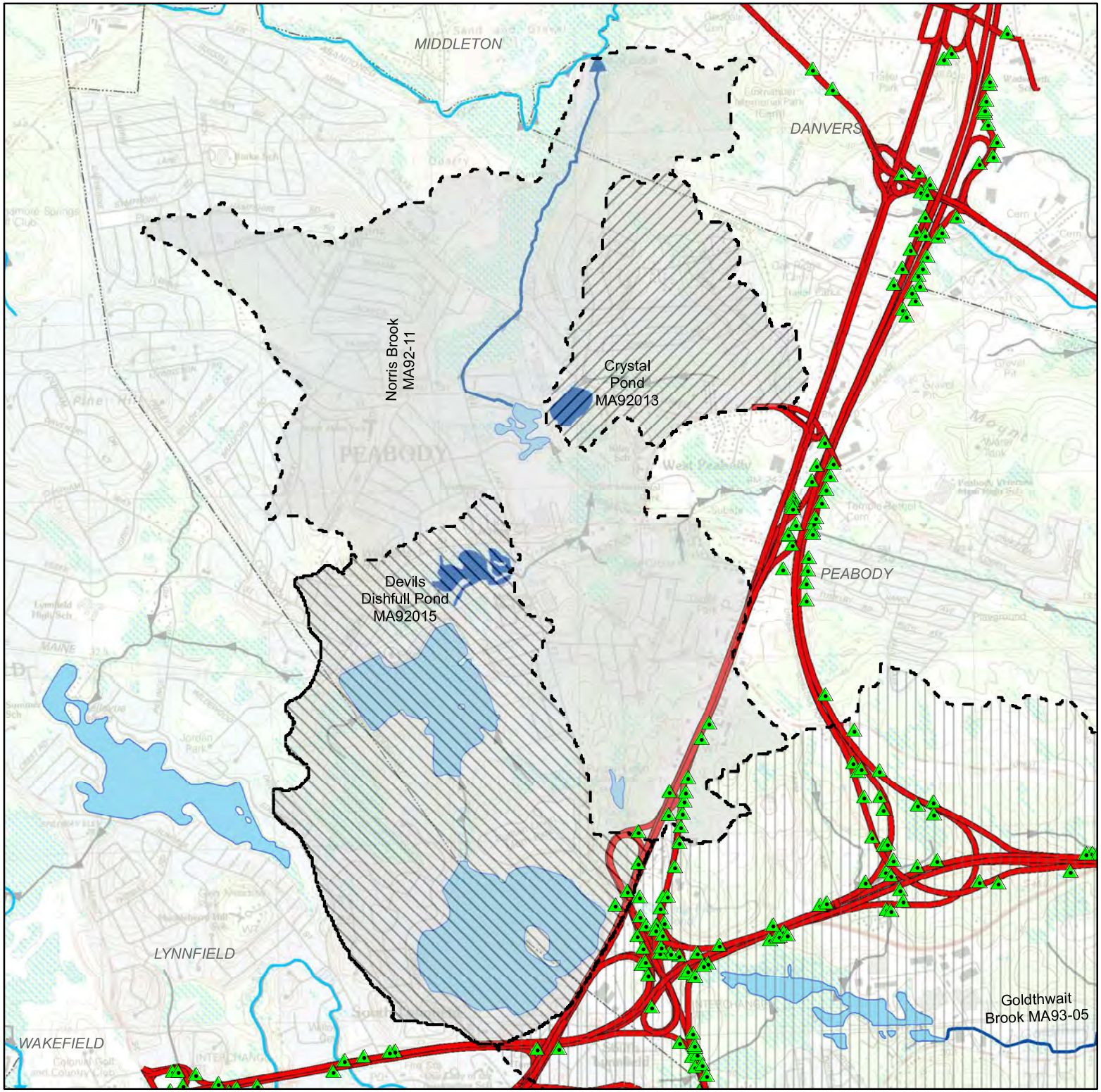
MA34058 and MA34099

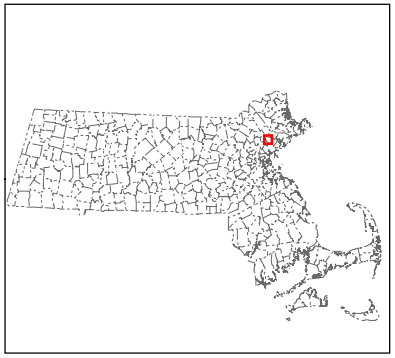
Noonan Cove and Watershops Pond

Connecticut

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

2,500 1,250 0 2,500 ft

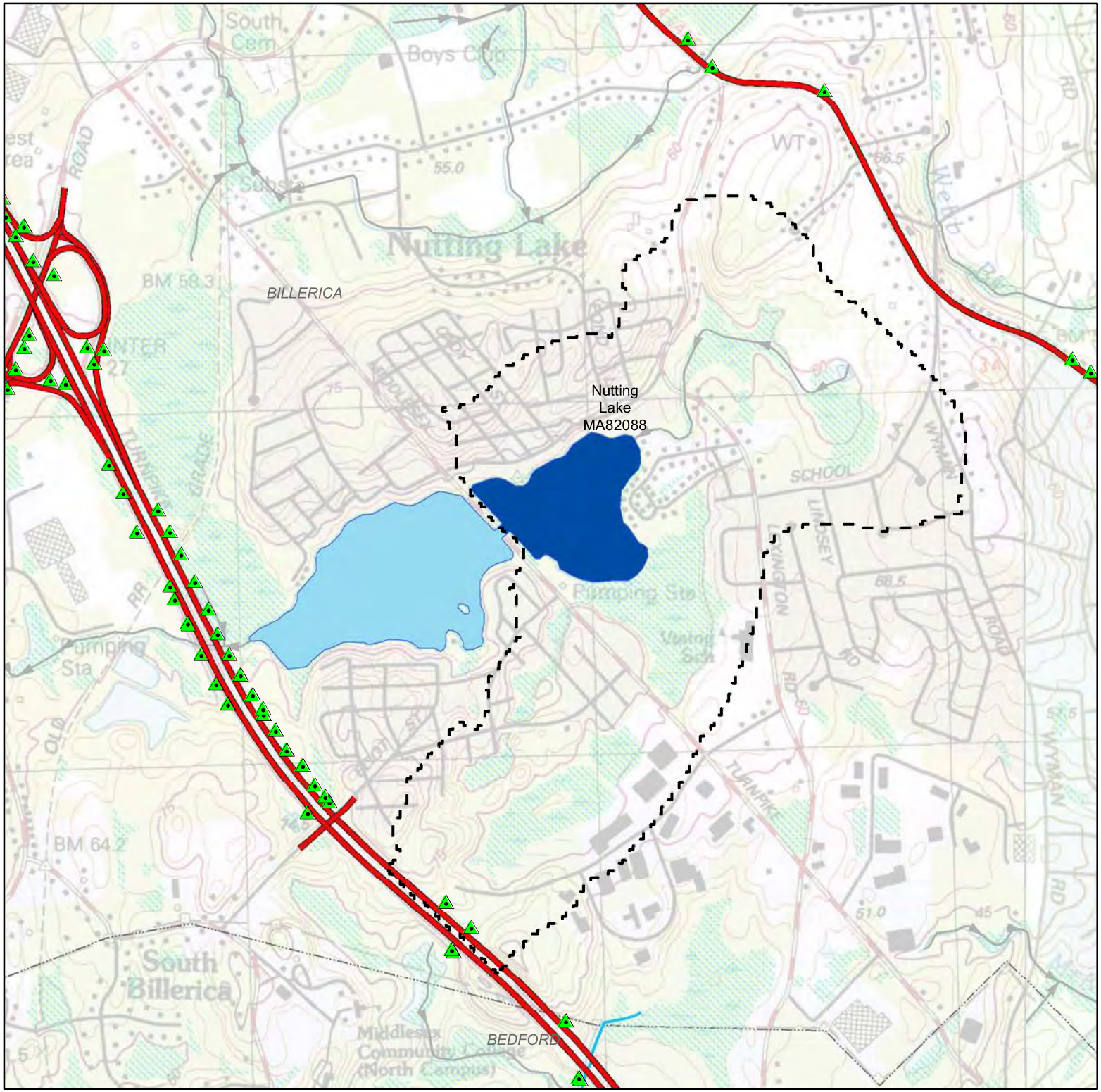
MA92-11, MA92013, MA92015

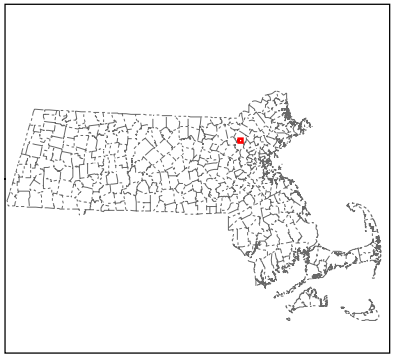
Norris Brook, Crystal Pond, Devils Dishfull Pond

Ipswich

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,250 625 0 1,250

ft

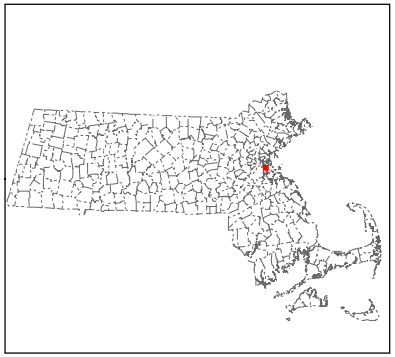
MA82088

Nutting Lake

Concord

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division



Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,000 500 0 1,000 ft

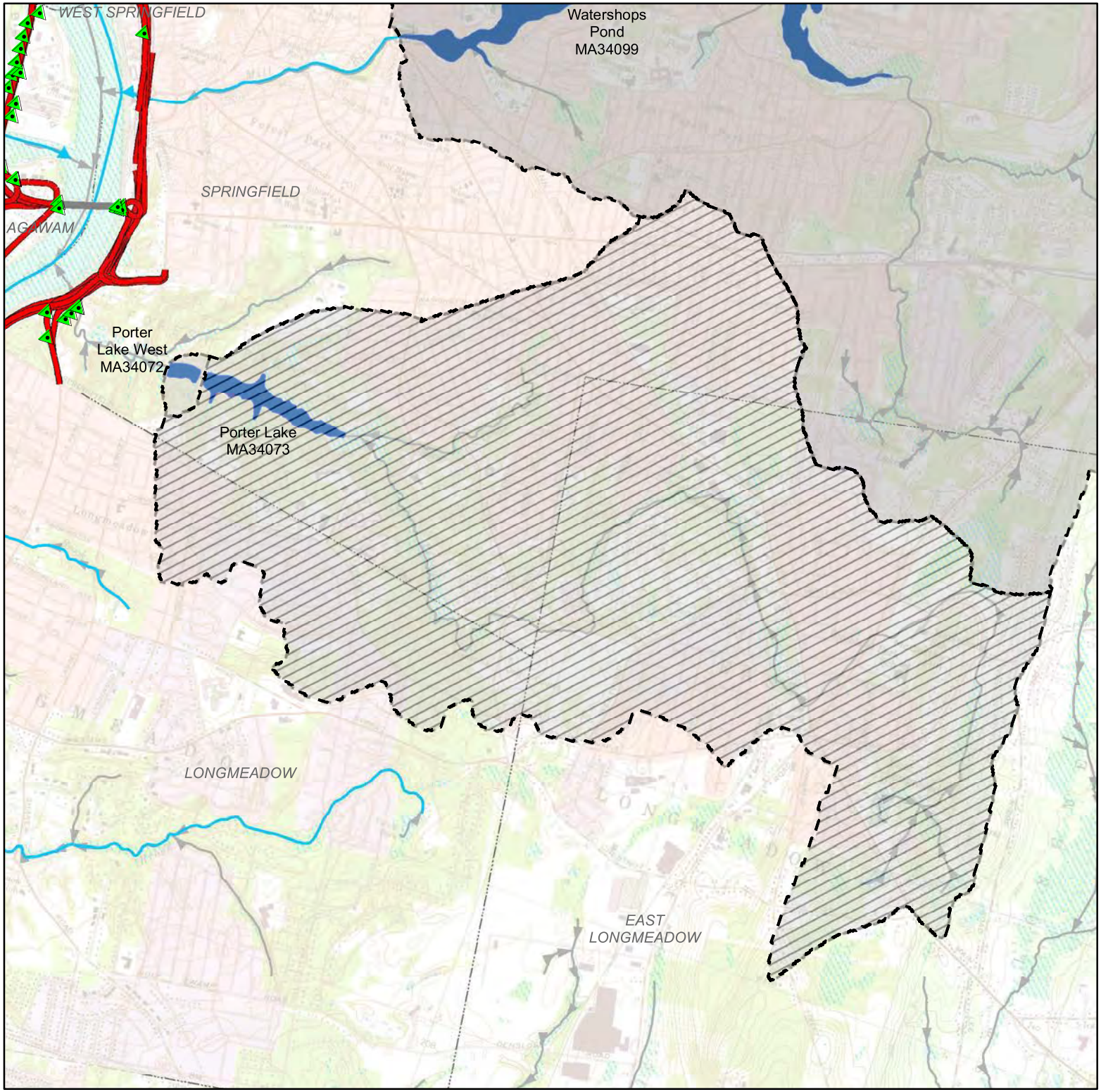
MA70-11

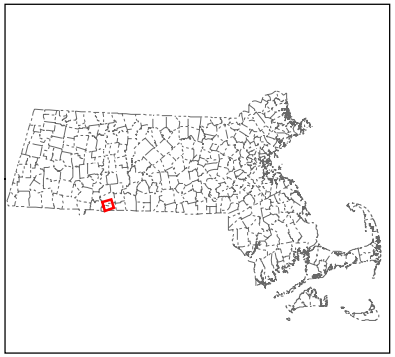
Pleasure Bay

Boston Harbor

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

3,000 1,500 0 3,000 ft

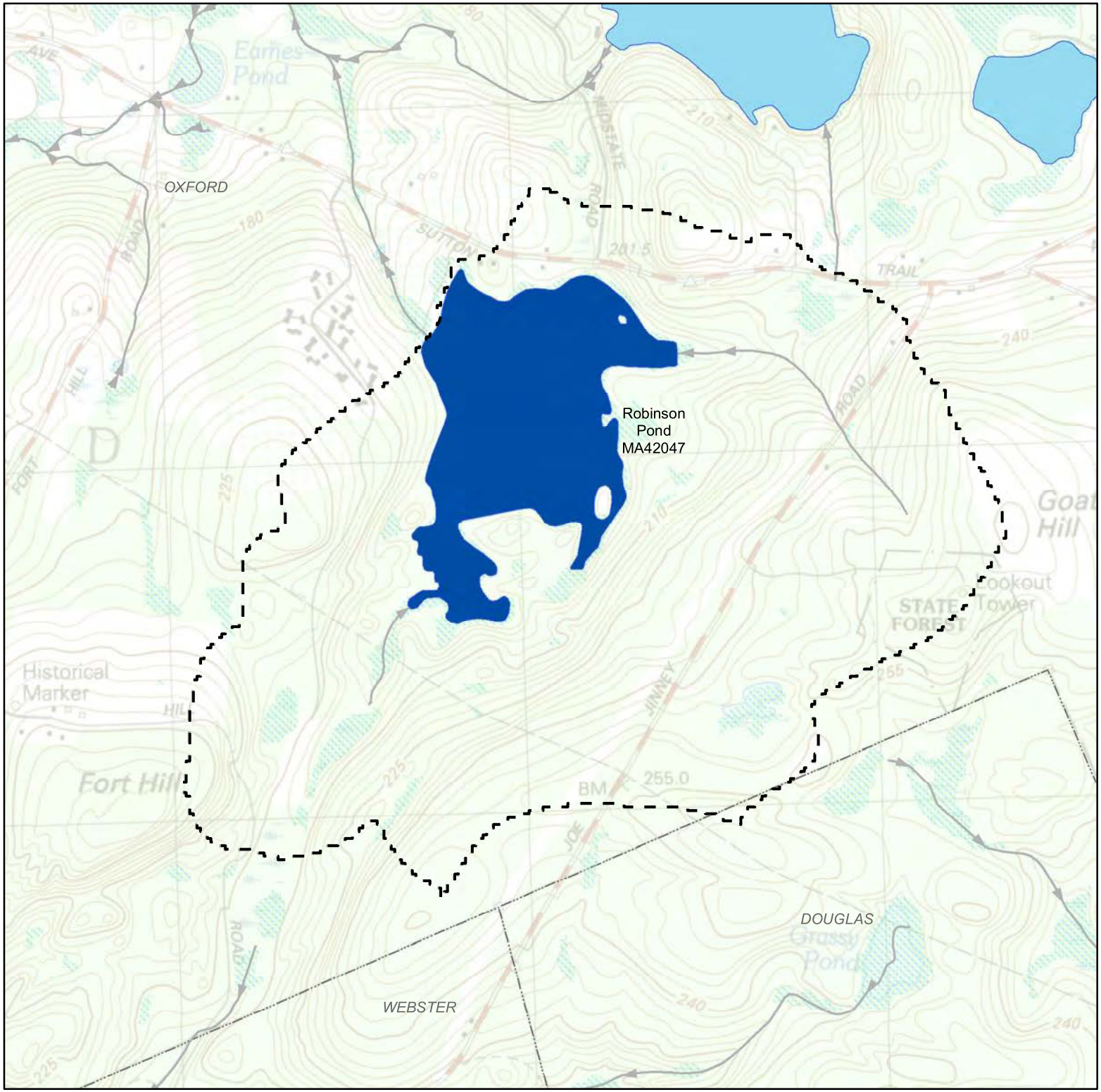
MA34073 and MA34072

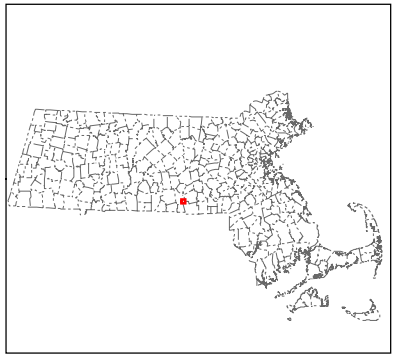
Porter Lake and Porter Lake West

Connecticut

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,250 625 0 1,250

ft

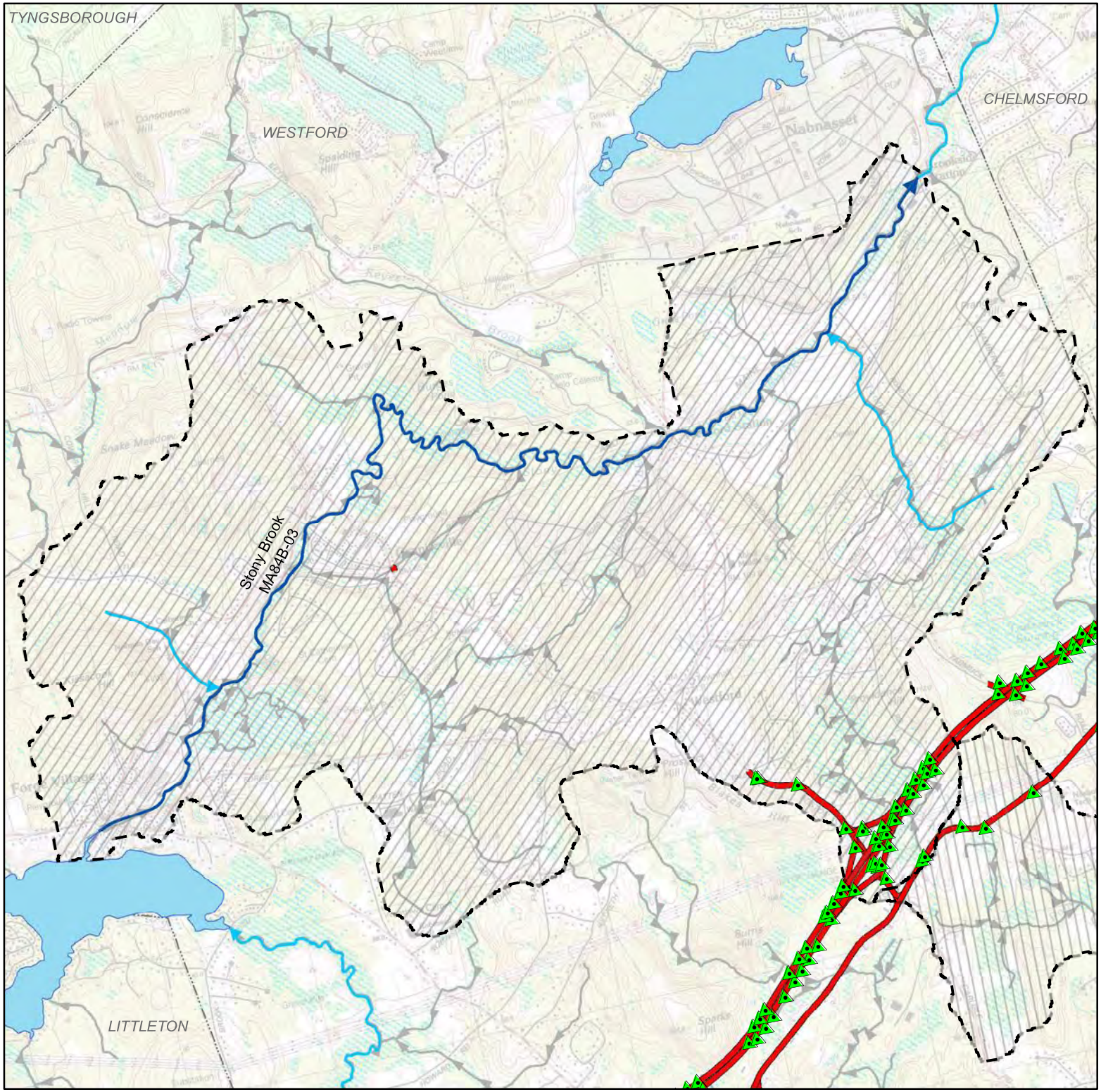
MA42047

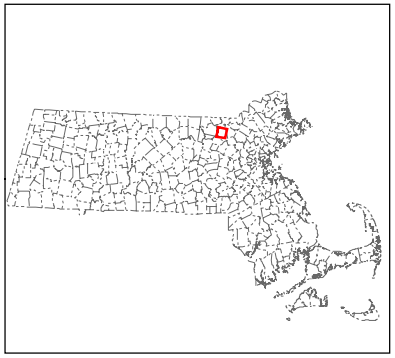
Robinson Pond

French

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

3,000 1,500 0 3,000 ft

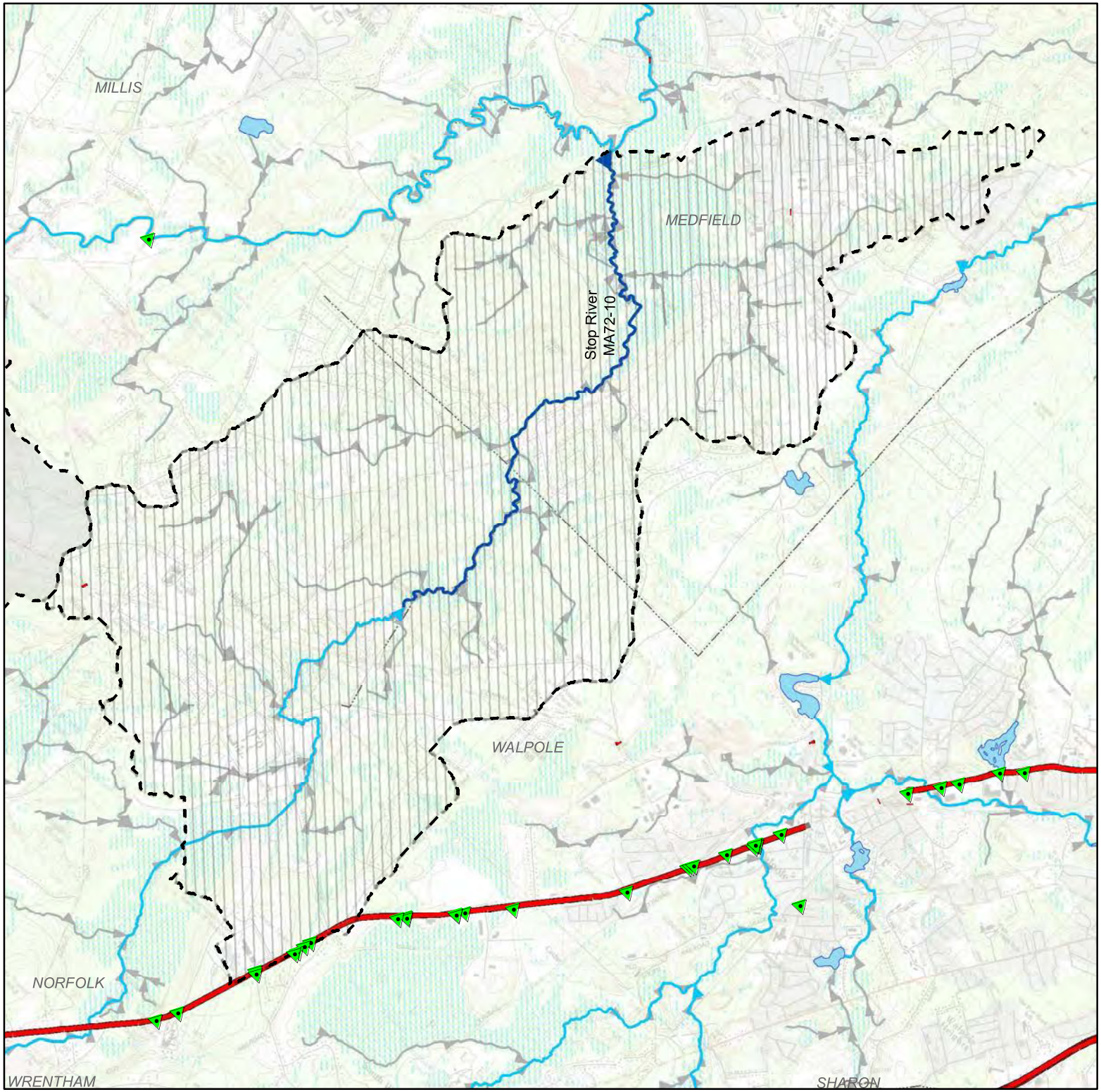
MA84B-03

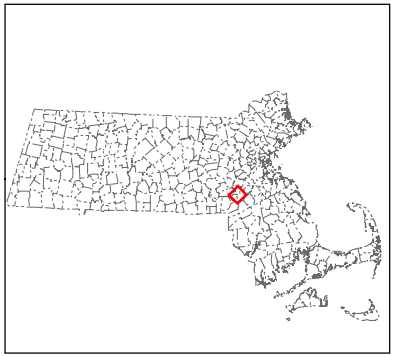
Stony Brook

Merrimack

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

4,000 2,000 0 4,000

ft

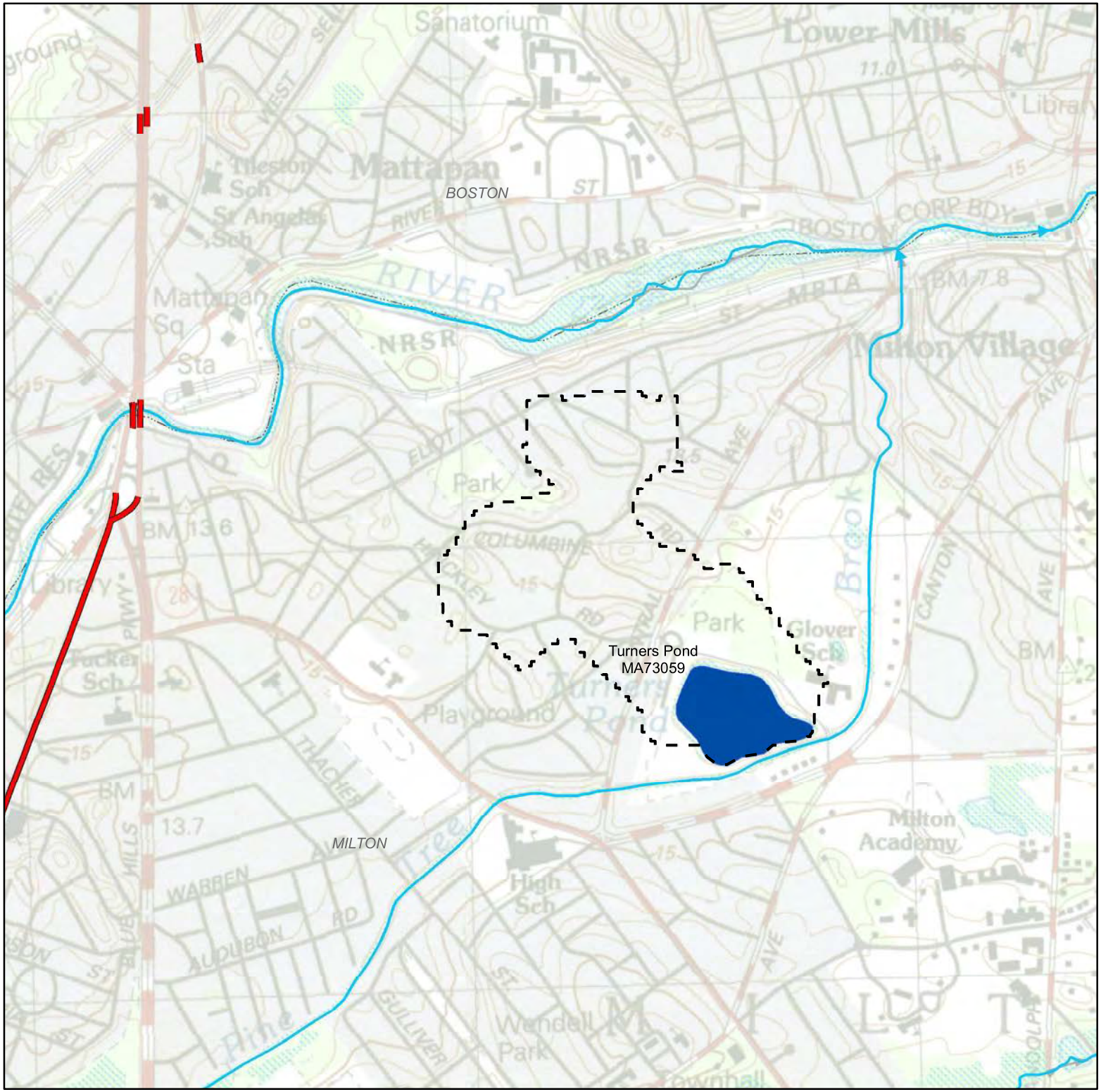
MA72-10

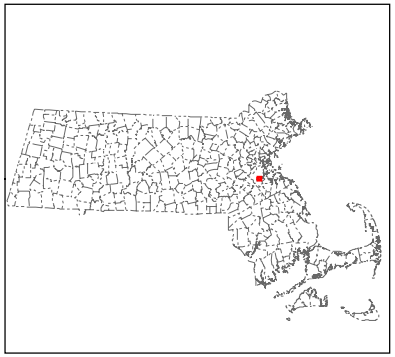
Stop River

Charles

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,000 500 0 1,000 ft

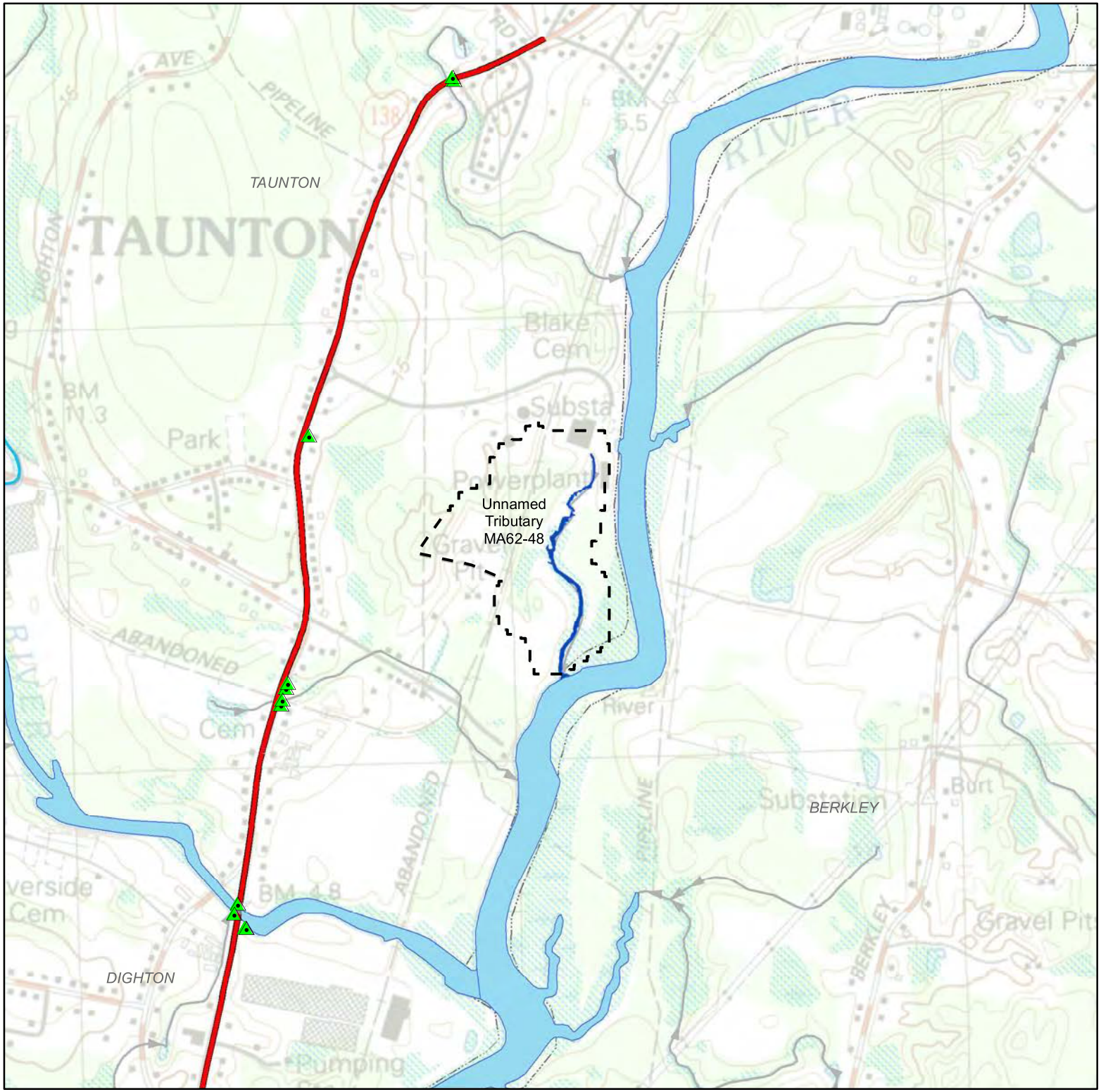
MA73059

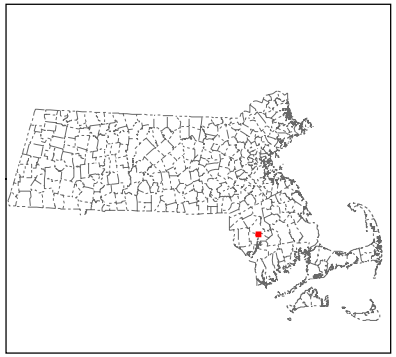
Turners Pond

Boston Harbor: Neponset

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,000 500 0 1,000
ft

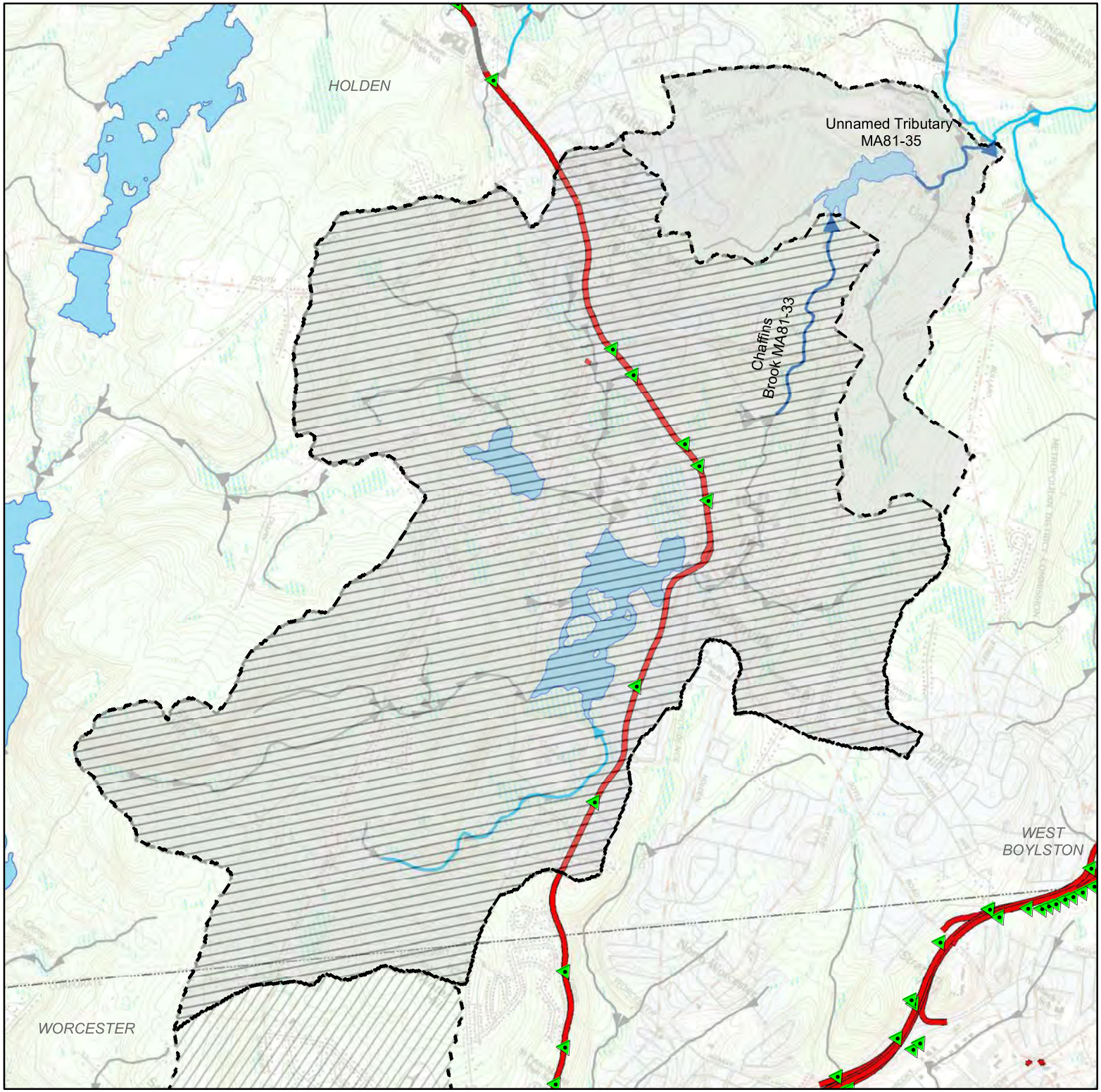
MA62-48

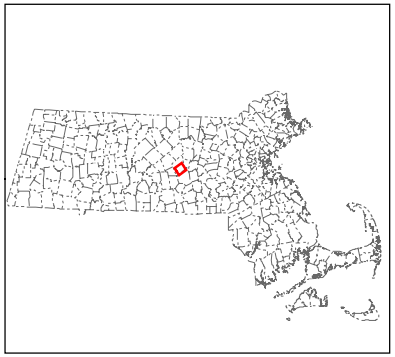
Unnamed Tributary

Taunton

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

2,750 1,375 0 2,750

ft

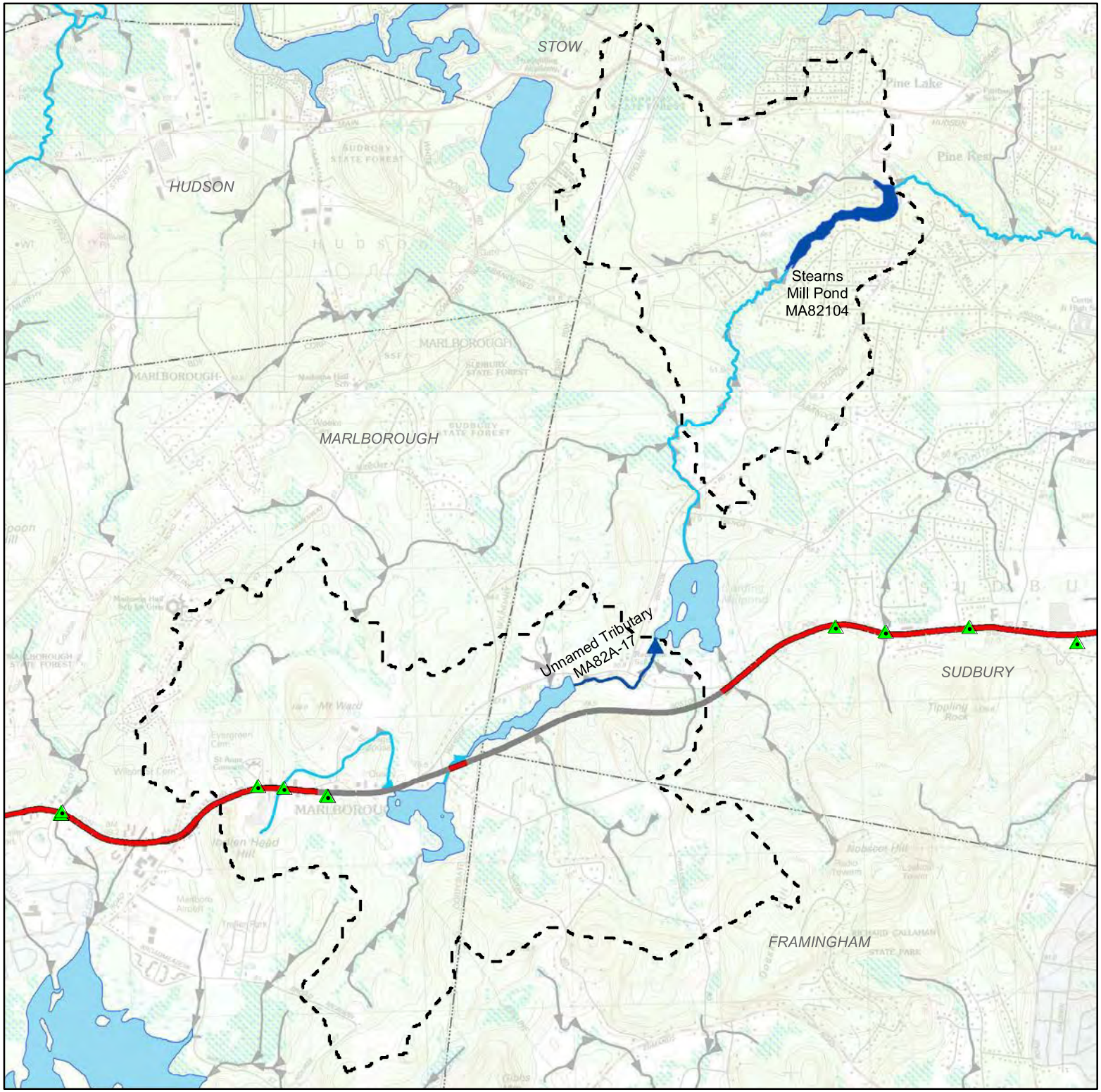
MA81-35 and MA81-33

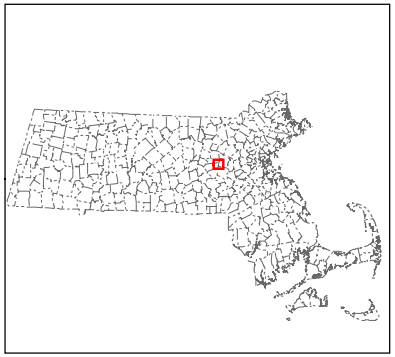
Unnamed Tributary and Chaffins Brook

Nashua

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

3,000 1,500 0 3,000 ft

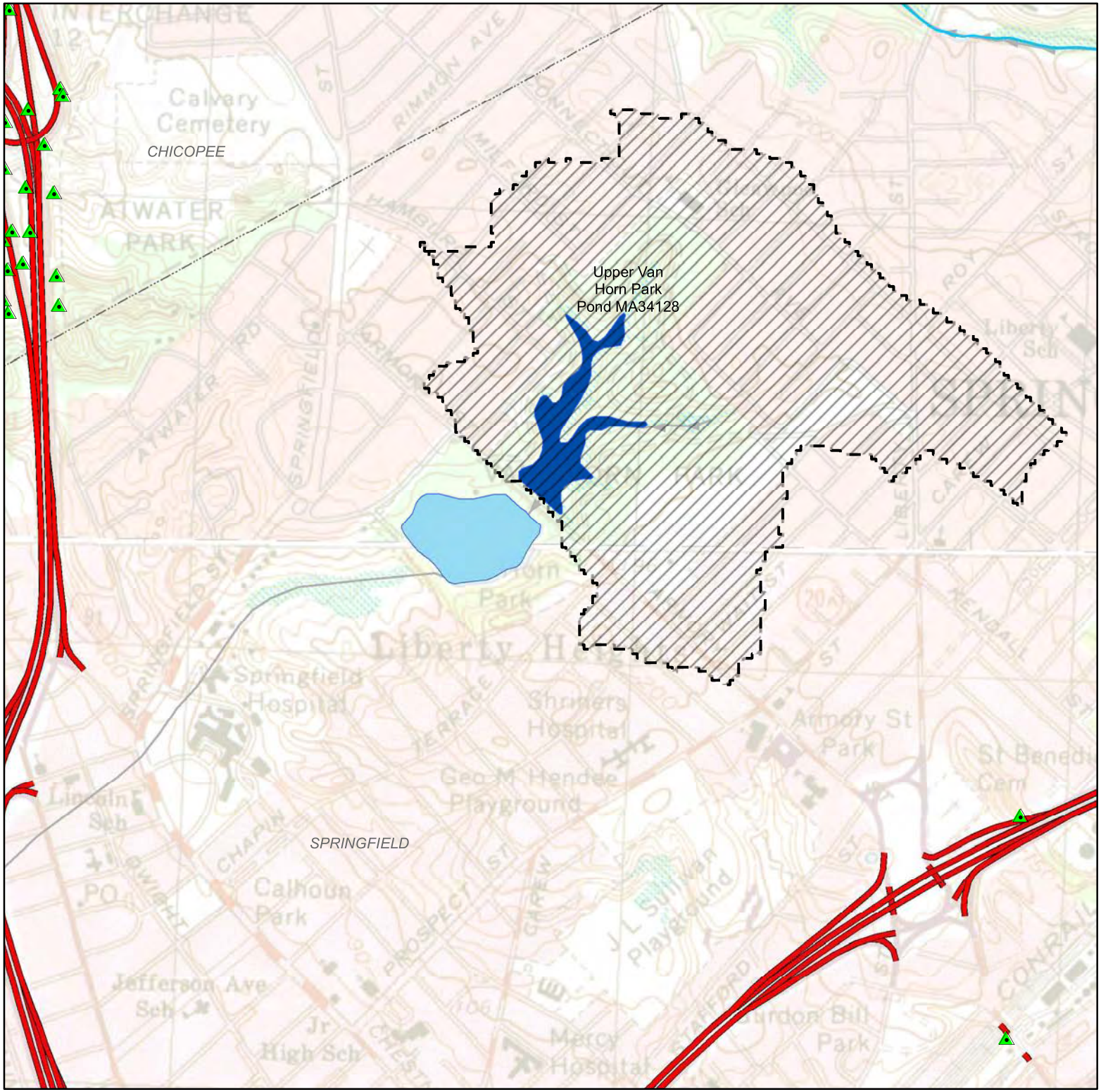
MA82A-17 and MA82104

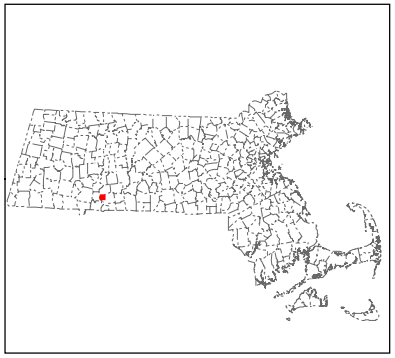
Unnamed Tributary and Stearns Mill Pond

Concord

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,000 500 0 1,000

ft

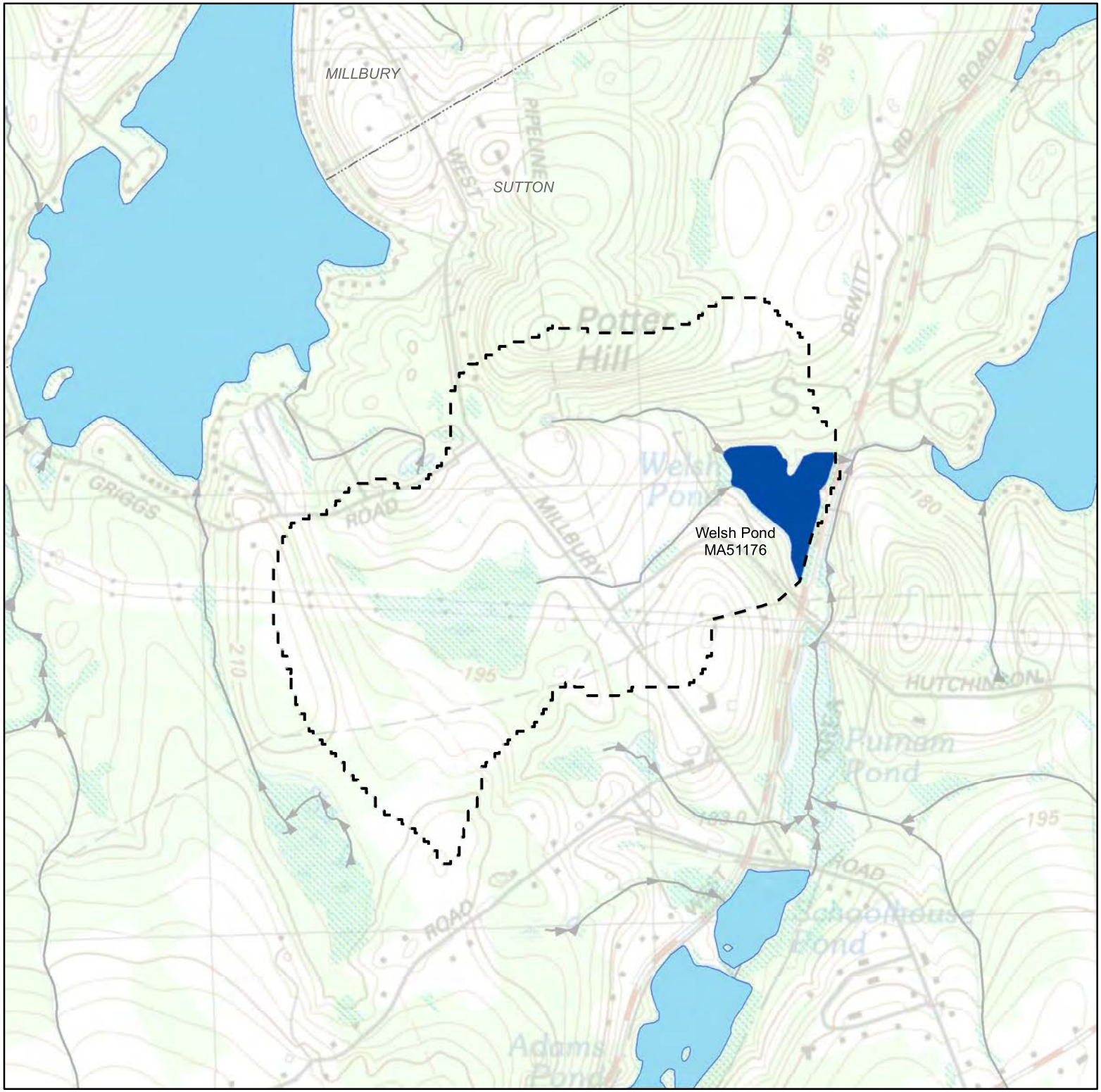
MA34128

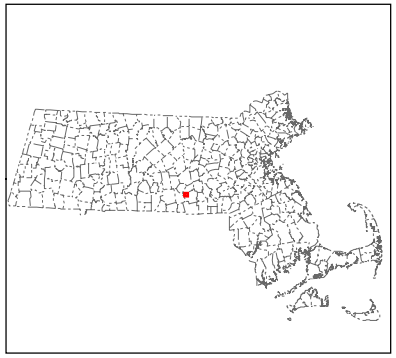
Upper Van Horn Park Pond

Connecticut

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,000 500 0 1,000 ft

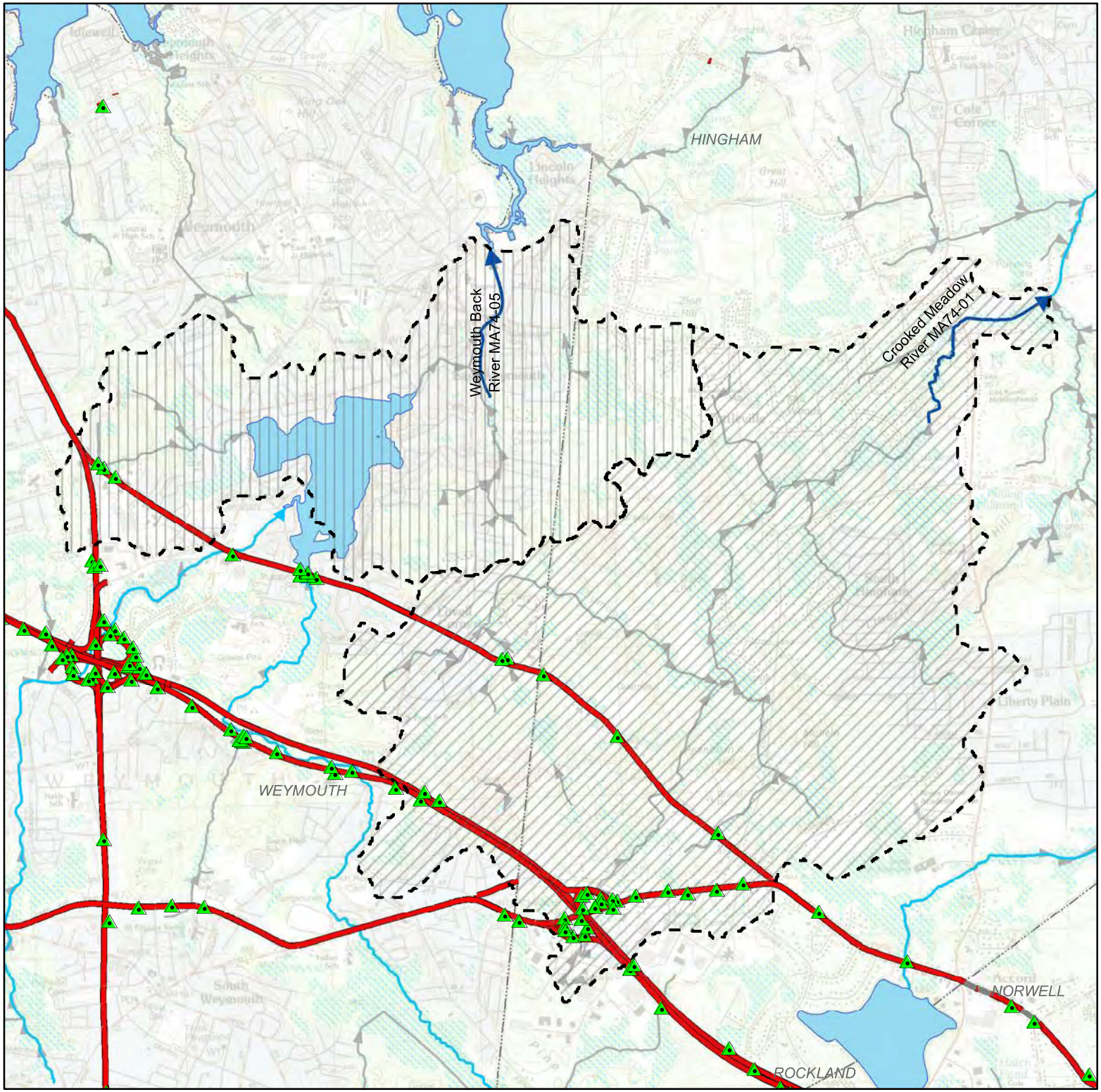
MA51176

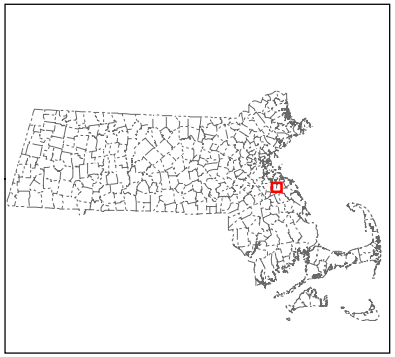
Welsh Pond

Blackstone

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

3,000 1,500 0 3,000 ft

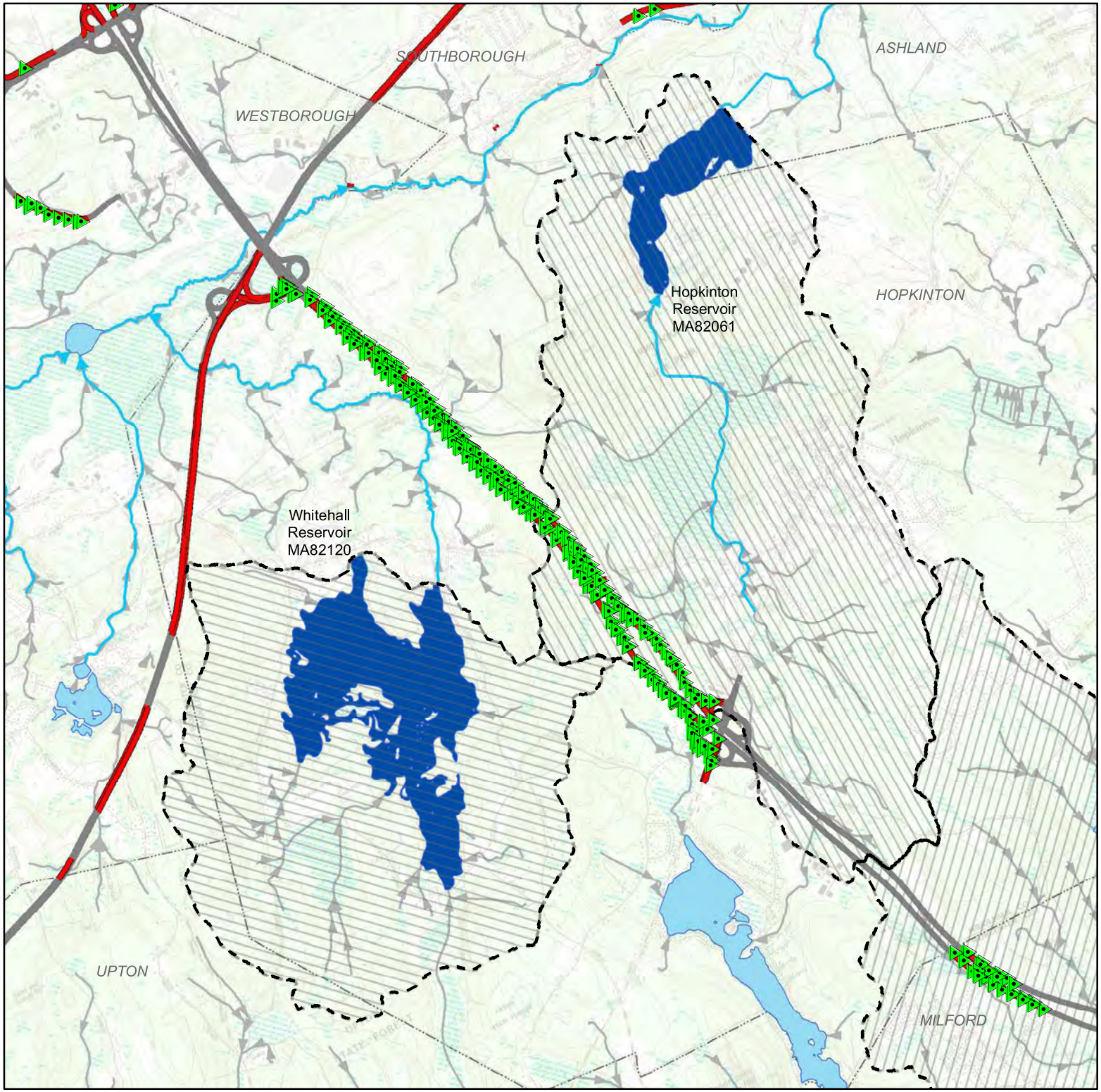
MA74-05 and MA74-01

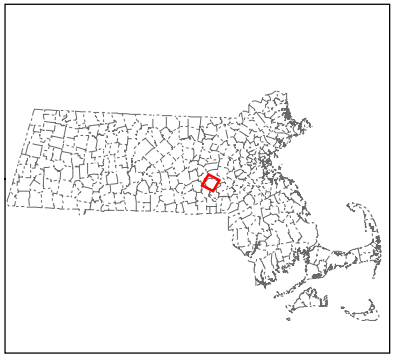
Weymouth Back River and Crooked Meadow River

Boston Harbor: Weymouth & Weir

June 2012

massDOT Massachusetts Department of Transportation Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

4,000 2,000 0 4,000 ft

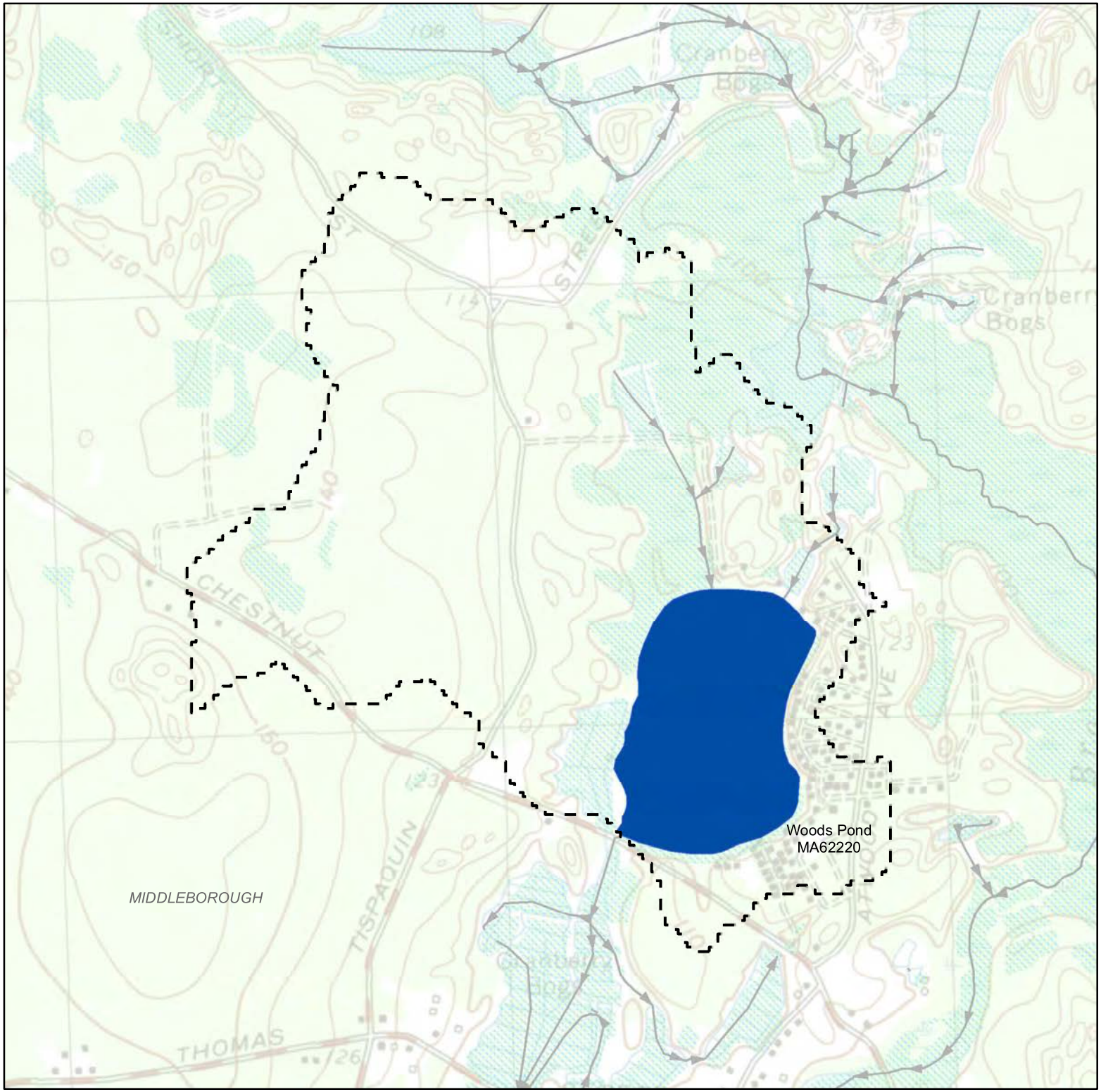
MA82120 and MA82061

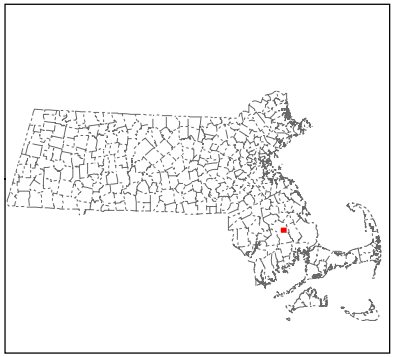
Whitehall Reservoir and Hopkinton Reservoir

Concord

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division





Impaired Water Body Being Assessed

Impaired Water Body

NWI Wetland Areas

Impaired Stream Being Assessed

Impaired Stream Segment

Non-Impaired Stream Segments

MA DOT Roads

MA DOT Urban Area Roads

Town Boundaries

Stormwater Outfalls

N

1,000 500 0 1,000 ft

MA62220

Woods Pond

Taunton

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division

Assessments which identified No Discharges from MassDOT Outfalls

Under Step 2 of BMP 7U, MassDOT committed to map the locations of MassDOT urban outfalls relative to 303(d) waters. This step included "*performing a desktop review of the sub-basin of the 303(d) water body to determine the specific locations of MassDOT outfalls and their receiving waters. This procedure will help determine whether MassDOT's outfalls in fact are potentially discharging in to the water body at issue, and will identify the number of outfalls that may need to be addressed through a mitigation plan. If MassDOT concludes based on its mapping that MassDOT's outfalls clearly are not discharging to the 303(d) water, it will document the basis for the conclusion and will conduct no further assessment of the water body at issue*." Step 2 of BMP 7R includes a similar desktop review.

MassDOT has undertaken the assessment of the Charles River watershed, beginning with segments that fall within MassDOT's District 6. These assessments within District 6 includes all impaired segments within the Charles River watershed east of the Sherborn/Dover town line, all the way to its confluence with Boston Inner Harbor. MassDOT has reviewed each impaired segment within this subset of the Charles River watershed in detail and identified waters that do not receive direct discharge from MassDOT properties. These were identified based on a desktop review of topography, MassDOT roadway jurisdiction, outfall locations, and a review of existing highway plans.

Included in this report are assessments for each waterbody identified as not receiving direct discharges from MassDOT properties, including a figure for each location. The figures show the impaired waterbody segment being assessed in dark blue. The entire Charles River watershed is within an urban area.

Assessments included in this report for water bodies within the Charles River watershed that MassDOT has identified as not receiving discharge from MassDOT properties include:

- Waban Brook (MA72-17)
- Fuller Brook (MA72-18)
- Rock Meadow Brook (MA72-21)
- Alder Brook (MA72-22)
- Sawmill Brook (MA72-23)
- Unnamed Tributary "Laundry Brook" (MA72-30)
- Unnamed Tributary "Sawins Brook" (MA72-32)
- Bulloughs Pond (MA72011)
- Chandler Pond (MA72017)
- Jamaica Pond (MA72052)

Two assessments included in this report identify MassDOT contribution to impairments as *de minimus* and no further review is warranted. These include:

- Charles River (MA72-05)
- Fuller Brook (MA72-18)

For each segment, the assessments in this report discuss water body impairments, information from the *Charles River Watershed 2002-2006 Water Quality Assessment Report*, and the rational for determining that no MassDOT roadways discharge to the water body or that MassDOT contribution to impairments is *de minimus*. While no stormwater improvements in the subwatersheds of these segments are proposed at this time, MassDOT is reviewing the Charles River watershed as a whole and has committed to constructing stormwater retrofit BMPs on MassDOT property to address impaired waters.

Impaired Waters Assessment for Waban Brook (MA72-17)

Impaired Waterbody

Name: Waban Brook

Location: Wellesley, MA

Water Body ID: MA72-17

Impairments

According to the MassDEP Final Year 2010 Integrated List of Waters, Waban Brook is listed under Category 5, indicating that a TMDL is required for water temperature.

In addition, two TMDL reports have been finalized that address the Upper/Middle Charles River, which receives flow from this stream. The TMDLs that have been finalized are the *Final TMDL for Nutrients in the Upper/Middle Charles River (Control Number (CN) 272.0)* and the *Final Pathogen TMDL for the Charles River Watershed (CN 0156.0)*.

The *Charles River Watershed 2002-2006 Water Quality Assessment* Report (MassDEP 2008) lists elevated water temperature as the primary concern for this stream segment. Large impoundments in the upper watershed and runoff from impervious surfaces and separate storm sewer systems are suspected as the source of the elevated stream temperatures. Although only a limited amount of data was available, the Report also identified a potential impairment to some uses from elevated bacteria concentrations.

Relevant Water Quality Standards

- Water Body Classification: B, Warm Water Fishery
- 301 CMR § 4.05 (3)(b) – *Class B. These waters are designed as habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.*
- 314 CMR 4.05 (3)(b) 2 - *Temperature.*

  a. Shall not exceed 68°F (20°C) based on the mean of the daily maximum temperature over a seven day period in cold water fisheries, unless naturally occurring. Where a reproducing cold water aquatic community exists at a naturally occurring higher temperature, the temperature necessary to protect the community shall not be exceeded and the natural daily and seasonal temperature fluctuations necessary to protect the community shall be maintained. Temperature shall not exceed 83°F (28.3°C) in warm water fisheries. The rise in temperature due to a discharge shall not exceed 3°F (1.7°0C) in rivers and streams designated as cold water fisheries nor 5°F (2.8°C) in rivers and streams designated as warm water fisheries (based on the minimum expected flow for the month);

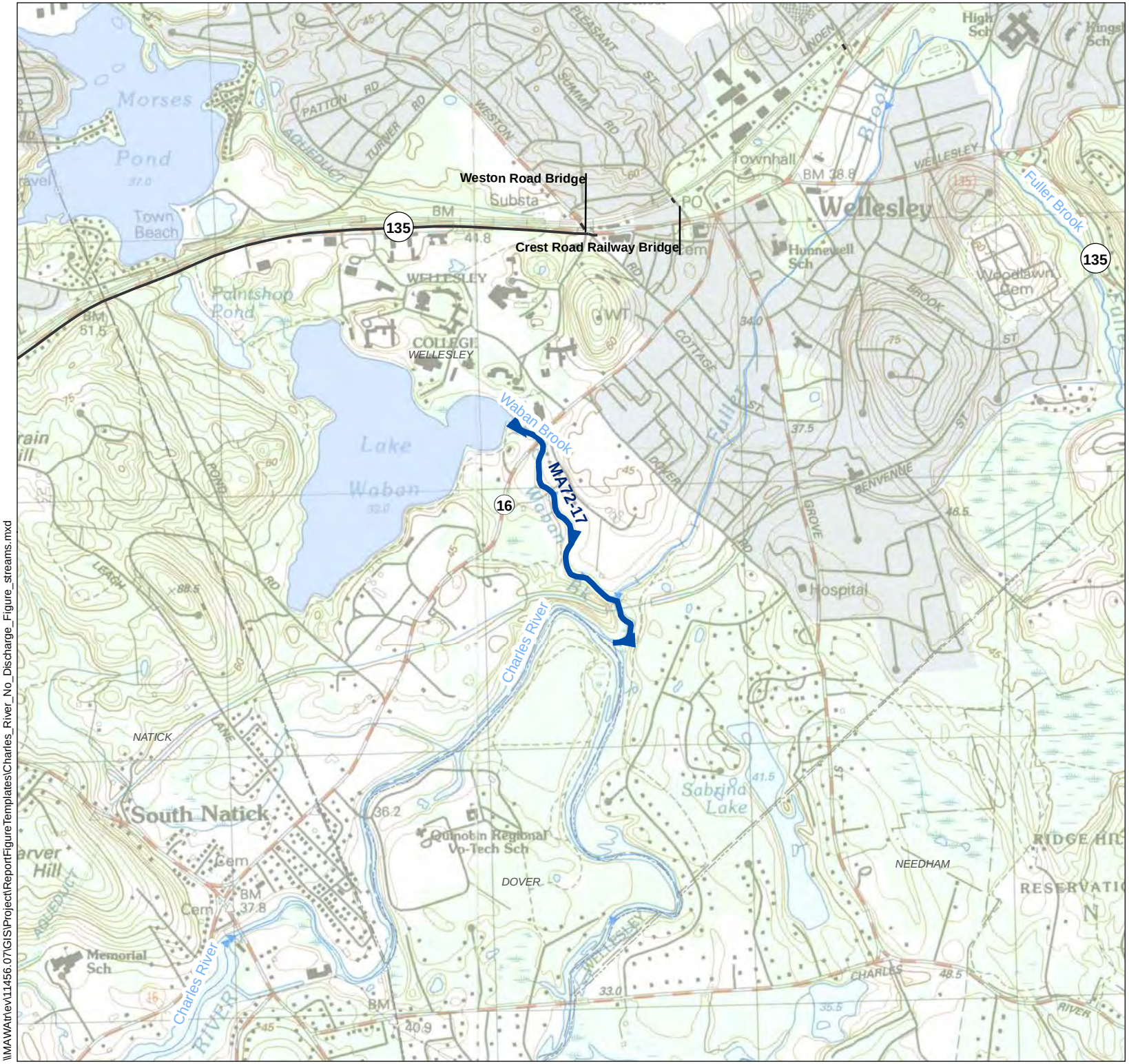
in lakes and ponds the rise shall not exceed 3°F (1.7°0C) in the epilimnion (based on the monthly average of maximum daily temperature);

b. natural seasonal and daily variations that are necessary to protect existing and designated uses shall be maintained. There shall be no changes from natural background conditions that would impair any use assigned to this Class, including those conditions necessary to protect normal species diversity, successful migration, reproductive functions or growth of aquatic organisms;

Site Description

Waban Brook is located within the Town of Wellesley, Massachusetts. Its headwaters originate at the outlet of Waban Lake and it flows southeast 0.7 miles to its confluence with the Charles River just north of the Wellesley/Needham line. It is impaired due to water temperatures that were found to be above the warm water fishery criterion of 28.3°C during summer months in 2002, 2003, and 2005. According to the 2006 Water Quality Assessment Report, the estimated percent impervious cover for this subwatershed is 14.7% and the primary land uses of the 15.7 square mile subwatershed are residential (52%), forest (27%), and open land (10%).

MassDOT property does not discharge directly to Waban Brook. MassDOT owns a portion of Central Street (Route 135) in Wellesley, approximately 0.45 miles north of Lake Waban (see attached figure). The drainage from the MassDOT-owned portion of Central Street is collected in a closed system and does not discharge directly to Waban Brook. MassDOT is also responsible for the Weston Road railway bridge and the Crest Road railway bridge, approximately 2,600 and 3,500 feet northeast of Waban Brook, respectively. Review of MassDOT plans indicate that the railway bridges discharge to closed drainage systems in the adjacent roadways, which are not owned or managed by MassDOT.



Waban Brook
MA72-17

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division

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Impaired Waters Assessment for Rock Meadow Brook (MA72-21)

Impaired Waterbody

Name: Rock Meadow Brook

Location: Westwood and Dedham, MA

Water Body ID: MA72-21

Impairments

According to the MassDEP Final Year 2010 Integrated List of Waters, Rock Meadow Brook is listed under Category 5 as impaired for aquatic macroinvertebrate bioassessments, aquatic plants (macrophytes), excess algal growth, nutrient/eutrophication biological indicators, dissolved oxygen, and total phosphorous.. Rock Meadow Brook is included in the *Final TMDL for Nutrients in the Upper/Middle Charles River (Control Number (CN)272.0)* which addresses the following impairments for the brook: aquatic plants (macrophytes), excess algal growth, nutrient/eutrophication biological indicators, dissolved oxygen, and total phosphorous.

In addition, a pathogen TMDL reports *(Final Pathogen TMDL for the Charles River Watershed (CN 0156.0)*) has been finalized that address the Upper/Middle Charles River, which receives flow from this brook.

The *Charles River Watershed 2002-2006 Water Quality Assessment* Report (MassDEP 2008) indicates that the Brook supports assessed uses for the upper 2.6 mile reach but is impaired for the lower 1.2 miles of its reach. The impairments are identified as related to water withdrawals, runoff, and impoundments associated with the Dedham Country Club golf course, as well as other urban runoff/stormwater from the subwatershed.

Relevant Water Quality Standards

- Water Body Classification: B
- 301 CMR § 4.05 (3)(b) – *Class B. These waters are designed as habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.*
- 314 CMR § 4.05 (3)(b)1 - *Dissolved Oxygen. a. Shall not be less than 6.0 mg/l in cold water fisheries and not less than 5.0 mg/l in warm water fisheries. Where natural background conditions are lower, DO shall not be less than natural background conditions. Natural seasonal and daily variations that are necessary to protect existing and designated uses shall be maintained.*
- 314 CMR § 4.05 (5)(a) – *Aesthetics. All surface waters shall be free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris,*

scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life.

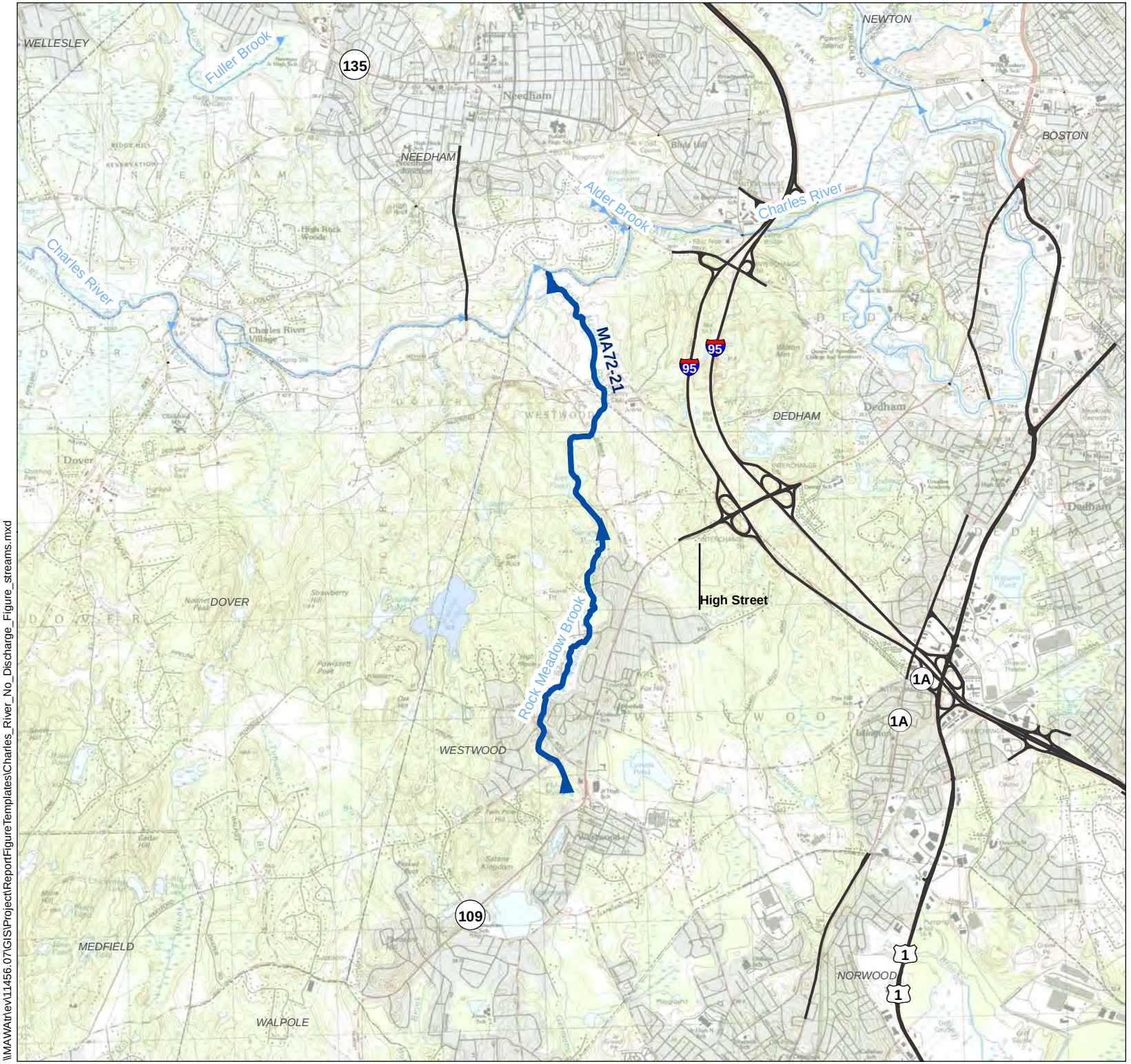
- 314 CMR § 4.05 (5)(c) – *Nutrients. Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses. Human activities that result in the nonpoint source discharge of nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control.*

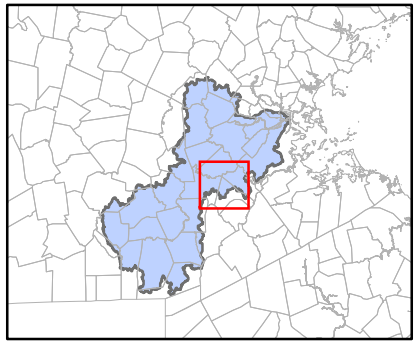
Site Description

Rock Meadow Brook is located in Westwood and Dedham, MA, with its headwaters in Fisher Meadow in Westwood, flowing north through Stevens Pond and Lee Pond in Westwood to its confluence with the Charles River (MA72-07) in Dedham. The total segment length is 3.8 miles, however, only the lower 1.2 miles are impaired. Its impairments are linked to excess nutrients. According to the *2002-2006 Water Quality Assessment Report*, the estimated percent impervious cover for this subwatershed is 10.4% and the primary land uses of the 2.7 square mile subwatershed are residential (41%), forest (34%), and open land (11%).

MassDOT property does not discharge directly to Rock Meadow Brook. The nearest MassDOT properties are portions of Route 109 (High Street) in Westwood and Interstate 95 in Westwood and Dedham, including the High Street interchange (see attached Figure). High Street is approximately 0.45 miles from Rock Meadow Brook and Interstate 95 is 2,600 feet from Rock Meadow Brook.

Review of MassDOT plans show that runoff from Interstate 95 (I-95) discharge to stormwater BMPs within and adjacent to I-95 with overflow to adjacent water bodies and eventually flowing to the Charles River. MassDOT owns approximately 4,000 linear feet of High Street at the interchange with I-95. Stormwater runoff from this portion of High Street is collected in catch basins and conveyed through drainage pipes to stormwater BMPs at the interchange with overflow to the highway median. Stormwater from High Street does not flow to Rock Meadow Brook. Therefore, it has been determined that no stormwater from MassDOT property discharges directly to Rock Meadow Brook.





Assessed Segment

MassDOT Roadways

Impaired Lakes

Impaired Streams

N

0 0.5 1 Miles

Rock Meadow Brook
MA72-21

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division

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Impaired Waters Assessment for Alder Brook (MA72-22)

Impaired Waterbody

Name: Alder Brook

Location: Needham, MA

Water Body ID: MA72-22

Impairments

According to the MassDEP Final Year 2010 Integrated List of Waters, Alder Brook is listed under Category 5 as impaired for aquatic macroinvertebrate bioassessments and nutrient/eutrophication biological indicators. Alder Brook is included in the *Final TMDL for Nutrients in the Upper/Middle Charles River (Control Number (CN) 272.0)* which addresses the nutrient/eutrophication biological indicators impairment of the brook.

In addition, a TMDL report *(Final Pathogen TMDL for the Charles River Watershed (CN 0156.0))* has been finalized that address the pathogen impairments of the Upper/Middle Charles River, which receives flow from this stream.

The *Charles River Watershed 2002-2006 Water Quality Assessment Report* (MassDEP 2008) indicates that no quality-assured data were available for Alder Brook and that no designated uses were assessed.

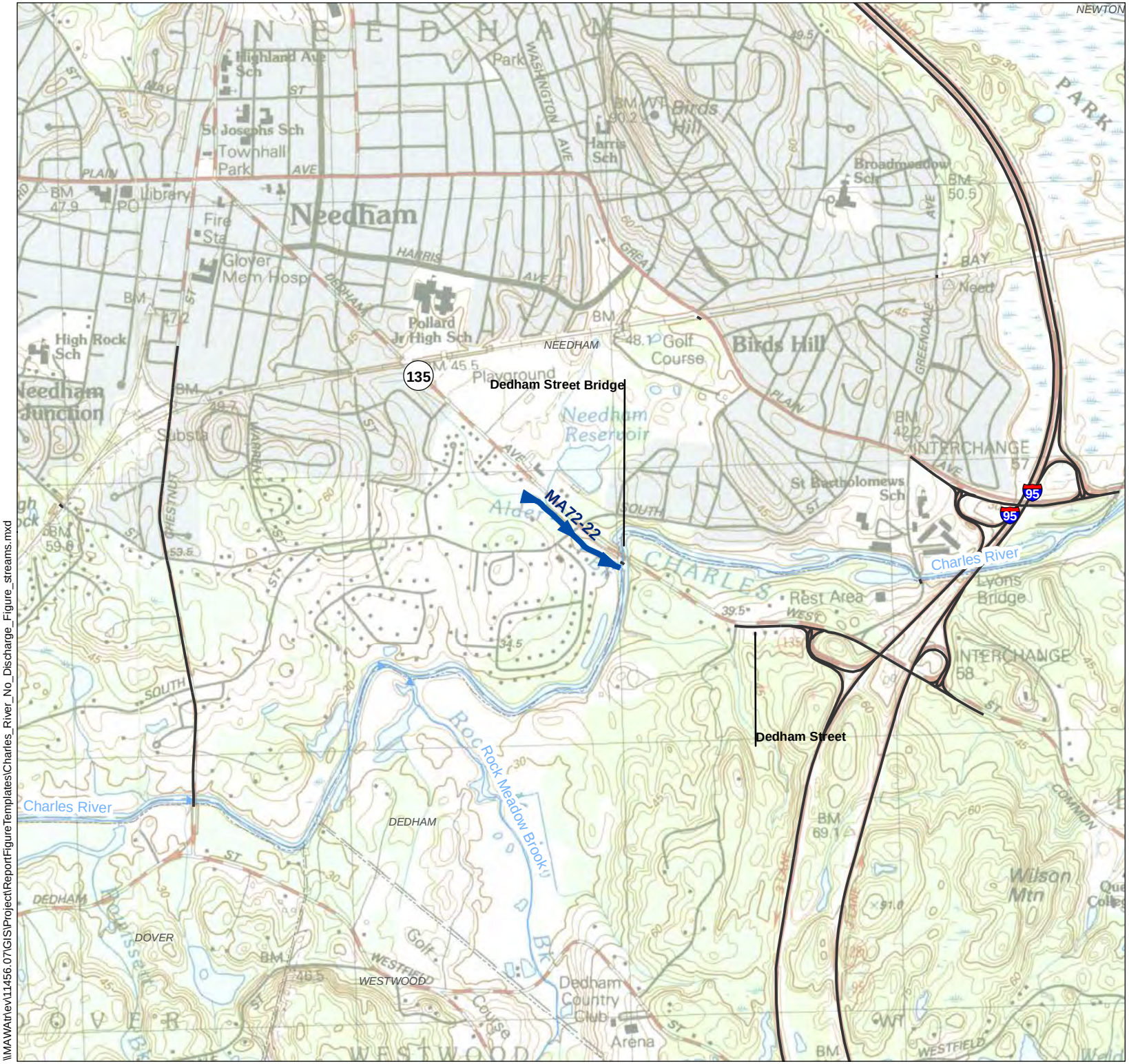
Relevant Water Quality Standards

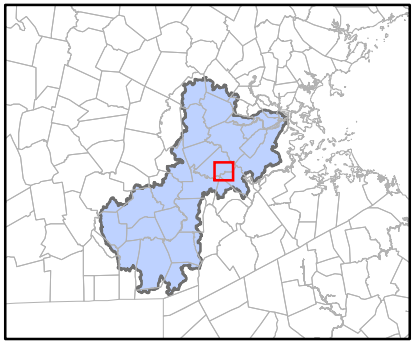
- Water Body Classification: B
- 301 CMR § 4.05 (3)(b) – *Class B. These waters are designed as habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.*
- 314 CMR § 4.05 (5)(c) – *Nutrients. Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses. Human activities that result in the nonpoint source discharge of nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control.*

Site Description

Alder Brook is located within the Town of Needham, Massachusetts. Its headwaters originate northwest of the Route 135 and South Street intersection and it flows southeasterly 0.3 miles to its confluence with the Charles River in Needham. According to the *2002-2006 Water Quality Assessment Report*, the estimated percent impervious cover for this subwatershed is 26.7% and the primary land uses of the 1.6 square mile subwatershed are residential (77%), open land (14%), and forest (4%).

MassDOT property does not discharge directly to Alder Brook. The nearest MassDOT property is the Dedham Street Bridge over the Charles River, directly north of Alder Brook's confluence with the Charles River. All stormwater runoff from this bridge discharges directly to the Charles River segment (MA72-07). Additionally, a section of Dedham Avenue at the Interstate 95 interchange (approximately 0.28 miles east of the brook) discharges stormwater directly to the Charles River (see attached figure).





Assessed Segment

MassDOT Roadways

Impaired Lakes

Impaired Streams

N

0 0.25 0.5 Miles

Alder Brook
MA72-22

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division

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Impaired Waters Assessment for Sawmill Brook (MA72-23)

Impaired Waterbody

Name: Sawmill Brook

Location: Newton and Boston, MA

Water Body ID: MA72-23

Impairments

According to the MassDEP Final Year 2010 Integrated List of Waters, Sawmill Brook is listed under Category 5 as impaired for chloride, total phosphorus; dissolved oxygen; organic enrichment (sewage) biological indicators, and Escherichia coli.

Two TMDL reports have been finalized that address the Upper/Middle Charles River, including Sawmill Brook.

- *Final TMDL for Nutrients in the Upper/Middle Charles River (Control Number (CN) 272.0),* addressing the following impairments to Sawmill Brook: total phosphorus; dissolved oxygen; and organic enrichment (sewage) biological indicators.
- *Final Pathogen TMDL for the Charles River Watershed (CN 0156.0),* addressing the Escherichia coli [32376] impairment.

The *Charles River Watershed 2002-2006 Water Quality Assessment Report* (MassDEP 2008) identifies urban/stormwater runoff, discharges from municipal separate storm sewer systems, and illicit connections/hook-ups to storm sewers among the main sources of impairments to this segment.

Relevant Water Quality Standards

- Water Body Classification: B
- 301 CMR § 4.05 (3)(b) – *Class B. These waters are designed as habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.*
- 314 CMR § 4.05 (3)(b)(1) – *Dissolved Oxygen. a. Shall not be less than 6.0 mg/l in cold water fisheries and not less than 5.0 mg/l in warm water fisheries. Where natural background conditions are lower, DO shall not be less than natural background conditions. Natural seasonal and daily variations that are necessary to protect existing and designated uses shall be maintained.*
- 314 CMR § 4.05 (3)(b)(4) – *Bacteria.*
  a. At bathing beaches as defined by the Massachusetts Department of Public Health in 105

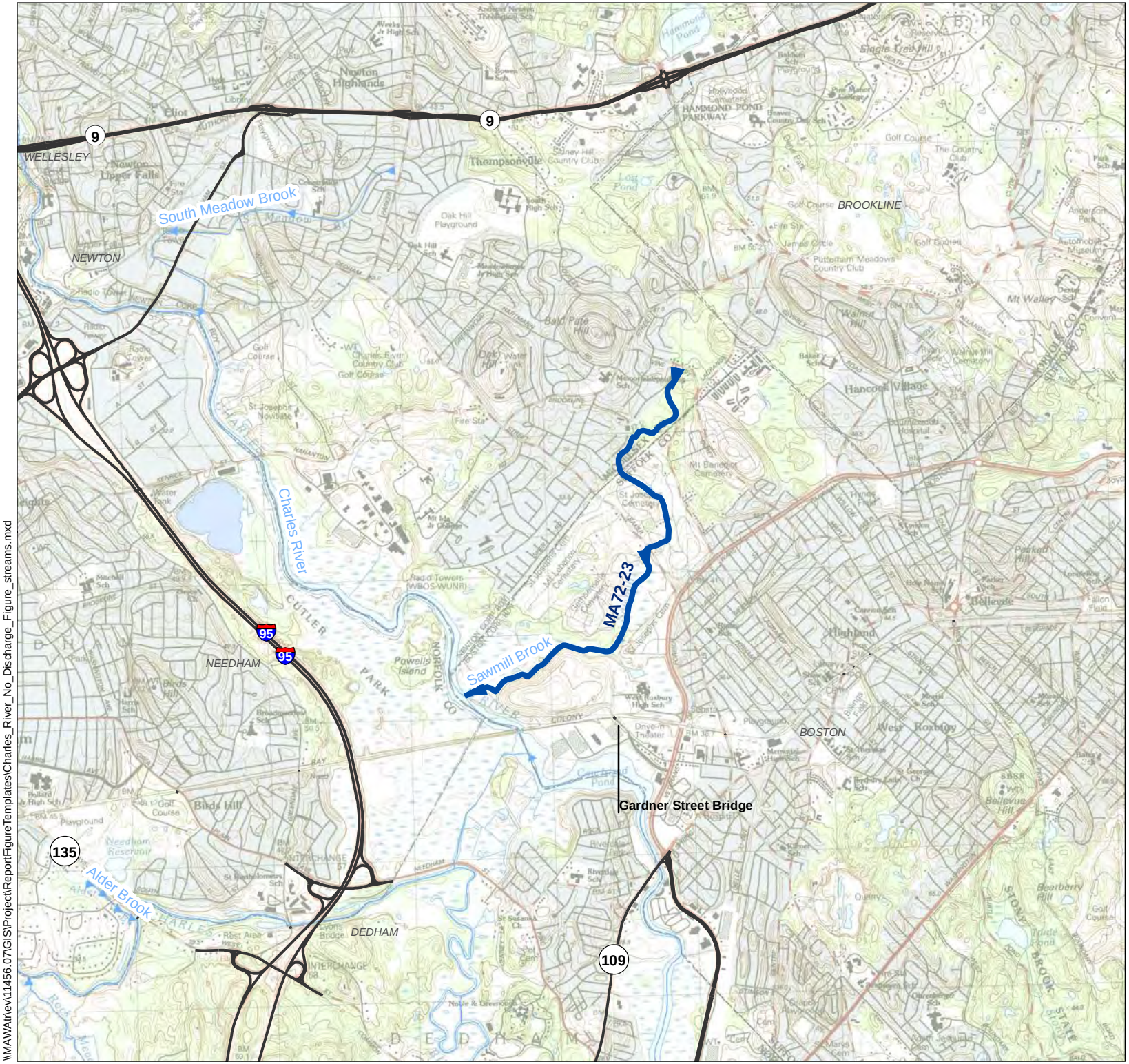
CMR 445.010: where E. coli is the chosen indicator, the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 126 colonies per 100 ml and no single sample taken during the bathing season shall exceed 235 colonies per 100 ml; alternatively, where enterococci are the chosen indicator, the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 33 colonies per 100 ml and no single sample taken during the bathing season shall exceed 61 colonies per 100 ml;
b. For other waters and, during the non bathing season, for waters at bathing beaches as defined by the Massachusetts Department of Public Health in 105 CMR 445.010: the geometric mean of all E. coli samples taken within the most recent six months shall not exceed 126 colonies per 100 ml typically based on a minimum of five samples and no single sample shall exceed 235 colonies per 100 ml; alternatively, the geometric mean of all enterococci samples taken within the most recent six months shall not exceed 33 colonies per 100 ml typically based on a minimum of five samples and no single sample shall exceed 61 colonies per 100 ml. These criteria may be applied on a seasonal basis at the discretion of the Department;

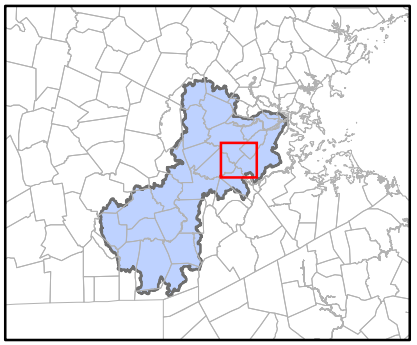
- 314 CMR § 4.05 (5)(c) – *Nutrients. Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses. Human activities that result in the nonpoint source discharge of nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control.*

Site Description

Sawmill Brook is located within Newton and Boston, Massachusetts. It originates near Vine Street in Newton and flows southwesterly through the West Roxbury area of Boston for 2.4 miles to its confluence with the Charles River. According to the *2002-2006 Water Quality Assessment Report,* the estimated percent impervious cover for this subwatershed is 25.8% and the primary land uses of the 2.8 square mile subwatershed are residential (57%), forest (16%), and open land (14%).

MassDOT property does not discharge directly to Sawmill Brook. The nearest MassDOT property is the Gardner Street bridge over the MBTA Needham rail line, approximately 0.28 miles southeast of the Brook (see attached figure). Segments of the VFW Parkway located closer to the Brook are under the control of the Department of Conservation and Recreation. Terrain between Route 9 to the north and Sawmill Brook would prohibit any stormwater discharges from Route 9 from reaching Sawmill Brook.





Assessed Segment

MassDOT Roadways

Impaired Lakes

Impaired Streams

N

0 0.5 1 Miles

Sawmill Brook
MA72-23

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division

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Impaired Waters Assessment for Unnamed Tributary "Laundry Brook" (MA72-30)

Impaired Waterbody

Name: Unnamed Tributary "Laundry Brook"

Location: Watertown, MA

Water Body ID: MA72-30

Impairments

According to the MassDEP Final Year 2010 Integrated List of Waters, Laundry Brook is listed under Category 5 as impaired for turbidity, total suspended solids (TSS), taste and odor, physical substrate habitat alterations, total phosphorus, Escherichia coli [32381], and Enterococcus [32381]. This segment is also identified as impaired by, but no TMDL is required for this impairment.

Two TMDL reports have been finalized that address the Lower Charles River, which include Laundry Brook.

- *Final Phosphorus TMDL Report for the Lower Charles River Basin (CN 301.0),* addressing the turbidity; total suspended solids (TSS); taste and odor; and total phosphorus impairments.
- *Final Pathogen TMDL for the Charles River Watershed (CN 0156.0),* addressing the Escherichia coli [32381] and Enterococcus [32381] impairments.

The *Charles River Watershed 2002-2006 Water Quality Assessment* Report (MassDEP 2008) identifies unspecified urban stormwater, discharges from municipal separate storm sewer systems, and illicit connections as the main sources of impairments to this stream. The impairment for physical substrate habitat alteration appears to be due to the Brook being culverted and channelized upstream from the confluence with the Charles River.

Relevant Water Quality Standards

- Water Body Classification: B
- 301 CMR § 4.05 (3)(b) – *Class B. These waters are designed as habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.*
- 314 CMR § 4.05 (3)(b)(4) – *Bacteria.*
  a. At bathing beaches as defined by the Massachusetts Department of Public Health in 105 CMR 445.010: where E. coli is the chosen indicator, the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 126 colonies per 100 ml and no single sample taken during the bathing season shall exceed 235 colonies per 100 ml; alternatively, where enterococci are the chosen indicator, the geometric mean

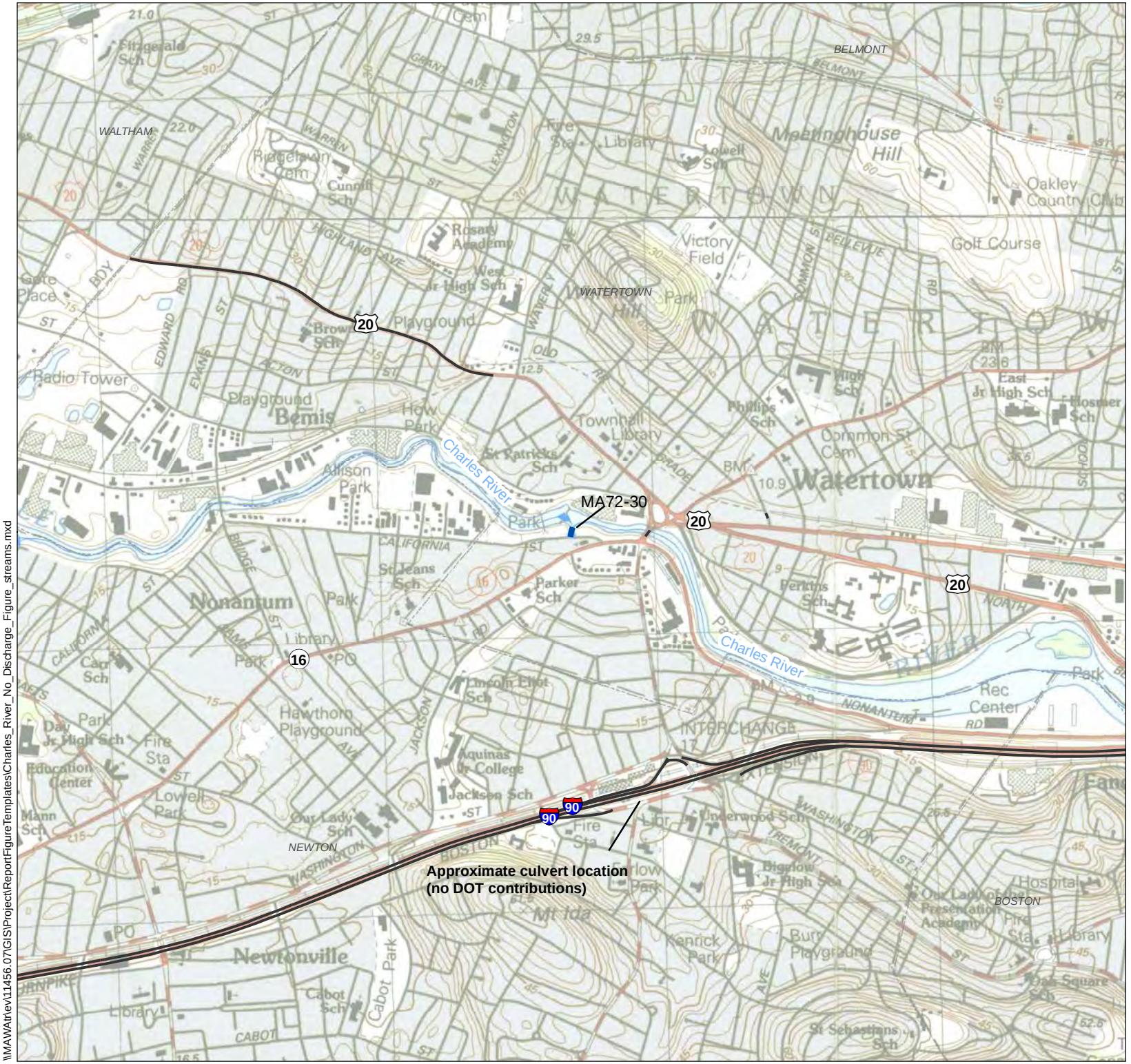
of the five most recent samples taken during the same bathing season shall not exceed 33 colonies per 100 ml and no single sample taken during the bathing season shall exceed 61 colonies per 100 ml;
b. For other waters and, during the non bathing season, for waters at bathing beaches as defined by the Massachusetts Department of Public Health in 105 CMR 445.010: the geometric mean of all E. coli samples taken within the most recent six months shall not exceed 126 colonies per 100 ml typically based on a minimum of five samples and no single sample shall exceed 235 colonies per 100 ml; alternatively, the geometric mean of all enterococci samples taken within the most recent six months shall not exceed 33 colonies per 100 ml typically based on a minimum of five samples and no single sample shall exceed 61 colonies per 100 ml. These criteria may be applied on a seasonal basis at the discretion of the Department;

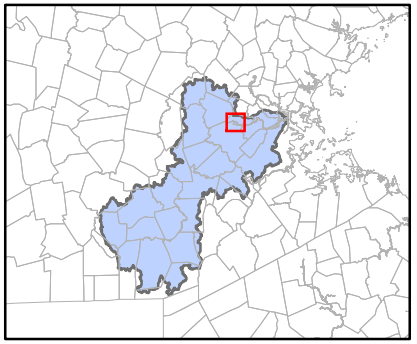
- 314 CMR § 4.05 (3)(b)(8) - *Taste and Odor. None in such concentrations or combinations that are aesthetically objectionable, that would impair any use assigned to this Class, or that would cause tainting or undesirable flavors in the edible portions of aquatic life.*
- 314 CMR § 4.05 (3)(b)(5) – *Solids. These waters shall be free from floating, suspended and settleable solids in concentrations or combinations that would impair any use assigned to this class, that would cause aesthetically objectionable conditions, or that would impair the benthic biota or degrade the chemical composition of the bottom.*
- 314 CMR § 4.05 (3)(b)(6) – *Color and Turbidity. These waters shall be free from color and turbidity in concentrations or combinations that are aesthetically objectionable or would impair any use assigned to this class.*
- 314 CMR § 4.05 (5)(b) – *Bottom Pollutants or Alterations. All surface waters shall be free from pollutants in concentrations or combinations or from alterations that adversely affect the physical or chemical nature of the bottom, interfere with the propagation of fish or shellfish, or adversely affect populations of non-mobile or sessile benthic organisms.*
- 314 CMR § 4.05 (5)(c) – *Nutrients. Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses. Human activities that result in the nonpoint source discharge of nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control.*

Site Description

The Unnamed Tributary segment MA72-30, otherwise known as Laundry Brook, is located within the Towns of Newton and Watertown, Massachusetts. The Brook originates at Bulloughs Pond in Newton, Massachusetts but is culverted for most of its length until it emerges on the north side of California Street, Watertown. It then flows northward approximately 100 feet to the confluence with the Charles River, at a point approximately 150 feet downstream from the Watertown Dam. As shown on the attached figure, only a small portion of the river is above ground. No estimates were available in the *2002-2006 Water Quality Assessment Report* for the estimated percent impervious cover for this subwatershed, and the primary land uses were not identified.

MassDOT property does not discharge directly to Laundry Brook. The nearest MassDOT property is the Galen Street bridge over the Charles River, approximately 900 feet east of the Brook. Stormwater runoff from this structure is directed to municipal catch basins on either end of the bridge. The culverted Brook runs under Interstate 90 just west of Interchange 17. Stormwater from I-90 discharges directly to Charles River segment MA72-36. No stormwater runoff from I-90 discharges to the Brook.





Assessed Segment

MassDOT Roadways

Impaired Lakes

Impaired Streams

N

0 0.25 0.5 Miles

Unnamed Tributary
(Laundry Brook)
MA72-30

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division

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Impaired Waters Assessment for Unnamed Tributary "Sawins Brook" (MA72-32)

Impaired Waterbody

Name: Sawins Brook

Location: Watertown, MA

Water Body ID: MA72-32

Impairments

According to the MassDEP Final Year 2010 Integrated List of Waters, Sawins Brook is identified as being impaired by Escherichia coli (a pathogen) and is listed under Category 4a, indicating that a TMDL has been completed. Sawins Brook is included in the *Final Pathogen TMDL for the Charles River Watershed (CN 0156.0)*.

In addition, a nutrient TMDL report has been finalized that address the Lower Charles River, which receives flow from this stream (*Final TMDL for Nutrients in the Upper/Middle Charles River (CN 301.0)).*

The *Charles River Watershed 2002-2006 Water Quality Assessment* Report (MassDEP 2008) identifies unspecified urban stormwater, discharges from municipal separate storm sewer systems, and suspected illicit connections as the main sources of impairments to this stream.

Relevant Water Quality Standards

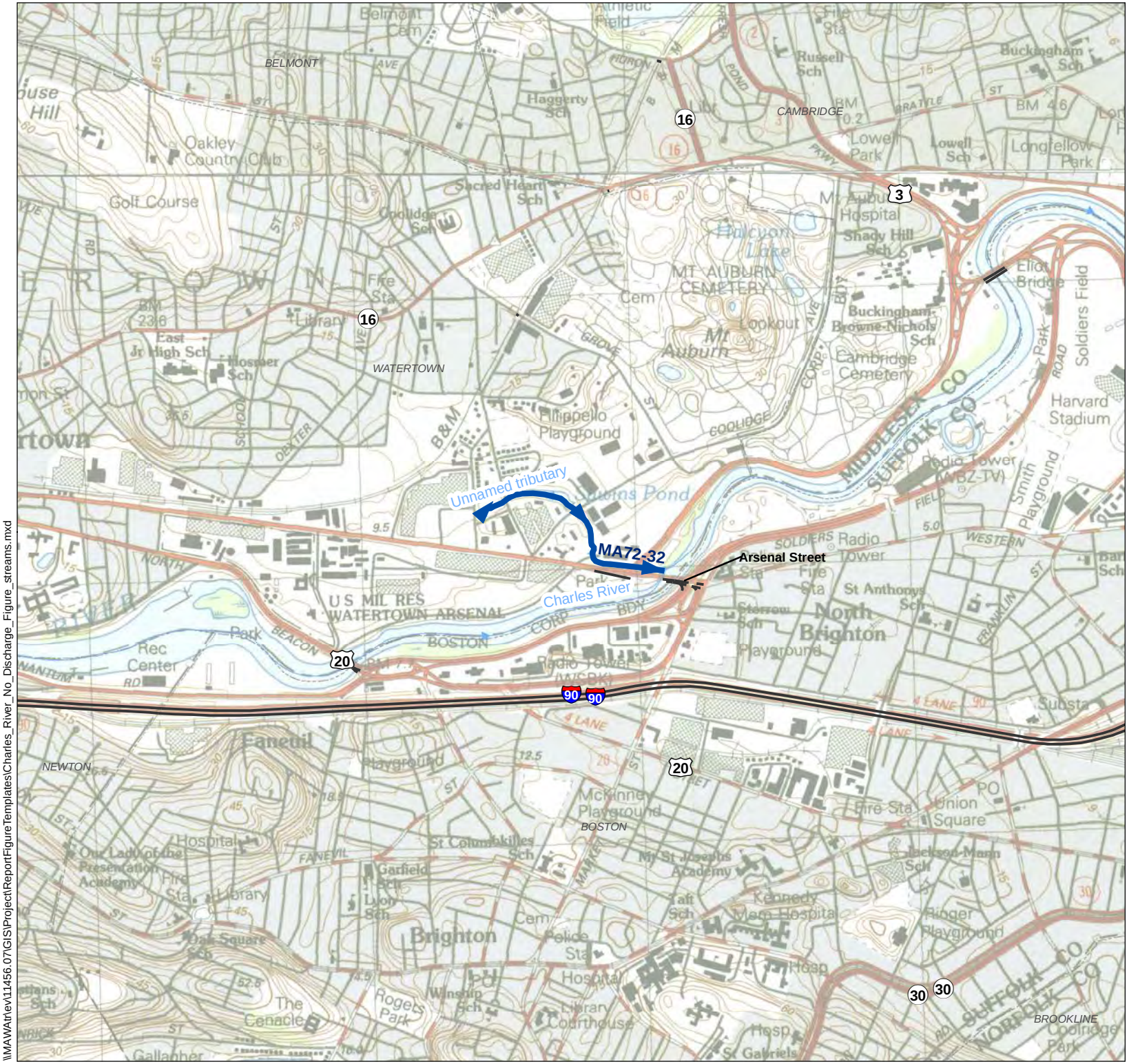
- Water Body Classification: B
- 301 CMR § 4.05 (3)(b) – *Class B. These waters are designed as habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.*
- 314 CMR § 4.05 (3)(b)(4) – *Bacteria.*
  a. At bathing beaches as defined by the Massachusetts Department of Public Health in 105 CMR 445.010: where E. coli is the chosen indicator, the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 126 colonies per 100 ml and no single sample taken during the bathing season shall exceed 235 colonies per 100 ml; alternatively, where enterococci are the chosen indicator, the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 33 colonies per 100 ml and no single sample taken during the bathing season shall exceed 61 colonies per 100 ml;
  b. For other waters and, during the non bathing season, for waters at bathing beaches as defined by the Massachusetts Department of Public Health in 105 CMR 445.010: the geometric mean of all E. coli samples taken within the most recent six months shall not exceed 126 colonies per 100 ml typically based on a minimum of five samples and no

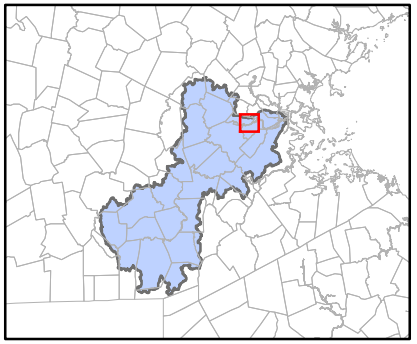
single sample shall exceed 235 colonies per 100 ml; alternatively, the geometric mean of all enterococci samples taken within the most recent six months shall not exceed 33 colonies per 100 ml typically based on a minimum of five samples and no single sample shall exceed 61 colonies per 100 ml. These criteria may be applied on a seasonal basis at the discretion of the Department;

Site Description

Sawins Brook is located within the Town of Watertown, Massachusetts. It emerges on the east side of Elm Street and flows easterly and southerly approximately 0.5 miles. The Brook's confluence with the Charles River is approximately 50 feet downstream from the Arsenal Street bridge over the Charles River. A section of the Brook is impounded and is known as Sawins Pond. According to the *2002-2006 Water Quality Assessment Report*, the estimated percent impervious cover for this subwatershed is 48.6% and the primary land uses of the 0.5 square mile subwatershed are residential (39%), commercial (22%), and industrial (20%).

MassDOT property does not discharge directly to Sawins Brook. The nearest MassDOT property is a small portion of Arsenal Street and the bridge carrying Arsenal Street over the Charles River, was recently transmitted to MassDOT from DCR (see attached Figure).





Assessed Segment

MassDOT Roadways

Impaired Lakes

Impaired Streams

N

0 0.25 0.5 Miles

Unnamed tributary (Sawins Brook) MA72-32

June 2012

massDOT Massachusetts Department of Transportation Highway Division

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Impaired Waters Assessment for Bulloughs Pond (MA72011)

Impaired Waterbody

Name: Bulloughs Pond

Location: Newton, MA

Water Body ID: MA72011

Impairments

According to the MassDEP Final Year 2010 Integrated List of Waters, Bulloughs Pond is listed under Category 5 as impaired for nutrient/eutrophication biological indicators and excess algal growth. Bulloughs Pond is included in the *Final TMDL for Nutrients in the Lower Charles River (Control Number (CN) 301.0),* which addresses both impairments (nutrient/eutrophication biological indicators and excess algal growth).

In addition, a pathogen TMDL report has been finalized that address the Lower Charles River, which receives flow from this pond via Laundry Brook(*Final Pathogen TMDL for the Charles River Watershed (CN 0156.0))*.

The *Charles River Watershed 2002-2006 Water Quality Assessment* Report (MassDEP 2008) indicates that no designated uses are assessed and that no recent quality-assured data are available for this pond. The Report recommends that water quality monitoring be conducted to evaluate the designated uses.

Relevant Water Quality Standards

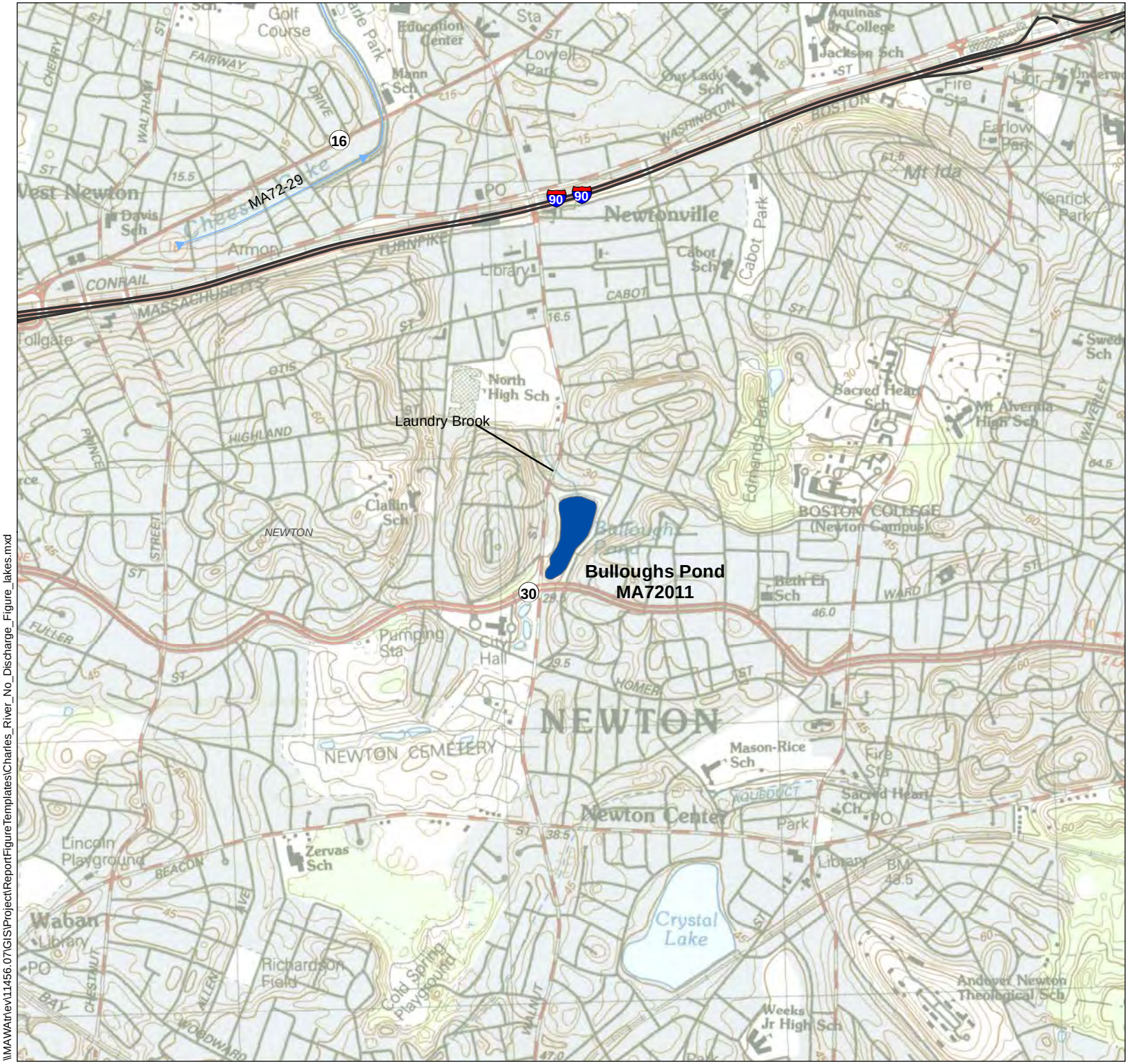
- Water Body Classification: B
- 301 CMR § 4.05 (3)(b) – *Class B. These waters are designed as habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.*
- 314 CMR § 4.05 (5)(c) – *Nutrients. Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses. Human activities that result in the nonpoint*

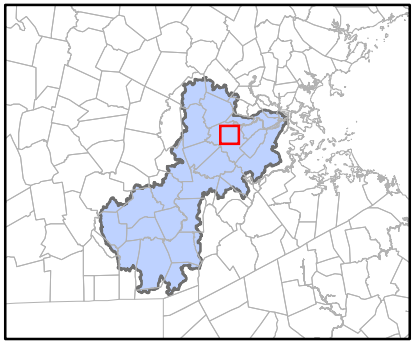
source discharge of nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control.

Site Description

Bulloughs Pond is a 6.9 acre pond in Newton, MA that was formed by the impoundment of Laundry Brook. The Pond is owned by the Commonwealth of Massachusetts and surrounding parkland is controlled by the City of Newton Parks and Recreation Department. The watershed is within an urbanized area that is moderately developed with single- and multi-family residences, and open space (parkland, cemetery).

MassDOT property does not discharge directly to Bulloughs Pond. The Pond is near the intersection of Route 30 and Walnut Street, neither of which are MassDOT roadways (see attached figure). The nearest upgradient MassDOT property is Interstate 90,approximately 0.66 miles north of the Pond. This section of I-90 discharges directly to the Charles River and Cheese Cake Brook.





Assessed Segment

MassDOT Roadways

Impaired Lakes

Impaired Streams

N

0 0.25 0.5 Miles

Bulloughs Pond
MA72011

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division

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Impaired Waters Assessment for Chandler Pond (MA72017)

Impaired Waterbody

Name: Chandler Pond

Location: Boston, MA

Water Body ID: MA72017

Impairments

According to the MassDEP Final Year 2010 Integrated List of Waters, Chandler Pond is listed under Category 5 as impaired for total phosphorus; secchi disk transparency; nutrient/eutrophication biological indicators; and excess algal growth.

Two TMDL reports have been finalized that address the Upper/Middle Charles River, the larger watershed in which this pond is located. The TMDLs that have been finalized are the *Final TMDL for Nutrients in the Upper/Middle Charles River (Control Number (CN) 272.0)* and the *Final Pathogen TMDL for the Charles River Watershed (CN 156.0)*.

The *Charles River Watershed 2002-2006 Water Quality Assessment* Report (MassDEP 2008) identifies the introduction of non-native macrophyte (water chestnut, *Trapa natans*), and stormwater/urban runoff as the main sources of impairments to this pond. The resulting impairments are biological indicators of nutrient enrichment, elevated total phosphorous, and excessive algal growth.

Relevant Water Quality Standards

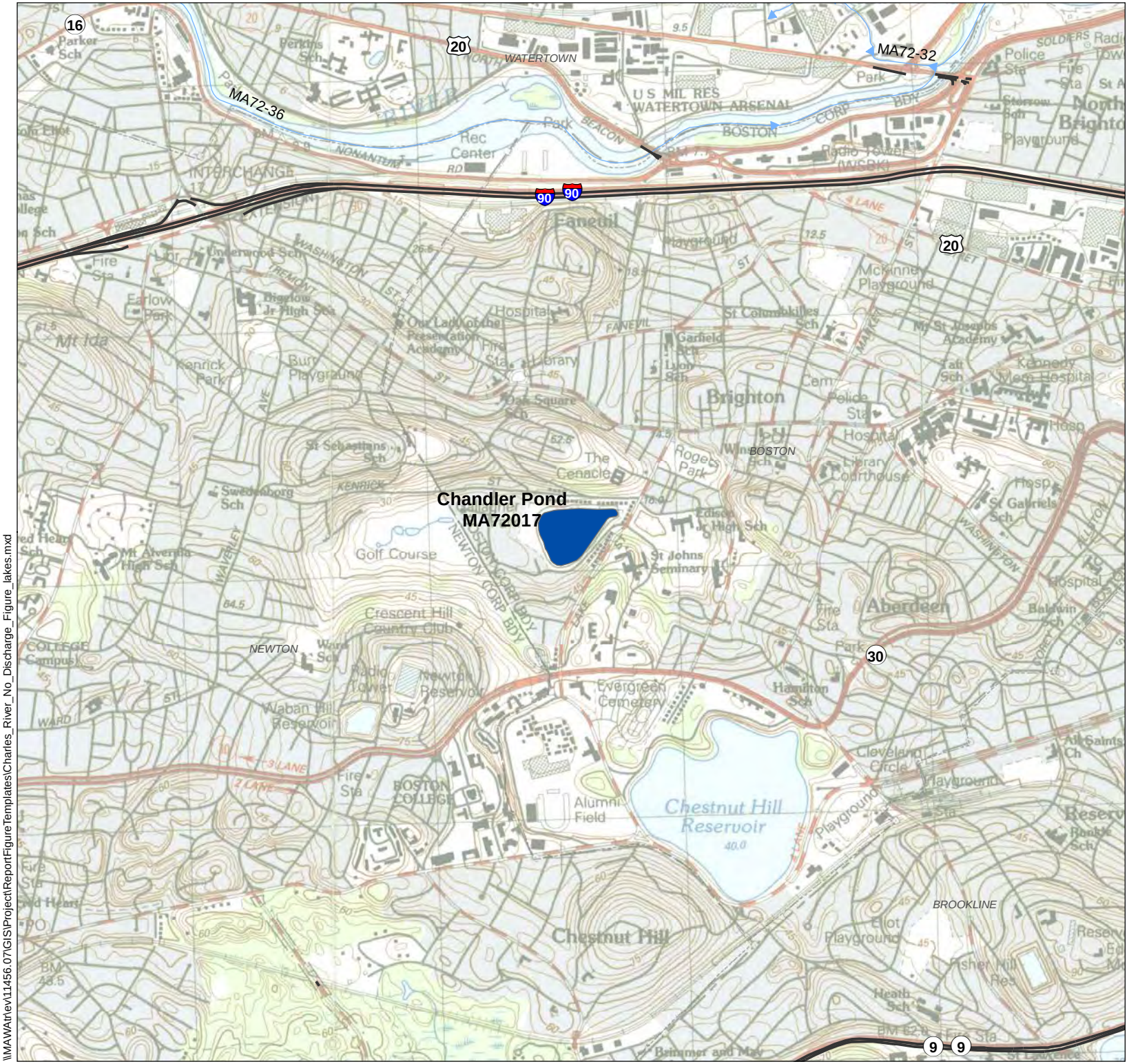
- Water Body Classification: B
- 301 CMR § 4.05 (3)(b) – *Class B. These waters are designed as habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.*
- 314 CMR § 4.05 (3)(b)(5) – *Solids. These waters shall be free from floating, suspended and settleable solids in concentrations or combinations that would impair any use assigned to this class, that would cause aesthetically objectionable conditions, or that would impair the benthic biota or degrade the chemical composition of the bottom.*
- 314 CMR § 4.05 (5)(a) – *Aesthetics. All surface waters shall be free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life.*
- 314 CMR § 4.05 (5)(c) – *Nutrients. Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of*

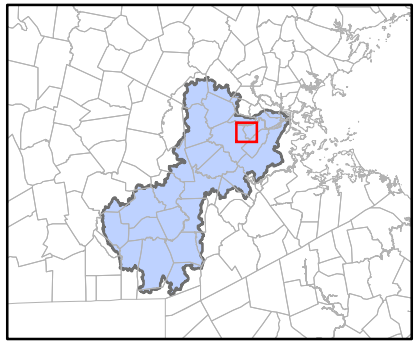
existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses. Human activities that result in the nonpoint source discharge of nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control.

Site Description

Chandler Pond is an 11.4 acre pond in the Brighton section of Boston and owned by the Boston Department of Parks and Recreation. The Pond is an impoundment that was originally created for ice making. The watershed is within an urbanized area that is moderately developed with single- and multi-family residences, open space (parkland and golf course), and institutional properties.

MassDOT property does not discharge directly to Chandler Pond (see attached figure). The nearest up-gradient MassDOT property is a segment of Interstate 90 approximately 0.75 miles north of the Pond. Stormwater runoff from this section of I-90 discharges to the Charles River. Route 9 is approximately 1.4 miles south of the Pond. Neither of these MassDOT roadways discharge directly to the Pond.





Assessed Segment

MassDOT Roadways

Impaired Lakes

Impaired Streams

N

0 0.25 0.5 Miles

Chandler Pond
MA72017

June 2012

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Massachusetts Department of Transportation
Highway Division

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Impaired Waters Assessment for Jamaica Pond (MA72052)

Impaired Waterbody

Name: Jamaica Pond

Location: Boston, MA

Water Body ID: MA72052

Impairments

According to the MassDEP Final Year 2010 Integrated List of Waters, Jamaica Pond is listed under Category 5 as impaired for total phosphorous and dissolved oxygen. Jamaica Pond is included in the *Final TMDL for Nutrients in the Lower Charles River (Control Number (CN) 301.0)* which addresses both the total phosphorous and dissolved oxygen impairments.

In addition, a pathogen TMDL report has been finalized that address the Lower Charles River, which receives flow from this pond via the Muddy River (*Final Pathogen TMDL for the Charles River Watershed (CN 0156.0)*).

The *Charles River Watershed 2002-2006 Water Quality Assessment* Report (MassDEP 2008) indicates that aquatic life is impaired due to the low dissolved oxygen and elevated total phosphorous concentrations. Fish consumption and primary contact uses were not assessed due to a lack of bacteria (pathogen) data. Secondary contact and aesthetic uses were determined to be supported. The Report cites results from earlier studies that identified nutrient cycling from bottom sediments as the source of the impairment and recommends that a management plan or TMDL be developed to control nutrient inputs from other sources.

Relevant Water Quality Standards

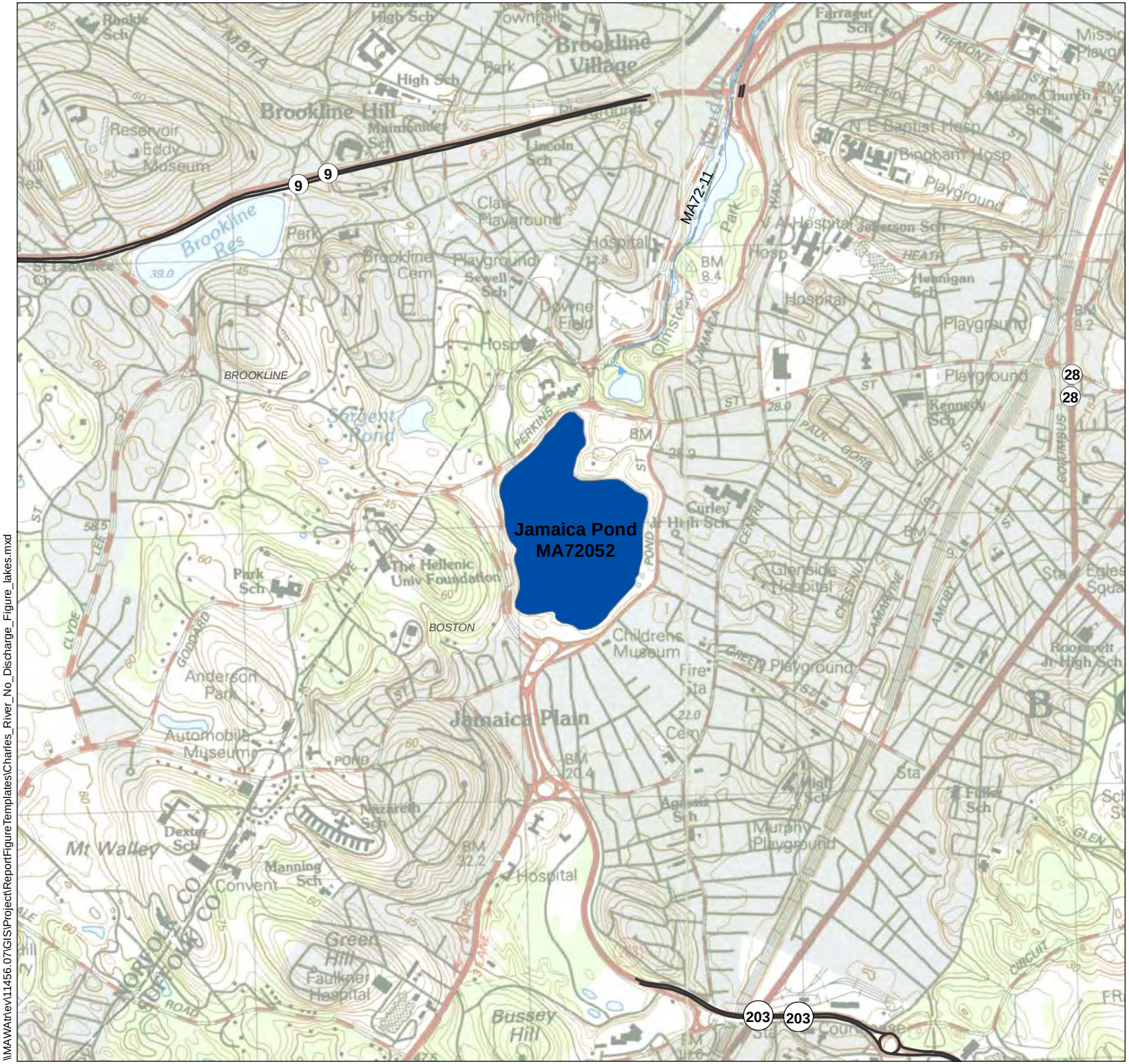
- Water Body Classification: B
- 301 CMR § 4.05 (3)(b) – *Class B. These waters are designed as habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.*
- 314 CMR § 4.05 (3)(b)(1) – *Dissolved Oxygen. a. Shall not be less than 6.0 mg/l in cold water fisheries and not less than 5.0 mg/l in warm water fisheries. Where natural background conditions are lower, DO shall not be less than natural background conditions. Natural seasonal and daily variations that are necessary to protect existing and designated uses shall be maintained.*
- 314 CMR § 4.05 (5)(c) – *Nutrients. Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a*

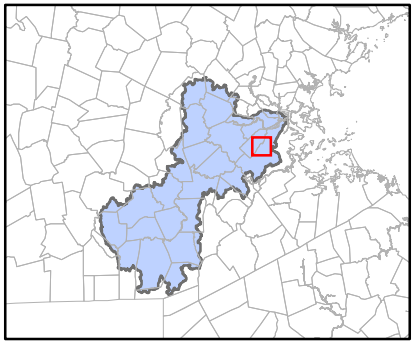
TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses. Human activities that result in the nonpoint source discharge of nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control.

Site Description

Jamaica Pond is a 66.7 acre pond located in Boston, Massachusetts (see attached figure). It is a kettle pond and the headwater of Muddy River.

MassDOT property does not discharge directly to Jamaica Pond. MassDOT owns a portion of Monsignor Casey Highway (Route 203), approximately 0.8 miles southeast of Jamaica Pond, which discharges to the adjoining wetlands in the Arnold Arboretum. MassDOT also owns a portion of Boylston Street (Route 9) in Brookline and Boston, which discharges to the Muddy River.





Assessed Segment

MassDOT Roadways

Impaired Lakes

Impaired Streams

N

0 0.25 0.5 Miles

Jamaica Pond
MA72052

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division

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Impaired Waters Assessment for Charles River (MA72-05)

Impaired Waterbody

Name: Charles River

Location: Dover, Medfield, Medway, Millis, Natick, Norfolk, and Sherborn, MA

Water Body ID: MA72-05

Impairments

According to the MassDEP Final Year 2010 Integrated List of Waters, this segment of the Charles River is listed under Category 5 as impaired for DDT; aquatic macroinvertebrate bioassessments; mercury in fish tissue; non-native aquatic plants, total phosphorus, turbidity, dissolved oxygen, nutrient/eutrophication biological indicators, excess algal growth, and chlordane.

Two TMDL reports have been finalized that address the Upper/Middle Charles River, which includes this segment. Those reports include:

- *Final Nutrient TMDL Report for the Upper/Middle Charles River (Control Number (CN) 272.0)* addressing the following impairments: total phosphorus; turbidity; dissolved oxygen; nutrient/eutrophication biological indicators; excess algal growth; and dissolved oxygen saturation.
- *Final Pathogen TMDL Report for the Charles River Watershed (CN 0156.0).* (Although not impaired for pathogens, this segment is covered by the TMDL).

The *Charles River Watershed 2002-2006 Water Quality Assessment Report* (MassDEP, 2008) lists discharges from municipal NPDES discharges (waste water treatment plants), nonpoint sources, and internal nutrient recycling among the main sources of impairments to this segment. Other sources of impairments in the subwatershed include atmospheric deposition of contaminants.

Relevant Water Quality Standards

- Water Body Classification: B, Warm Water Fishery

- 301 CMR § 4.05 (3)(b) – *Class B. These waters are designed as habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.*

- 314 CMR § 4.05 (3)(b)(1) – *Dissolved Oxygen. a. Shall not be less than 6.0 mg/l in cold water fisheries and not less than 5.0 mg/l in warm water fisheries. Where natural background conditions are lower, DO shall not be less than natural background conditions. Natural seasonal and daily variations that are necessary to protect existing and designated uses shall be maintained.*

- 314 CMR § 4.05 (3)(b)(6) – *Color and Turbidity. These waters shall be free from color and turbidity in concentrations or combinations that are aesthetically objectionable or would impair any use assigned to this class.*

- 314 CMR § 4.05 (5)(a) – *Aesthetics. All surface waters shall be free from pollutants in concentrations or combinations that settle to form objectionable deposits; float as debris, scum or other matter to form nuisances; produce objectionable odor, color, taste or turbidity; or produce undesirable or nuisance species of aquatic life.*

- 314 CMR § 4.05 (5)(c) – *Nutrients. Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses. Human activities that result in the nonpoint source discharge of nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control.*

- 314 CMR § 4.05 (5)(e) - *Toxic Pollutants. All surface waters shall be free from pollutants in concentrations or combinations that are toxic to humans, aquatic life or wildlife. For pollutants not otherwise listed in 314 CMR 4.00, the National Recommended Water Quality Criteria: 2002, EPA 822R-02-047, November 2002 published by EPA pursuant to Section 304(a) of the Federal Water Pollution Control Act, are the allowable receiving water concentrations for the affected waters, unless the Department either establishes a site specific criterion or determines that naturally occurring background concentrations are higher. Where the Department determines that naturally occurring background concentrations are higher, those concentrations shall be the allowable receiving water concentrations. The Department shall use the water quality criteria for the protection of aquatic life expressed in terms of the dissolved fraction of metals when EPA's 304(a) recommended criteria provide for use of the dissolved fraction. The EPA recommended criteria based on total recoverable metals shall be converted to dissolved metals using EPA's published conversion factors. Permit limits will be written in terms of total recoverable metals. Translation from dissolved metals criteria to total recoverable metals permit limits will be based on EPA's conversion factors or other methods approved by the Department. The Department may establish site specific criteria for toxic pollutants based on site specific considerations.*

Summary

MassDOT has assessed stormwater discharges from MassDOT properties to the Charles River using BMP 7R in order to address the Phosphorus and Pathogen TMDLs. MassDOT determined that the water body impairments for the Charles River segment MA72-05 not covered by a TMDL are not related to stormwater runoff. Specific impairments unrelated to stormwater for this segment of the Charles River include DDT; aquatic macroinvertebrate bioassessments; mercury in fish tissue; chlordane, and non-native aquatic plants. MassDOT has not included these impairments in this assessment as they are not caused by stormwater runoff.

Based on this review, it was determined that the MassDOT contribution to the impairments of the Charles River covered by the Phosphorus and Pathogen TMDLs are *de minimus* and no further review is warranted. See the Conclusions section of this assessment for more information.

Site Description

The subject segment is an 18.1-mile segment of the Charles River extending from the outlet of Populatic Pond in Norfolk/Medway to the South Natick Dam in Natick. According to the *2002-2006 Water Quality Assessment Report*, the estimated percent of impervious cover (IC) for this subwatershed is 10.4% and the primary land uses of the 155.9 square mile subwatershed include forest (47%), residential (30%), and open land (7%).

MassDOT owns three bridges which cross this segment of the Charles River (see Figure 1). These three bridges are the only MassDOT-owned property discharging directly to this segment of the Charles River and include:

- Norfolk Road over the Charles River in Millis;
- Main Street (Route 109) over the Charles River between Millis and Medfield; and
- South Main Street (Route 27) over the Charles River between Sherborn and Medfield.

At each of these locations, MassDOT owns only the bridge and minimal to no property surrounding the bridge. The approach roadways are owned and operated by the respective towns. No closed drainage systems exist on the bridge structures; however, the bridges are curbed. Stormwater is contained on the roadway for the length of the bridge spans and then flows overland to adjacent wetlands or directly into the Charles River. No existing stormwater best management practices (BMPs) are installed at these locations to treat stormwater discharges from the MassDOT-owned bridges.

Assessment under BMP 7R for Impairments addressed by Phosphorus TMDL (CN 272.0)

The *Total Maximum Daily Load for Nutrients in the Upper/Middle Charles River, Massachusetts (CN 272.0)* addresses the dissolved oxygen, dissolved oxygen saturation, excess algal growth, nutrient/eutrophication biological indicators, phosphorus, and turbidity impairments for this water body. Therefore, MassDOT assessed the contribution of phosphorus from MassDOT urban areas to this water body using the approach described in BMP 7R (TMDL Watershed Review).

Pollutant of Concern: Phosphorus

1) Impairment Addressed: dissolved oxygen, dissolved oxygen saturation, excess algal growth, nutrient/eutrophication biological indicators, phosphorus, turbidity

2) Applicable Waste Load Allocation (WLA): See Table ES-3 Phase III Final Report.

    a) Description of Associated Land Use: Transportation

    b) Transportation Land Use Current Load (TP): 2,167 kilograms per year (kg/yr)

    c) Transportation Land Use WLA (TP): 759 kg/yr

d) Commercial/Industrial/Transportation Area in Watershed: 15.9 square miles or 5.9% (reported in Phase III Calibration Report Table 5. Transportation not separated from Commercial/Industrial during TMDL analysis)

e) Commercial/Industrial/Transportation Land Use Areal WLA: 0.72 kilograms per hectare per year (kg/ha/yr) (0.64 pounds per acre per year (lbs/ac/yr)) (calculated)

3) Applicable Recommendations: Section 7.2 Phase III Final Report

a) Management of Stormwater systems - Page 83 Phase III Final Report

i) "Comprehensive programs will be necessary to achieve the phosphorus reduction and water quality goals of this TMDL. Programs should build upon existing stormwater management to accomplish the following tasks:

(1) characterize the drainage areas that contribute to discharges requiring permit coverage under the Permittee's jurisdiction

(2) implement a comprehensive Illicit Discharge Detection and Elimination (IDDE) program

(3) prioritize source areas for stormwater management and control

(4) identify site-specific and regional opportunities for implementation of BMPs

(5) include the necessary structural and non-structural BMPs that, upon implementation, will achieve reductions in phosphorus loadings from the NPDES covered drainage areas that are consistent with the phosphorus load reductions identified in this TMDL

ii) Management of illicit discharges to stormwater drainage systems"

For the BMP 7R Phosphorus Assessment, MassDOT estimated the median annual load of total phosphorus from its impervious area as 1.6 lbs/acre/year. This loading rate is based on data collected in a study of stormwater runoff conducted by the United States Geological Survey (USGS) (Smith and Granato, 2010). The study analyzed stormwater samples from 12 sites located on highways operated by MassDOT across Massachusetts between September 2005 and September 2007.

The following table summarizes the median annual phosphorus load for the MassDOT directly contributing watershed discharging to the Charles River for existing conditions.

Annual Watershed Phosphorus Loading under Existing Conditions

Watershed/ BMP ID	Watershed Size (Acres)	Pre- BMP Annual Load (pounds/year)	Post-BMP Annual Load (pounds/year)	Estimated Annual Removal Efficiency
Total Directly Contributing MassDOT Watershed	0.28	0.45	0.45	0%

The load from the MassDOT directly contributing watershed is approximately 0.45 pounds of phosphorus per year. There are currently no BMPs in place to treat this runoff. Based on the TMDL, MassDOT's WLA is 0.72 kg/ha/yr (0.64 lbs/ac/yr) or 0.18 pounds of phosphorus per year for MassDOT's directly contributing watershed.

Assessment and Mitigation Plan

The MassDOT directly contributing watershed consists of three bridges crossing the Charles River. The total phosphorus load from these bridges is 0.45 lbs/yr. This load is higher than the TMDL WLA of 0.18 lbs/yr.

As outlined in the TMDL, the current total phosphorus load from transportation land uses in the Upper/Middle Charles River Watershed is 4,777 lbs/yr (2,167 kg/yr). The current phosphorus load of the MassDOT directly contributing area is 0.45 lbs/year, or 0.009% of the total transportation annual phosphorus load for the watershed. The WLA for MassDOT's directly contributing watershed (0.18 lbs/yr) represents 0.01% of the Upper/Middle Charles River Watershed WLA (1,673 lbs/yr).

Based on the small relative annual load of phosphorus from the MassDOT total contributing watershed, MassDOT determined that no BMPs are warranted to treat stormwater directly discharging from its property to the Charles River (MA72-05). Constructing retrofit BMPs to treat the stormwater discharging directly from MassDOT properties would be cost prohibitive given the relatively small annual phosphorus load the BMPs would treat.

Assessment under BMP 7R for Pathogens

The *Pathogen Total Maximum Daily Load (TMDL) for the Charles River Watershed (CN 0156.0)* covers this segment of the Charles River. The TMDL states that sources of indicator bacteria in the Charles River Watershed were found to be many and varied. The TMDL lists sources as failing septic systems, combined sewer overflows (CSO), sanitary sewer overflows (SSO), sewer pipes connected to storm drains, certain recreational activities, wildlife including birds along with domestic pets and animals, and direct overland stormwater runoff.

In addition, as stated on page 12 of the TMDL, *Many of the impacts associated with increased impervious surface area also result in changes in pathogen loading (e.g., increased sediment loading can result in increased pathogen loading). In addition to increased impervious surface impacts, increased human and pet densities in developed areas increase potential fecal contamination. Furthermore, stormwater drainage systems and associated stormwater culverts and outfall pipes often result in the channelization of streams which leads to less attenuation of pathogen pollution.*

Pathogen concentrations in stormwater vary widely temporally and spatially; concentrations can vary by orders of magnitude within a given storm event (MassDEP, 2009). Therefore, it is difficult to predict stormwater pathogen concentrations with accuracy. Due to this difficulty, MassDOT is not conducting site specific assessments of loading at each location impaired for pathogens as part of this Retrofit Program. However, MassDOT recognizes that its roadways, especially in urbanized areas, contribute to the pathogen impairment of the Charles River Watershed and has performed a general assessment and developed a mitigation plan as described below.

BMP 7R Pathogens Assessment

Pathogen loadings are highly variable and, as a result, quantitative assessments are challenging and of little value. Therefore, MassDOT has reviewed its existing programs and their consistency with the Pathogen TMDL for the Charles River Watershed recommendations as well as the draft EPA National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit requirements for the North Coastal Watershed.

The Pathogen TMDL for the Charles River Watershed recognizes that mitigation for pathogen impairments is difficult to address and emphasizes the need for an iterative adaptive management approach. The Executive Summary of the TMDL, page xi, states:

> *TMDL implementation to achieve [the pathogen reduction goals] should be an iterative process with selection and implementation of mitigation measures followed by monitoring to determine the extent of water quality improvement realized. Recommended TMDL implementation measures include identification and elimination of prohibited sources such as leaky or improperly connected sanitary sewer flows and best management practices to mitigate stormwater runoff volume.*

The existing NPDES MS4 permit that covers MassDOT stormwater discharges does not provide guidance on what measures are necessary to comply with the Pathogen TMDL for the Charles River Watershed. The fact sheet for the draft permit for MS4 stormwater discharges for the North Coastal Watershed contains some guidance on what measures EPA has determined necessary to be consistent with the Pathogen TMDL for the Charles River Watershed. Page 36 of the fact sheet states:

> *Instead of a numeric limitation for bacteria, the draft permit includes requirements for MS4s to provide education to pet owners and owners of septic systems, to implement a comprehensive illicit discharge detection and elimination program that addresses not only sources of pathogens but also sources of phosphorus, and to implement programs to address water fowl. In addition, although entitled "Phosphorus Control Plan" most of the actions needed to develop and implement a successful PCP are also effective in supporting the achievement of the WLA for the Charles River pathogen TMDL.*

As discussed above, both the Pathogen TMDL for the Charles River Watershed and the draft North Coastal Watershed MS4 permit state that identification of illicit discharges and addressing stormwater volumes and pollutants, such as phosphorus, are the best approaches to mitigate the pathogen impairments. MassDOT has developed a mitigation plan, described below, to address the pathogen impairments using guidance from these two documents.

BMP 7R Pathogens Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing Stormwater Management Plan (SWMP) including educational programs, illicit connection review, and source control. The specific non-structural BMPs that can help reduce potential pathogen loading in the current SWMP include:

- BMP 3C-1: Drainage Connection Policy
- BMP 3C-2: Drainage Tie-In Standard Operating Procedure
- BMP 3D: Illicit Discharge Detection Review
- BMP 5H-1: Post Construction Runoff Enforcement – Illicit Discharge Prohibition
- BMP 5H-2: Post Construction Runoff Enforcement – Drainage Tie-In
- BMP 5H-3: Post Construction Runoff Enforcement – Offsite Pollution to MassHighway Drainage System
- BMP 6A-1: Source Control – 511 Program
- BMP 6A-2: Source Control – Adopt-A-Highway Program
- BMP 6C-1: Maintenance Program

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MassDOT is reviewing the Charles River Basin as an entire watershed and has committed to constructing stormwater BMP retrofit projects to address impaired waters. During the assessment phase of the Impaired Waters Program, MassDOT has focused on directly contributing areas and identified BMPs that can be constructed entirely on MassDOT property without resulting in substantial wetland impacts or result in an adverse impact on historical or archeological resources. Projects that meet these requirements can utilize the Federal Highway Administration's Alternative Contracting mechanism (SEP-14) created for this program. MassDOT will advance designs for BMPs where practicable in the watershed above and beyond the target mitigation to compensate for areas like these, where site constraints prohibit BMPs.

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As an overall program, MassDOT will re-evaluate the potential need for structural BMPs to address pollutant loading when roadwork is conducted as programmed projects for the area. Further work by MassDOT on programmed projects, which often include broader scale road layout changes, may provide additional opportunities for construction of new treatment BMPs. This is consistent with an iterative adaptive management approach to address impairments. MassDOT will include an update in annual reports and biannual submittals to EPA regarding progress made towards meeting target IC reductions, plans for construction of proposed BMPs and finalized assessments including reduction achieved by finalized BMP designs. Furthermore, MassDOT will continue to implement non-structural BMPs that reduce the impacts of stormwater.

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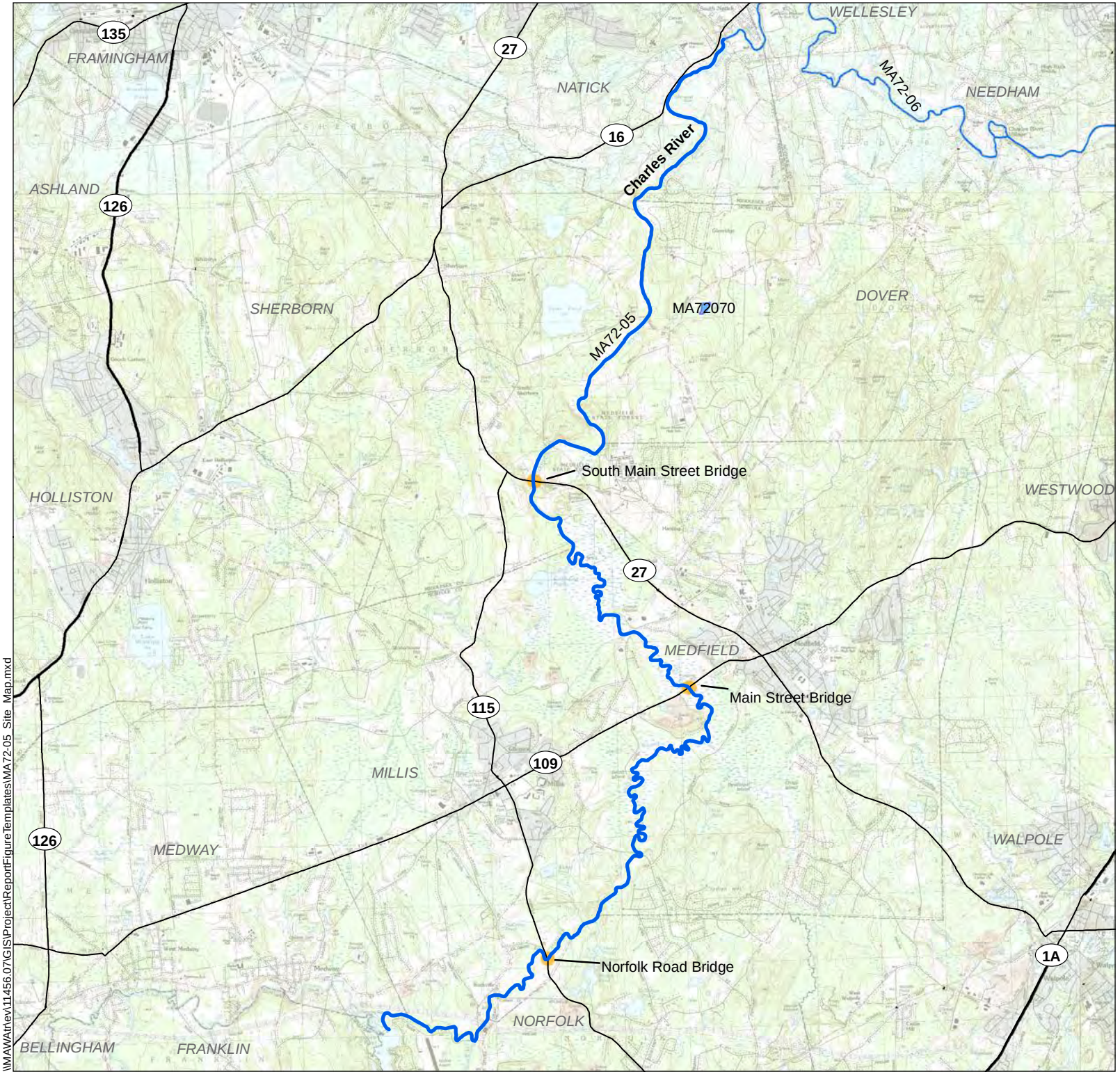

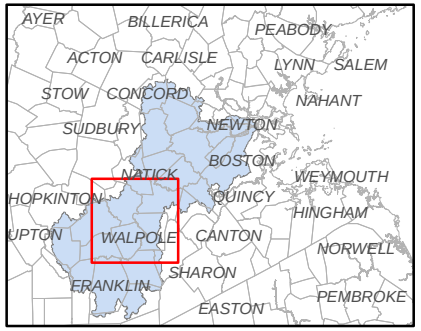

MassDOT Directly Discharging Watershed

MassDOT Roadways

Impaired Waters

Impaired Streams

N

0 0.5 1 2 Miles

Figure 1
Locus Map

Charles River
MA72-05

June 2012

massDOT
Massachusetts Department of Transportation
Highway Division

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Impaired Waters Assessment for Fuller Brook (MA72-18)

Impaired Waterbody

Name: Fuller Brook

Location: Needham and Wellesley, MA

Water Body ID: MA72-18

Impairments

According to the MassDEP Final Year 2010 Integrated List of Waters, Fuller Brook is listed under Category 5 as impaired for sedimentation/siltation, physical substrate habitat alterations, Escherichia coli, and nutrient/eutrophication biological indicators.

Two TMDL reports have been finalized that address the Upper/Middle Charles River, which includes Fuller Brook.

- *Final TMDL for Nutrients in the Upper/Middle Charles River (Control Number (CN) 272.0),* addressing the nutrient/eutrophication biological indicators impairment.
- *Final Pathogen TMDL Reports for the Charles River Watershed (CN 0156.0),* addressing the Escherichia coli impairment.

The *Charles River Watershed 2002-2006 Water Quality Assessment* Report identifies discharges from municipal separate storm sewer systems and post-development erosion and sedimentation as the main sources of impairments to this subwatershed. Other sources of impairments in the subwatershed include loss of riparian habitat and waterfowl.

Relevant Water Quality Standards

- Water Body Classification: B
- 301 CMR § 4.05 (3)(b) – *Class B. These waters are designed as habitat for fish, other aquatic life, and wildlife, including for their reproduction, migration, growth, and other critical functions, and for primary and secondary contact recreation. Where designated in 314 CMR 4.06, they shall be suitable as a source of public water supply with appropriate treatment ("Treated Water Supply"). Class B waters shall be suitable for irrigation and other agricultural uses and for compatible industrial cooling and process uses. These waters shall have consistently good aesthetic value.*
- 314 CMR § 4.05 (3)(b)(4) – *Bacteria.*
  a. At bathing beaches as defined by the Massachusetts Department of Public Health in 105 CMR 445.010: where E. coli is the chosen indicator, the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 126 colonies per 100 ml and no single sample taken during the bathing season shall exceed 235 colonies per 100 ml; alternatively, where enterococci are the chosen indicator, the geometric mean of the five most recent samples taken during the same bathing season shall not exceed 33 colonies per 100 ml and no single sample taken during the bathing season shall exceed 61 colonies per 100 ml;

b. for other waters and, during the non bathing season, for waters at bathing beaches as defined by the Massachusetts Department of Public Health in 105 CMR 445.010: the geometric mean of all E. coli samples taken within the most recent six months shall not exceed 126 colonies per 100 ml typically based on a minimum of five samples and no single sample shall exceed 235 colonies per 100 ml; alternatively, the geometric mean of all enterococci samples taken within the most recent six months shall not exceed 33 colonies per 100 ml typically based on a minimum of five samples and no single sample shall exceed 61 colonies per 100 ml. These criteria may be applied on a seasonal basis at the discretion of the Department;

- 314 CMR § 4.05 (3)(b)(5) – *Solids. These waters shall be free from floating, suspended and settleable solids in concentrations or combinations that would impair any use assigned to this class, that would cause aesthetically objectionable conditions, or that would impair the benthic biota or degrade the chemical composition of the bottom.*
- 314 CMR § 4.05 (5)(b) – *Bottom Pollutants or Alterations. All surface waters shall be free from pollutants in concentrations or combinations or from alterations that adversely affect the physical or chemical nature of the bottom, interfere with the propagation of fish or shellfish, or adversely affect populations of non-mobile or sessile benthic organisms.*
- 314 CMR § 4.05 (5)(c) – *Nutrients. Unless naturally occurring, all surface waters shall be free from nutrients in concentrations that would cause or contribute to impairment of existing or designated uses and shall not exceed the site specific criteria developed in a TMDL or as otherwise established by the Department pursuant to 314 CMR 4.00. Any existing point source discharge containing nutrients in concentrations that would cause or contribute to cultural eutrophication, including the excessive growth of aquatic plants or algae, in any surface water shall be provided with the most appropriate treatment as determined by the Department, including, where necessary, highest and best practical treatment (HBPT) for POTWs and BAT for non POTWs, to remove such nutrients to ensure protection of existing and designated uses. Human activities that result in the nonpoint source discharge of nutrients to any surface water may be required to be provided with cost effective and reasonable best management practices for nonpoint source control.*

Summary

MassDOT has assessed stormwater discharges from MassDOT properties to the Charles River using BMP 7R in order to address the Phosphorus and Pathogen TMDLs and BMP 7U to address impairments not addressed by the TMDLs.

Based on this review, it was determined that the MassDOT contribution to the stormwater-related impairments of Fuller Brook are *de minimus* and no further review is required. See the Conclusions section of this assessment for more information.

Site Description

Fuller Brook is located within Needham and Wellesley, Massachusetts. Fuller Brook flows westerly from its headwaters south of Route 135 in Needham to its confluence with Waban Brook (MA72-17) in Wellesley. Waban Brook flows into the Charles River just north of the Wellesley/Needham line. According to the *2002-2006 Water Quality Assessment Report*, the estimated percent impervious cover for this subwatershed is 15.3% and the primary land uses of the 5.3 square mile subwatershed are residential (55%), forest (24%), and open land (13%).

Two bridges near Fuller Brook, Crest Road over the CSX and MBTA railroad (Bridge No. W-13-009) and Kingsbury Street over the CSX and MBTA railroad (Bridge No. W-13-008), are owned by

MassDOT. MassDOT does not own the surrounding property or roadways. The Crest Road bridge and the Kingsbury Street bridge are approximately 1,800 feet and 800 feet from Fuller Brook, respectively. These two bridges were reconstructed by MassDOT (then MassHighway) in 1994 (MassDOT Project # 036490).

Both bridges are curbed and stormwater from the bridges flows into catch basins in the approach roadways. The catch basins are connected to the closed municipal storm system that may discharge to Fuller Brook.

Assessment under BMP 7R for Impairments addressed by Phosphorus TMDL (CN 272.0)

The *Total Maximum Daily Load for Nutrients in the Upper/Middle Charles River, Massachusetts (CN 272.0)* addresses the nutrient/eutrophication biological indicators impairment for this water body. Therefore, MassDOT assessed the contribution of phosphorus from MassDOT urban areas to this water body using the approach described in BMP 7R (TMDL Watershed Review).

Pollutant of Concern: Phosphorus

1) Impairment Addressed: dissolved oxygen, dissolved oxygen saturation, excess algal growth, nutrient/eutrophication biological indicators, phosphorus, turbidity

2) Applicable Waste Load Allocation (WLA): See Table ES-3 Phase III Final Report.

    a) Description of Associated Land Use: Transportation

    b) Transportation Land Use Current Load (TP): 2,167 kilograms per year (kg/yr)

    c) Transportation Land Use WLA (TP): 759 kg/yr

    d) Commercial/Industrial/Transportation Area in Watershed: 15.9 square miles or 5.9% (reported in Phase III Calibration Report Table 5. Transportation not separated from Commercial/Industrial during TMDL analysis)

    e) Commercial/Industrial/Transportation Land Use Areal WLA: 0.72 kilograms per hectare per year (kg/ha/yr) (0.64 pounds per acre per year (lbs/ac/yr)) (calculated)

3) Applicable Recommendations: Section 7.2 Phase III Final Report

    a) Management of Stormwater systems - Page 83 Phase III Final Report

        i) "Comprehensive programs will be necessary to achieve the phosphorus reduction and water quality goals of this TMDL. Programs should build upon existing stormwater management to accomplish the following tasks:

            (1) characterize the drainage areas that contribute to discharges requiring permit coverage under the Permittee's jurisdiction

            (2) implement a comprehensive Illicit Discharge Detection and Elimination (IDDE) program

            (3) prioritize source areas for stormwater management and control

(4) identify site-specific and regional opportunities for implementation of BMPs

(5) include the necessary structural and non-structural BMPs that, upon implementation, will achieve reductions in phosphorus loadings from the NPDES covered drainage areas that are consistent with the phosphorus load reductions identified in this TMDL

ii) Management of illicit discharges to stormwater drainage systems"

For the BMP 7R Phosphorus Assessment, MassDOT estimated the annual load of total phosphorus from its 0.16 acres of impervious area likely discharging to Fuller Brook as 0.26 lbs/ac/yr. This loading rate is based on data collected in a study of stormwater runoff conducted by the United States Geological Survey (USGS) (Smith and Granato, 2010). The study analyzed stormwater samples from 12 sites located on highways operated by MassDOT across Massachusetts between September 2005 and September 2007.

There are currently no BMPs in place to treat this runoff. Based on the TMDL, MassDOT's WLA is 0.72 kg/ha/yr (0.64 lbs/ac/yr) or 0.10 pounds of phosphorus per year for MassDOT's contributing watershed.

Assessment and Mitigation Plan

The MassDOT directly contributing watershed consists of the Crest Road and Kingsbury Street bridges with a total phosphorus load of 0.26 lbs/year. This load is higher than the TMDL WLA of 0.10 lbs/yr.

As outlined in the TMDL, the current total phosphorus load from transportation land uses in the Upper/Middle Charles River Watershed is 4,777 lbs/yr (2,167 kg/yr). The current phosphorus load of the MassDOT directly contributing area is 0.26 lbs/year, or 0.005% of the total transportation phosphorus load for the watershed. The WLA for MassDOT's directly contributing watershed (0.10 lbs/yr) represents 0.006% of the Upper/Middle Charles River Watershed WLA (1,673 lbs/yr). Although not all Fuller Brook impairments are covered by the TMDL, the relatively small impact demonstrated by the phosphorus loading calculations show that MassDOT's stormwater impact is minimal.

Based on the small relative phosphorus load from the MassDOT total contributing watershed, MassDOT determined that no BMPs are warranted to treat stormwater from the two bridges that may discharge to Fuller Brook. Constructing retrofit BMPs to treat the stormwater from these MassDOT properties would be cost prohibitive given the relatively small phosphorus load the BMPs would treat.

Assessment under BMP 7R for Pathogens

The *Pathogen Total Maximum Daily Load (TMDL) for the Charles River Watershed (CN 0156.0)* covers this segment of the Charles River. The TMDL states that sources of indicator bacteria in the Charles River Watershed were found to be many and varied. The TMDL lists sources as failing septic systems, combined sewer overflows (CSO), sanitary sewer overflows (SSO), sewer pipes connected to storm drains, certain recreational activities, wildlife including birds along with domestic pets and animals, and direct overland stormwater runoff.

In addition, as stated on page 12 of the TMDL, *Many of the impacts associated with increased impervious surface area also result in changes in pathogen loading (e.g., increased sediment loading can result in increased pathogen loading). In addition to increased impervious surface*

impacts, increased human and pet densities in developed areas increase potential fecal contamination. Furthermore, stormwater drainage systems and associated stormwater culverts and outfall pipes often result in the channelization of streams which leads to less attenuation of pathogen pollution.

Pathogen concentrations in stormwater vary widely temporally and spatially; concentrations can vary by orders of magnitude within a given storm event (MassDEP, 2009). Therefore, it is difficult to predict stormwater pathogen concentrations with accuracy. Due to this difficulty, MassDOT is not conducting site specific assessments of loading at each location impaired for pathogens as part of this Retrofit Program. However, MassDOT recognizes that its roadways, especially in urbanized areas, contribute to the pathogen impairment of the Charles River Watershed and has performed a general assessment and developed a mitigation plan as described below.

BMP 7R Pathogens Assessment

Pathogen loadings are highly variable and, as a result, quantitative assessments are challenging and of little value. Therefore, MassDOT has reviewed its existing programs and their consistency with the Pathogen TMDL for the Charles River Watershed recommendations as well as the draft EPA National Pollution Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit requirements for the North Coastal Watershed.

The Pathogen TMDL for the Charles River Watershed recognizes that mitigation for pathogen impairments is difficult to address and emphasizes the need for an iterative adaptive management approach. The Executive Summary of the TMDL, page xi, states:

> *TMDL implementation to achieve [the pathogen reduction goals] should be an iterative process with selection and implementation of mitigation measures followed by monitoring to determine the extent of water quality improvement realized. Recommended TMDL implementation measures include identification and elimination of prohibited sources such as leaky or improperly connected sanitary sewer flows and best management practices to mitigate stormwater runoff volume.*

The existing NPDES MS4 permit that covers MassDOT stormwater discharges does not provide guidance on what measures are necessary to comply with the Pathogen TMDL for the Charles River Watershed. The fact sheet for the draft permit for MS4 stormwater discharges for the North Coastal Watershed contains some guidance on what measures EPA has determined necessary to be consistent with the Pathogen TMDL for the Charles River Watershed. Page 36 of the fact sheet states:

> *Instead of a numeric limitation for bacteria, the draft permit includes requirements for MS4s to provide education to pet owners and owners of septic systems, to implement a comprehensive illicit discharge detection and elimination program that addresses not only sources of pathogens but also sources of phosphorus, and to implement programs to address water fowl. In addition, although entitled "Phosphorus Control Plan" most of the actions needed to develop and implement a successful PCP are also effective in supporting the achievement of the WLA for the Charles River pathogen TMDL.*

As discussed above, both the Pathogen TMDL for the Charles River Watershed and the draft North Coastal Watershed MS4 permit state that identification of illicit discharges and addressing stormwater volumes and pollutants, such as phosphorus, are the best approaches to mitigate the pathogen impairments. MassDOT has developed a mitigation plan, described below, to address the pathogen impairments using guidance from these two documents.

BMP 7R Pathogens Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing Stormwater Management Plan (SWMP) including educational programs, illicit connection review, and source control. The specific non-structural BMPs that can help reduce potential pathogen loading in the current SWMP include:

- BMP 3C-1: Drainage Connection Policy
- BMP 3C-2: Drainage Tie-In Standard Operating Procedure
- BMP 3D: Illicit Discharge Detection Review
- BMP 5H-1: Post Construction Runoff Enforcement – Illicit Discharge Prohibition
- BMP 5H-2: Post Construction Runoff Enforcement – Drainage Tie-In
- BMP 5H-3: Post Construction Runoff Enforcement – Offsite Pollution to MassHighway Drainage System
- BMP 6A-1: Source Control – 511 Program
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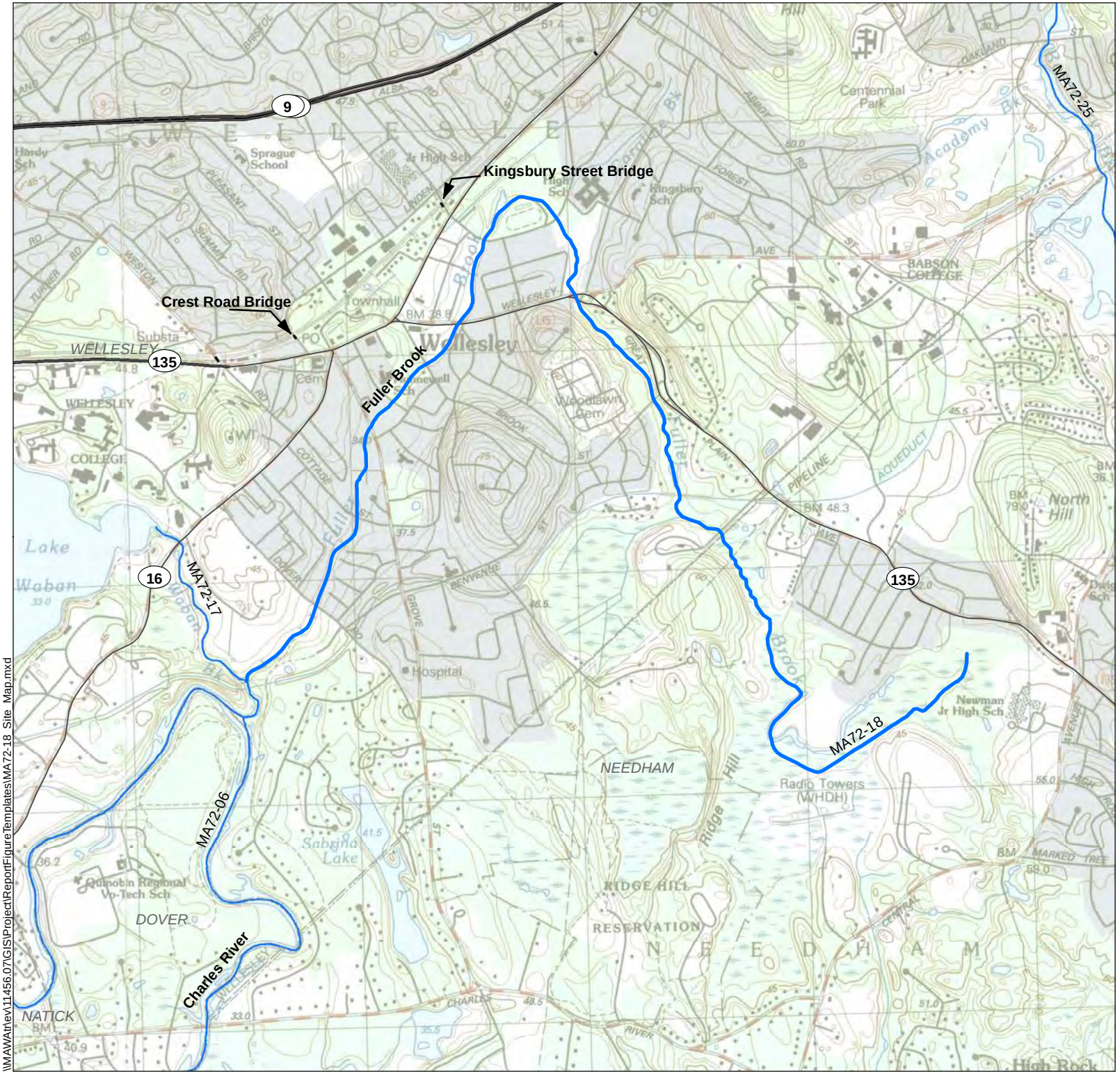

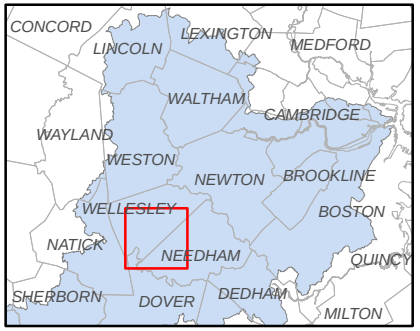

MassDOT Roadways

Impaired Streams

N

0 0.125 0.25 0.5 Miles

Figure 1
Locus Map

Fuller Brook
MA72-18

June 2012

massDOT
Massachusetts Department of Transportation
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