

MassDOT's Impaired Waters Program: A Case Study of MS4 Compliance

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Agenda

- MS4 Overview
- Compliance Challenge
- DOT WQ Assessment Approach
- DOT Methodologies
- Structural BMPs
- Non-Structural BMPs
- Progress to Date

MS4 Overview

- Part IIB – 6 MCMs
 - Public Education/Outreach
 - Public Involvement/Participation
 - Illicit Discharge Detection & Elimination (IDDE)
 - Construction Site Stormwater Runoff Control
 - Post Construction Stormwater Management
 - Pollution Prevention/Good Housekeeping

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- Part IC – Discharges to WQ Impaired Waters
- Part ID – Discharges to TMDL Waters

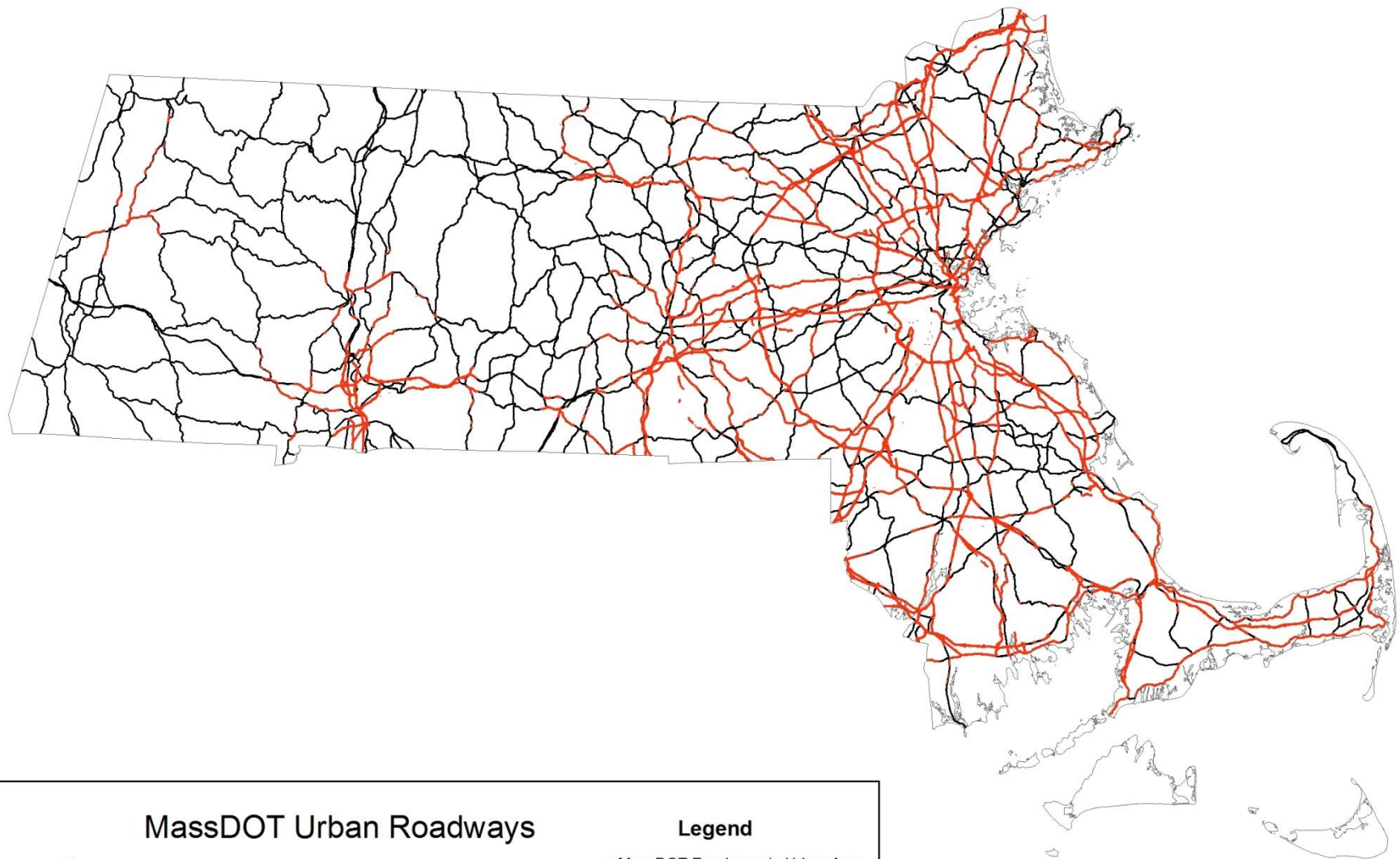
MS4 Part IC: Discharges to Water Quality Impaired Waters

- Determine Whether Stormwater Discharges Contribute to a 303(d) listed Water body
 - Category 4a – Waters with a TMDL
 - Category 5 – Waters in need of a TMDL
- If Yes, Do Discharges Cause Exceedance of Water Quality Standards?



MS4 Part ID: Total Maximum Daily Load Allocations

- Determine If TMDL is for pollutant “likely found” in MS4 Discharge
- Determine if WLA or BMP recommended for Stormwater Discharges
- If WLA exists, assess whether it is met
- Document in SWMP and Annual Reports
 - Controls implemented or planned
 - Schedule
 - Water Quality Assessment



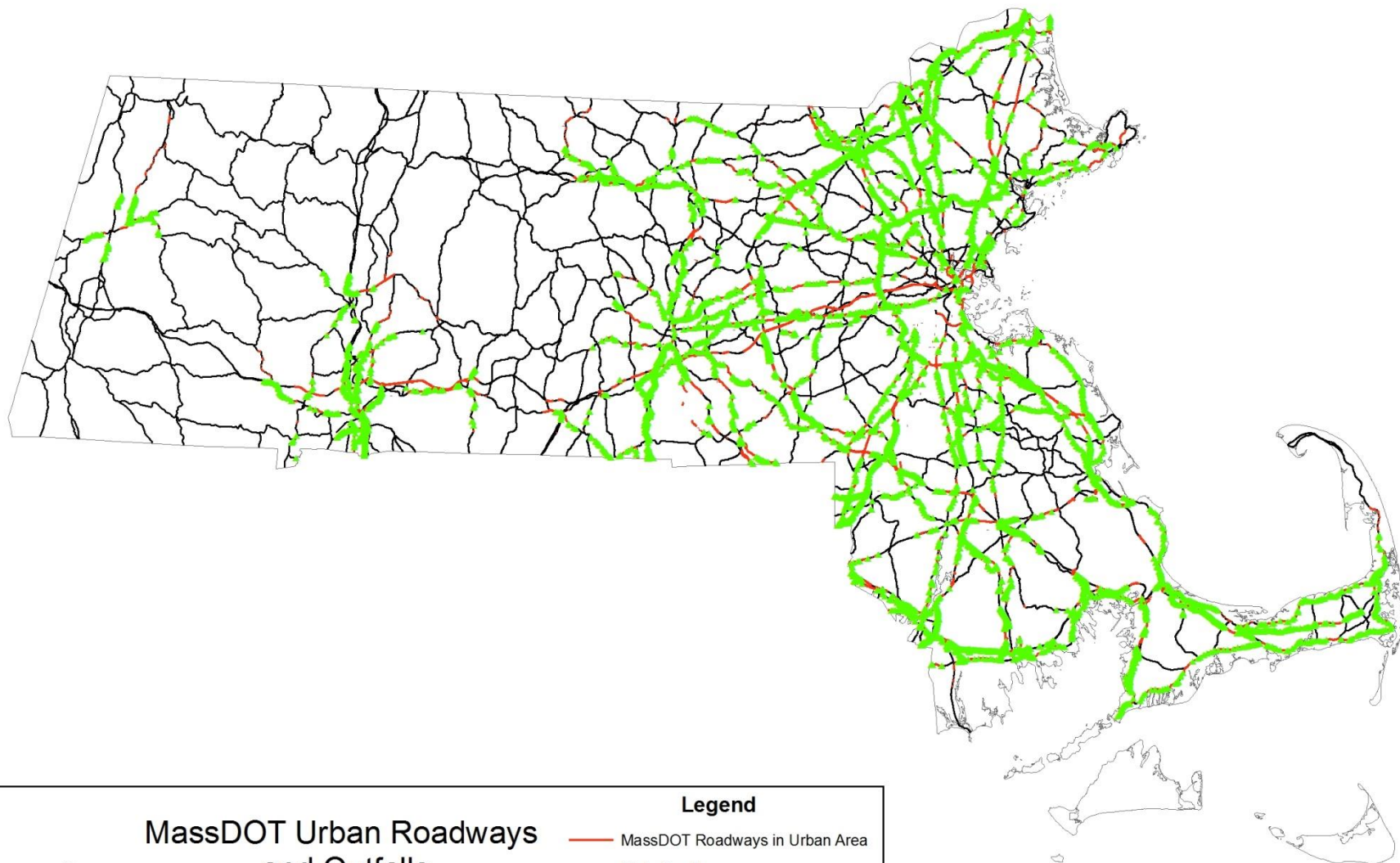
MassDOT Urban Roadways

Legend

- MassDOT Roadways in Urban Area
- Major Roads
- State Outline



0 5 10 20 30 40 Miles



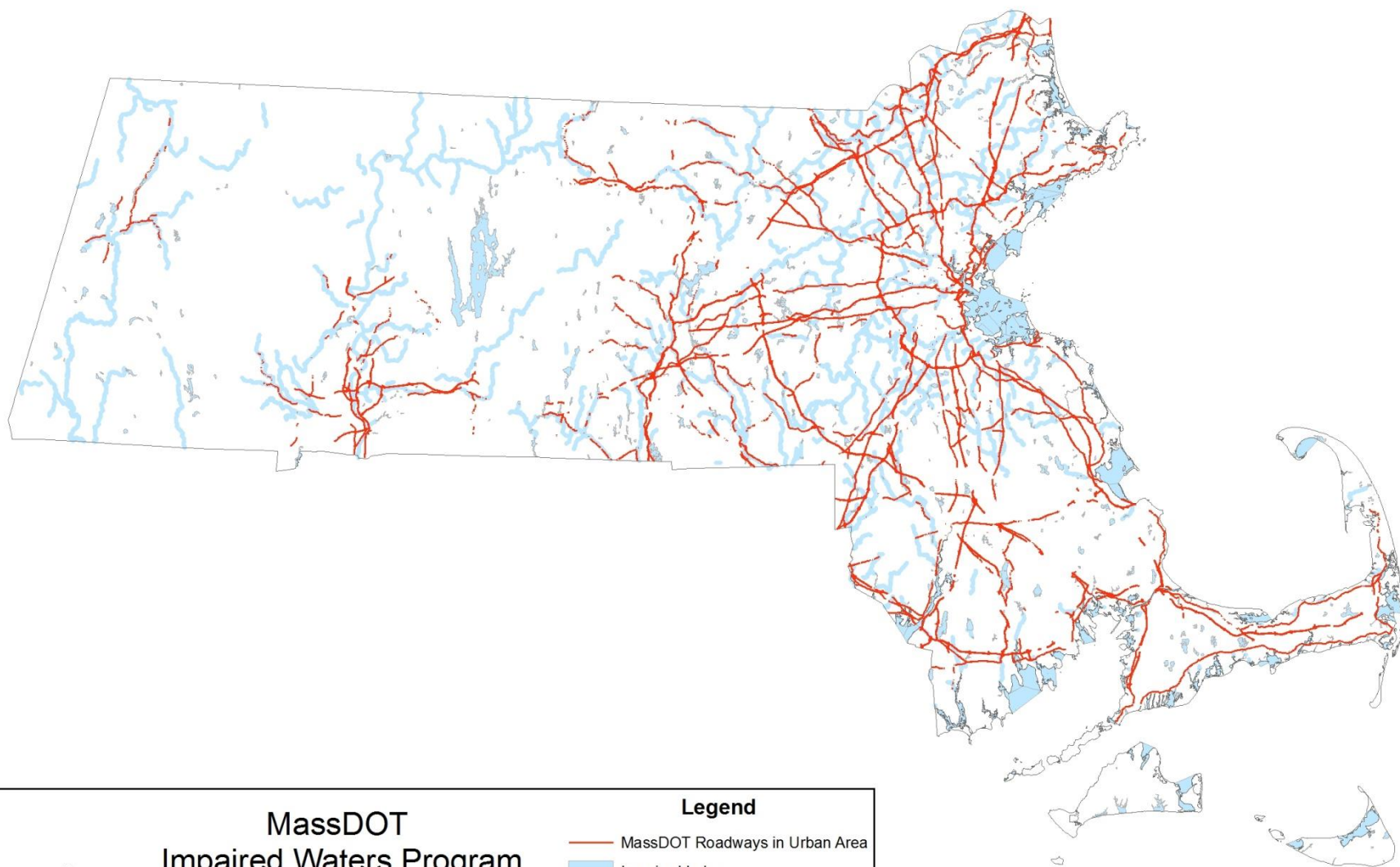
MassDOT Urban Roadways and Outfalls

Legend

- MassDOT Roadways in Urban Area
- Major Roads
- State Outline
- ▲ MassDOT Outfalls



0 5 10 20 30 40 Miles



MassDOT Impaired Waters Program

Legend

- MassDOT Roadways in Urban Area
- Impaired Lakes
- Impaired Streams
- State Outline



0 5 10 20 30 40 Miles

MassDOT Compliance Challenges

- Entire Commonwealth
 - Over 4,000 miles of roads
 - 17,000 + Discharges
 - Initially 684 Receiving Waters, now 850+
- Limited Staff
- Limited Budget



Solution: Systematic Approach

1. Identify Impairments Related to Highway Runoff
2. Map Outfalls
3. Desktop Evaluation of Drainage Patterns
4. Site Investigation
5. Assess Pollutant Loading and Effect on WQ
6. Select, Design and Implement BMPs
7. Document Results



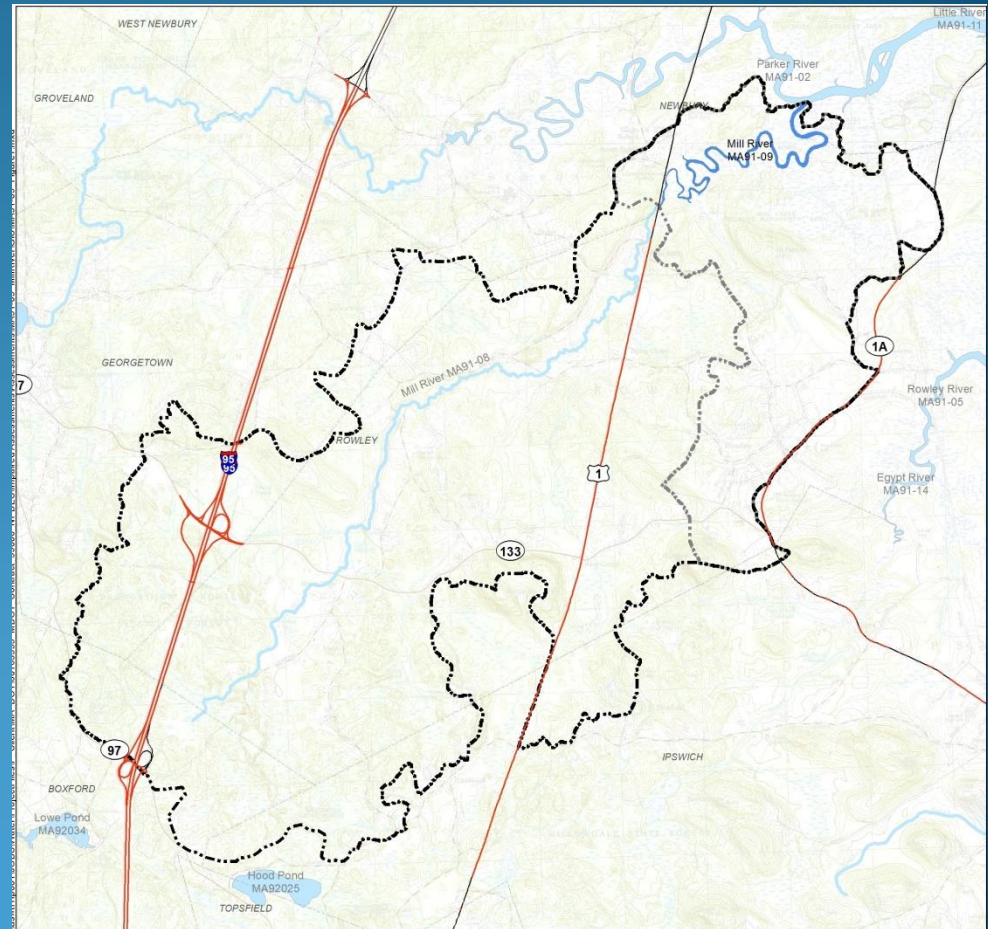
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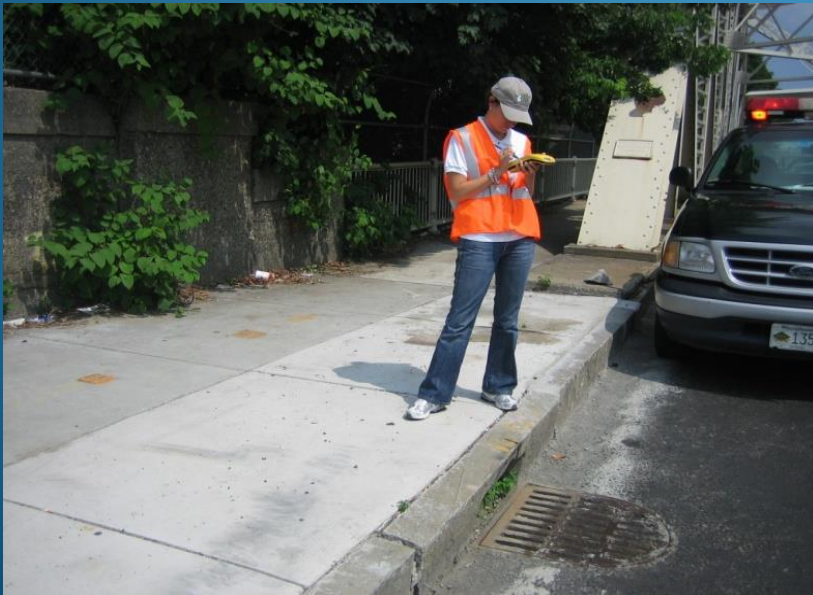
Water Quality Assessment

- USGS Watershed and Sub-Watershed
- Direct Discharges Only
- Highway Stormwater Related Pollutants Only
- USGS Highway Loading Data



Water Quality Assessment Methodologies

- Pathogen Only
- Impervious Cover
- TMDL (Surface Watershed)
- Groundwatershed with Nitrogen TMDL



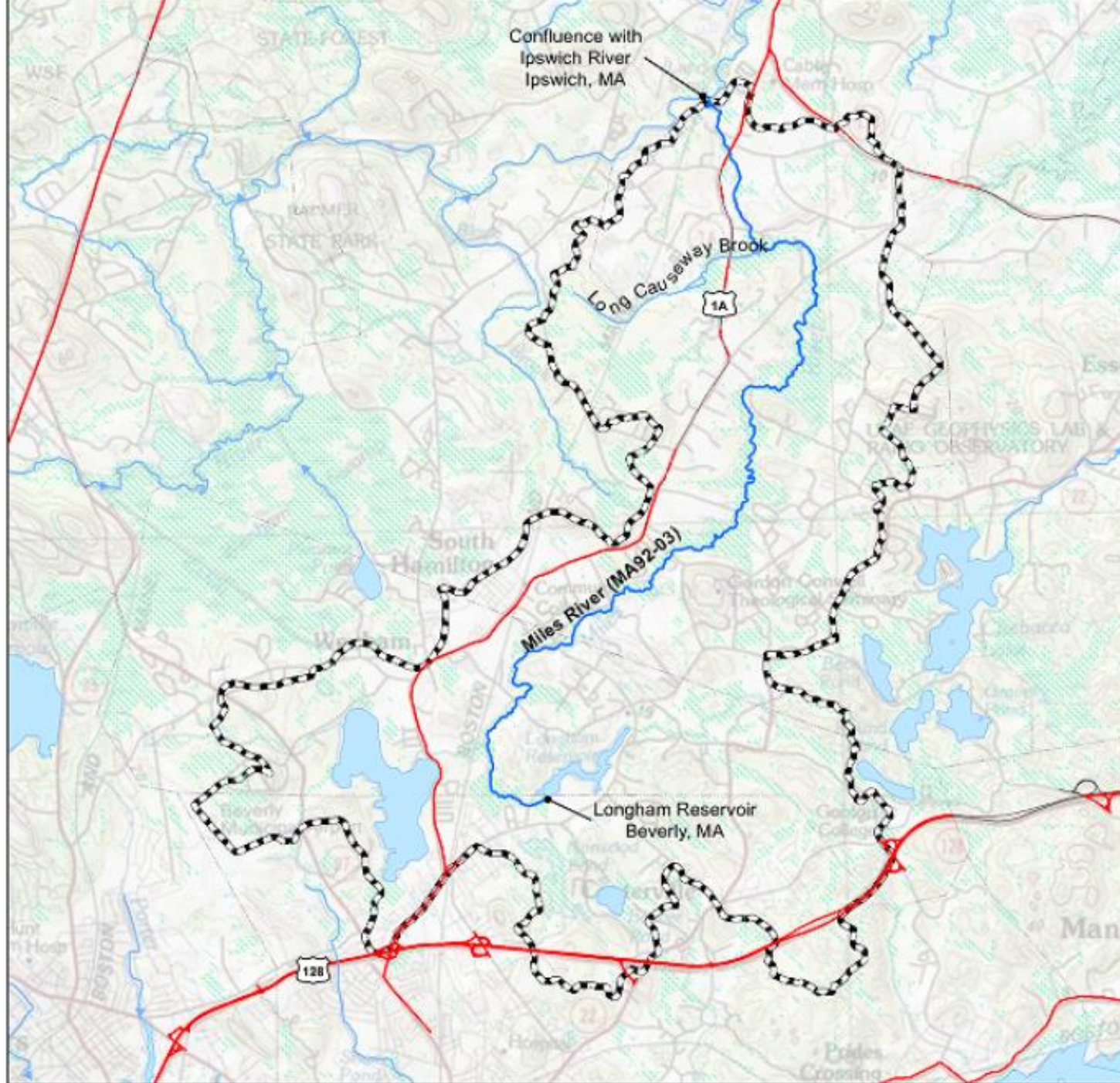
Pathogen-Impaired Water Bodies

- Pathogen Concentrations Vary Temporally and Spatially
- USGS Study of Highway Runoff
- MassDOT Roads Have Low Potential for
 - Illicit Connections
 - Breakout from Septic Systems
 - Pet Waste
 - Wildlife
- Mitigation Measures
 - Drainage Connection Policy/Tie-In Permits
 - Pet Waste Program
 - IDDE Program

Impervious Cover Method

- Based on US EPA Established Relationship Between Imperviousness and Water Quality Impairment and Benefits of Impervious Cover Reduction (ICR)
- Determine IC in Watershed
- If Greater than 9%, Calculate IC Reduction Goal
- Apply Percent Reduction Goal to DOT IC
- Look for Structural BMP Opportunities





- Miles River (MA92-03)
- Impaired Stream Segment
- Impaired Water Bodies
- NWI Wetland Areas
- MassDOT Roads in Urban Areas
- MassDOT Roads
- Town Boundaries
- Total & Subwatershed



1 in = 1 miles

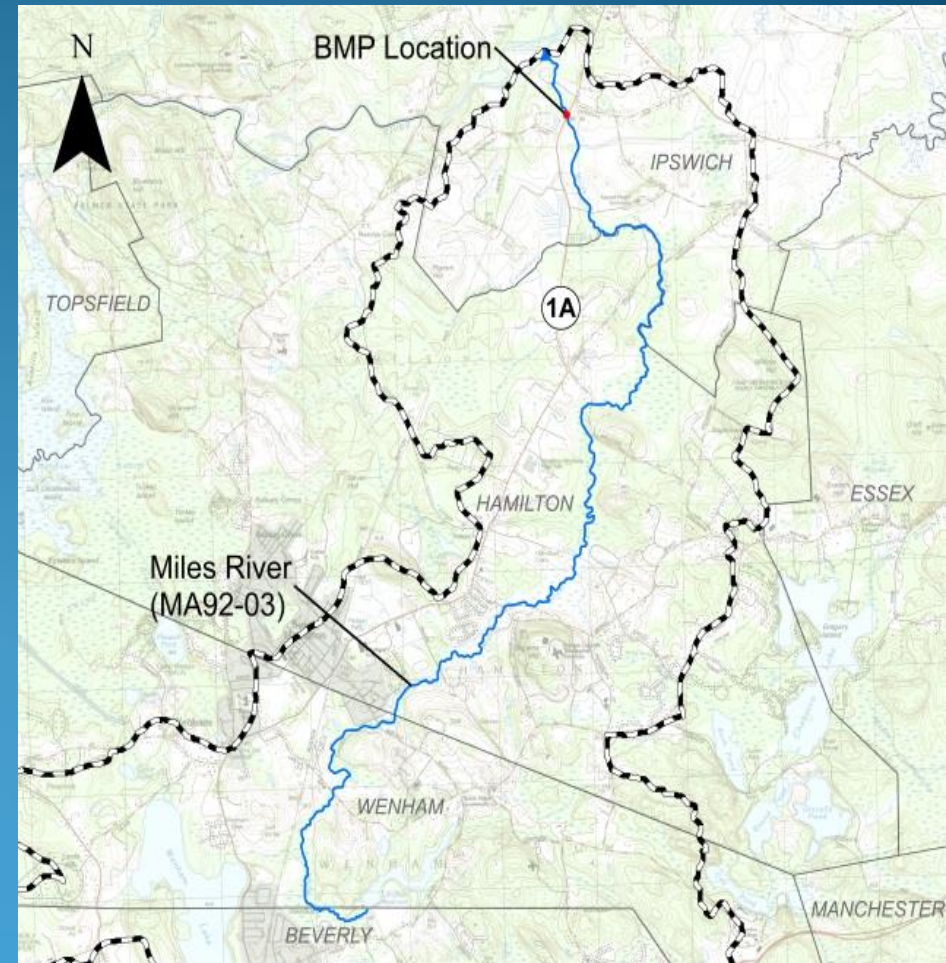
Figure 1

**Miles River
Total & Subwatershed
MA92-03**

December 2012

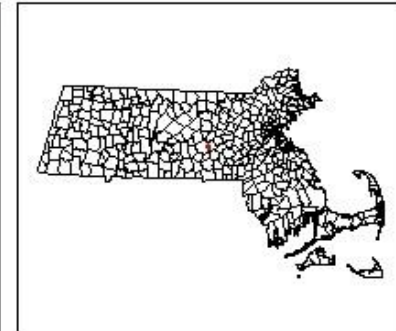
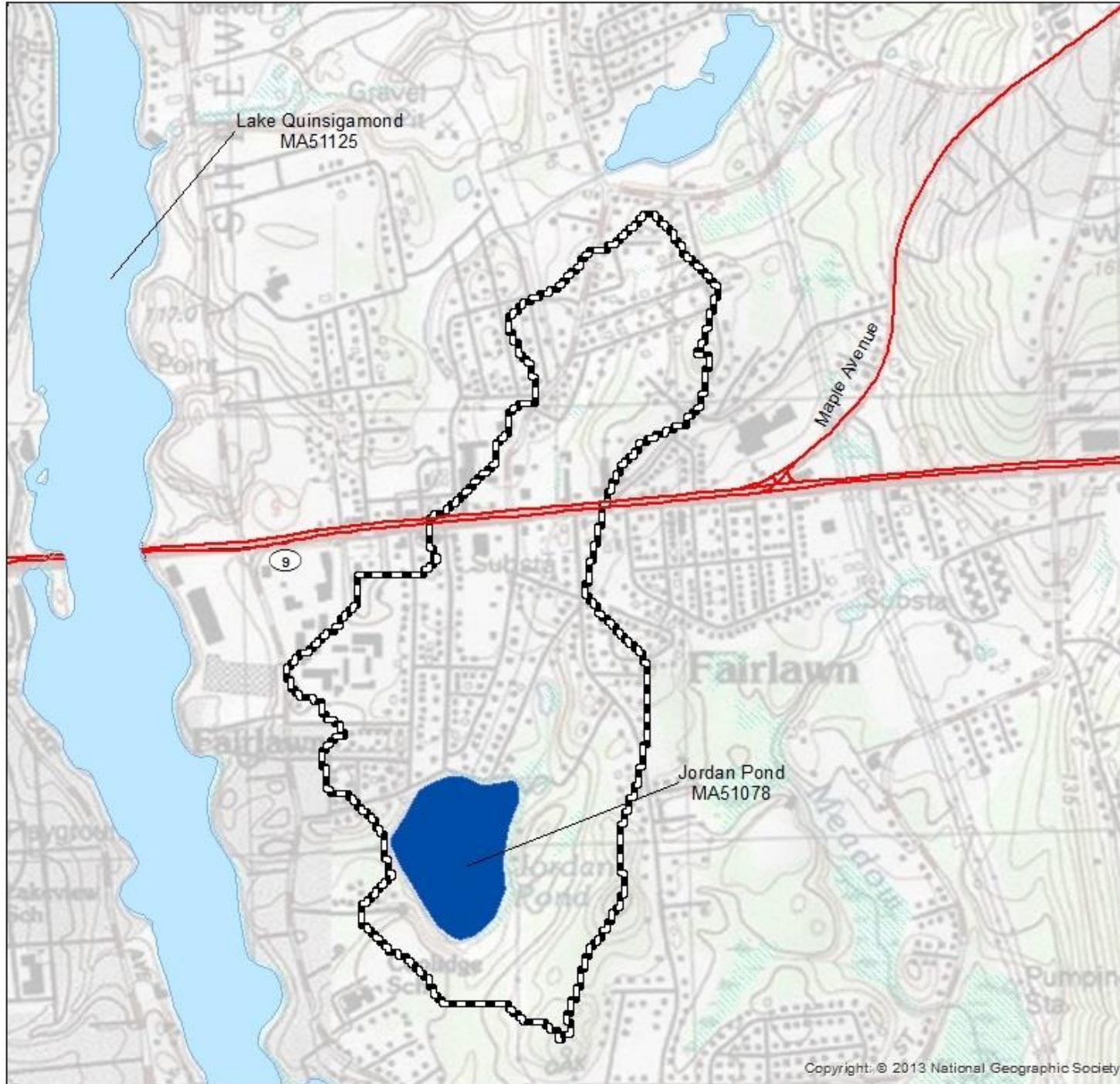
Miles River – ICR Example

Parameter	Quantity
Watershed (WS) Area	10,963 acres
Watershed IC	1,106 acres
WS % Impervious	10.1%
WS IC at 9% Goal	986 acres
Target WS IC Reduction	10.8%
DOT IC Directly Contributing to Impaired Segment	1.6 acres
DOT Target Effective IC Reduction	0.2 acres

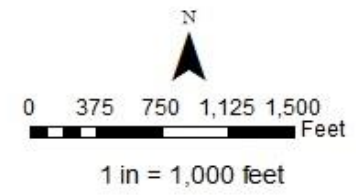


TMDL – Surface Watershed

- Identify Relevant Waste Load Allocation (WLA)
- Calculate Areal WLA
- Calculate DOT Portion of WLA
- Calculate DOT Nutrient Loading
- Compare DOT Loading to WLA Goal
- Identify Any DOT Reduction Target
- Evaluate Structural BMP Opportunities



-  Impaired Stream Segment
-  Jordan Pond
-  Impaired Water Bodies
-  NWI Wetland Areas
-  MassDOT Roads in Urban Areas
-  MassDOT Roads
-  Town Boundaries
-  Jordan Pond Subwatershed



**Jordan Pond
Total and Subwatershed
MA51078**

June 2013



TMDL Example: Jordan Pond

Total Maximum Daily Loads of Phosphorous Selected Northern Blackstone Lakes (CN 70.1)

1. Pollutant Contribution Goal:

- Land Use WLA 11.0 pounds/year
- Land Use Area 17.3 acres
- Areal WLA $11.0/17.3 = 0.6$ pounds/acre/year
- DOT Area 2.2 acres
- DOT WLA Goal $0.6 \times 2.2 = 1.3$ pounds/year

2. DOT Loading:

- Pervious + Impervious = 3.6 pounds/year

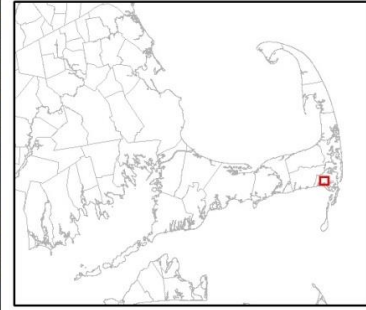
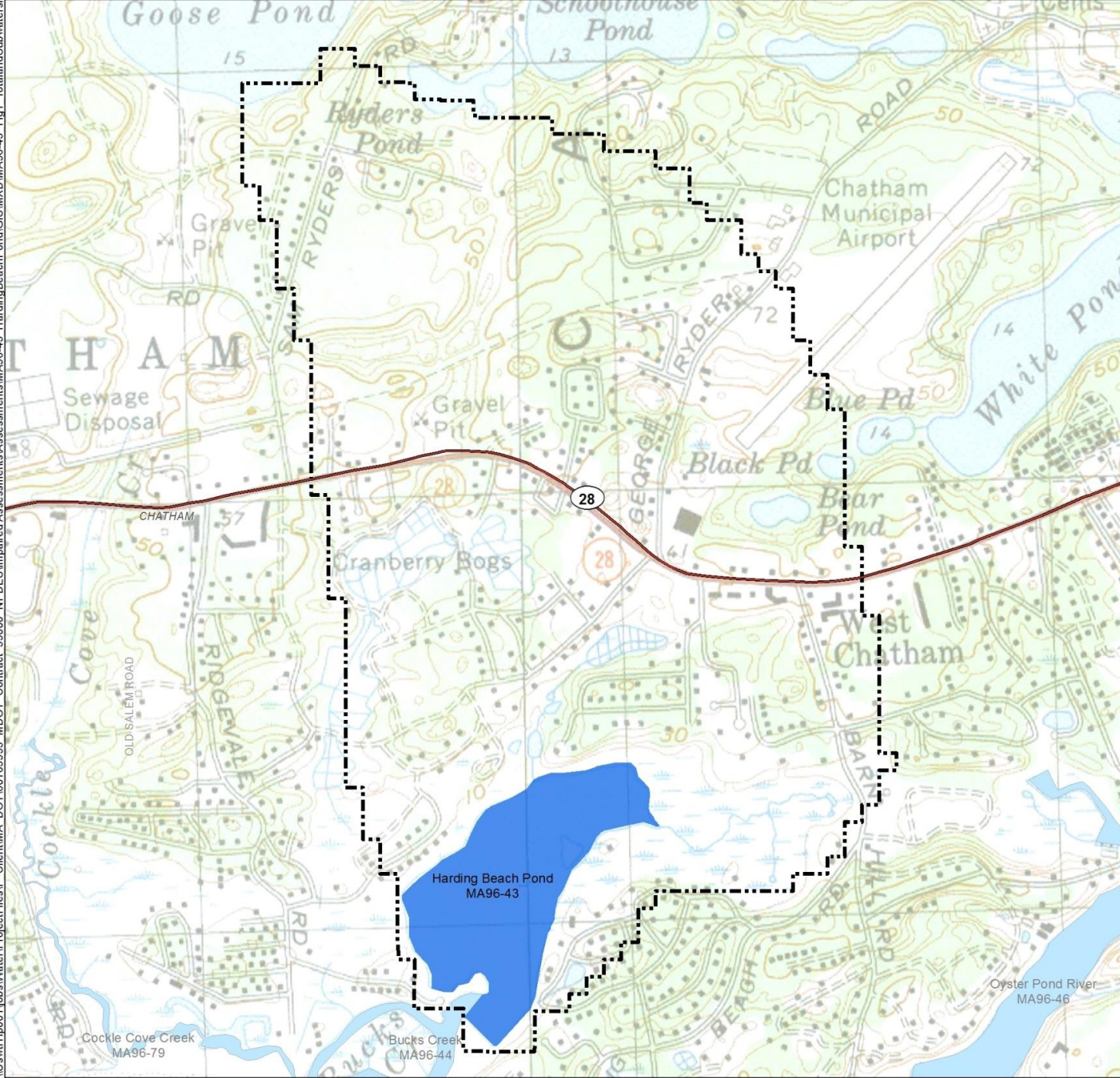
3. Target Reduction:

- DOT Loading – DOT WLA

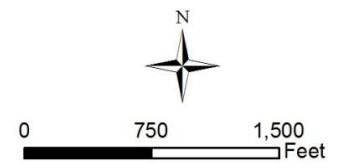
$$3.6 \text{ pounds/year} - 1.3 \text{ pounds/year} = 2.3 \text{ pounds/year}$$

TMDL – Groundwatershed

- Identify Target Land Use Watershed Nitrogen Load
- Calculate DOT Nitrogen Load
- Determine if DOT Nitrogen Load is Negligible
- If Not Negligible
 - Calculate Areal Target Watershed Load
 - Calculate DOT Acreage
 - Multiply DOT Acreage by Target Areal Load=DOT Target Load
 - Compare DOT Load to DOT Target to Identify Reduction Goal
 - Evaluate Structural BMP Opportunities



- MassDOT Roadways in Urban Area
- MassDOT Roadways
- Groundwatershed
- Assessed Segment
- Impaired Lakes
- Impaired Streams



**Harding Beach Pond
(MA96-43)
Groundwatershed**

June 2014



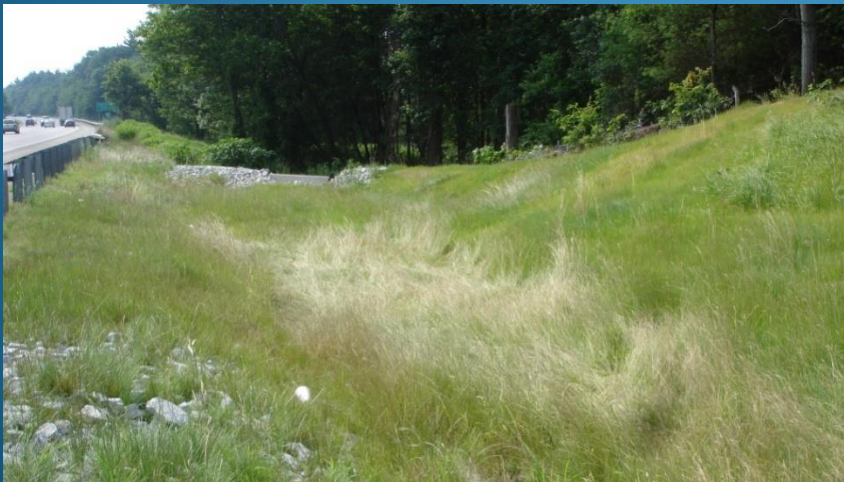
TMDL Groundwatershed: Harding Beach Pond MA 96-43

- TMDL: Stage Harbor/Oyster Pond, Sulphur Springs/Bucks Creed, Taylors Pond/Mill Creek
Total Maximum Daily Load Re-Evaluations for Total Nitrogen Lakes [CN 206.1] (MassDEP, 2007)

Parameter	Quantity
DOT Impervious Area	4.2 acres
DOT Pervious Area	0.6 acres
Estimated Existing MassDOT Load	37.2 lbs/year
Total Existing Nitrogen Load	8,042 lbs/year
MassDOT Existing Load % of Total Groundwatershed Load	0.46%

Structural BMPs

- Selection Criteria:
 - Pollutant of Concern
 - Removal Efficiencies
 - Programmed versus Retrofit Projects
 - Site Constraints



Non-Structural BMPs

- Rest Stop Dog Signage
- Street Sweeping
- Targeted IDDE Inspections & Ordinances
- Extensive Stormwater Data Tracking
 - Water Quality Data Forms
 - Impaired Waters Database
- Public Education
- Staff Training



Documentation of Results

- Written Water Quality Assessment
 - Protocols
 - Field Confirmed Drainage Patterns
 - Target Calculations
 - Conceptual BMPs
- Bi-Annual EPA/DEP Reports
- Annual MS4 Reports

NPDES Storm Water Management Plan
Annual Report - Permit Year 11

Municipality/Organization: MassDOT - Highway Division
EPA NPDES Permit Number: MA043025
MaDEP Transmittal Number: _____
Annual Report Number & Reporting Period: No. 11: April 2013-March 2014

**NPDES Phase II Small MS4 General Permit
Annual Report**

Part I. General Information

Contact Person: Mr. Henry Barbaro Title: Supervisor of Wetlands & Water Resources
Telephone #: (857) 368-8788 Email: henry.barbaro@state.ma.us

Certification:

I certify under penalty of law that this document and all attachments were prepared by me or under my direct supervision and that I am a duly qualified professional engineer or geologist under the laws of the State of Massachusetts, and that I am duly licensed to practice in the State of Massachusetts, and that I am duly qualified to perform the services covered by this report, and that I am duly qualified to perform the services covered by this report, and that I am duly qualified to perform the services covered by this report.

Signature: Frank A. DePaola
Printed Name: Frank A. DePaola, P.E.
Title: Highway Administrator - MassDOT, Highway Division
Date: 05/01/2014



Deval L. Patrick, Governor
Timothy P. Murray, Lt. Governor
Richard A. Davey, Secretary & CEO
Frank DePaola, Administrator



June 6, 2014

David Gray
U.S. Environmental Protection Agency, Region 1
5 Post Office Square - Suite 100, Mail Code #OEP06-1
Boston, MA 02110

Subject: Semi Annual Submittal under MassDOT's Impaired Waters Program

Dear Mr. Gray,

As part of MassDOT's Impaired Waters Program, the attached report documents MassDOT's activities between December 2013 and June 2014. In the last six months, MassDOT's Impaired Waters Program has generated 89 assessments of impaired receiving waters (76 of the 89 are part of the Original L-1 list), including those performed for upcoming programmed (planned) roadway construction projects. Prioritizing assessments for programmed projects maximizes the efficiency of the overall program by identifying the potential need for additional stormwater best management practices (BMPs) during the design process, and then implementing construction of these BMPs during a larger construction effort. Implementing BMP construction during larger, programmed construction projects reduces costs such as mobilization, achieves savings through an economy of scale, maximizes efficient use of DOT resources needed for bidding and construction oversight, and allows a holistic approach to stormwater management in a discrete geographic area.

This memo outlines the progress made towards the MassDOT commitment to assess the 684 impaired water bodies listed in Appendix L-1 of MassDOT's June 9, 2010 and July 23, 2010 submittals to EPA. MassDOT is completing the assessments using the methodologies outlined in BMP 7U: Impaired Waters Assessment and Mitigation Plan and/ or BMP 7R: Total maximum Daily Load (TMDL) Watershed Review. For assessments where it is determined that further action is necessary to meet the target Impervious Cover (IC) or pollutant loading reductions, MassDOT forwards these assessments to design consultants for BMP design.

MassDOT has decided to discontinue the two step process of Progress Reports and Progress to Final Reports assessments and instead has included sufficient information in each assessment in this submittal to document whether BMPs are feasible to address identified target IC or pollutant reductions, thereby fulfilling the assessment requirement in one document. Progress Reports that identified targets which have been addressed by BMPs designed between March 2013 and March 2014 were summarized in the MassDOT MS4 Annual Report (dated, May 1, 2014). Assessments in this and future bi-annual submittals that have identified target reductions will proceed to design and, once design is complete, the achieved reductions will be reported in future MS4 Annual Reports. Final IC or pollutant reductions achieved by BMP designs initiated prior to March 2013 are documented in MassDOT's new Impaired Waters Database, which was launched in 2013.

Progress to Date

- June 2010 – June 2014
 - 574 Waters Assessed
 - 333 IC Method
 - 156 TMDL Method
 - 16 Groundwatershed Nitrogen TMDL
 - 69 Other (e.g., Hg)
 - 60+ Structural Retrofit BMP Projects in Design
 - 12 BMP Projects Under Construction
 - 16 Structural BMP Projects Completed



Questions?

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