

Attachment 5:

Pathogen Only

Attachment 5 includes 31 assessments for water bodies impaired only for pathogens which were evaluated using either MassDOT's Pathogen TMDL or Non-TMDL Method.

List of Impaired Water Bodies

MA11-04	Hoosic River*
MA32-08	Little River*
MA32-22	Potash Brook*
MA34-25	Mill River*
MA34-42	Buttery Brook*
MA36-39	Unnamed Tributary*
MA36-41	Fuller Brook*
MA41-13	McKinstry Brook*
MA53-17	Torrey Creek*
MA53-18	Rocky Run*
MA62-09	Beaver Brook*
MA73-25	Pecunit Brook*
MA81-13	Monoosnuc Brook*
MA81-20	James Brook*
MA84A-12	Richardson Brook*
MA84A-13	Trout Brook*
MA84A-14	Trull Brook*
MA84A-36	Bartlett Brook*
MA84A-37	Creek Brook*
MA84A-39	East Meadow River*
MA84B-06	Bennetts Brook*
MA93-02	Crane Brook*
MA93-17	Rockport Harbor*
MA93-47	Causeway Brook*
MA93-55	Salem Sound*
MA93-57	Rockport Harbor*
MA94-01	Cohasset Harbor*
MA94-32	Cohasset Cove*
MA95-44	Snell Creek*
MA95-45	Snell Creek*
MA95-59	Snell Creek*

*Not on Appendix L-1 list

Impaired Waters Assessment for Hoosic River (MA11-04)

Summary

Impaired Water¹	Impairments: Stormwater:	<i>Fecal Coliform</i>
	Non-Stormwater: ²	<i>Alteration in stream-side or littoral vegetative covers, Other flow regime alterations</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>
	Final TMDLs:	<i>None</i>
Location	WQ Assessment:	<i>Hudson River Watershed 2002 Water Quality Assessment Report³</i>
	Towns:	<i>Adams, North Adams</i>
	MassDOT Roads:	<i>Route 2, Route 8, Route 8A, Route 116</i>
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/> 7U (Non-TMDL Method) <input checked="" type="checkbox"/>	

Site Description

Hoosic River (MA11-04) is a 5.4-mile segment located in Adams and North Adams, Massachusetts. This segment of the Hoosic River starts at the discharge from the Adams Waste Water Treatment Plant in Adams and ends at the confluence with the North Branch Hoosic River (MA11-02) in North Adams. This segment of the Hoosic River is located south of Route 2 and runs generally parallel to Route 8. The Hoosic River is classified as a Class B because it is designated as a habitat for fish and is used for primary and secondary contact recreation. This segment is also classified as a Warm Water Fishery. The total watershed is approximately 75 square miles and the subwatershed is approximately 10 square miles. Both are shown in Figure 1A. Land use within the subwatershed consist mostly of commercial, industrial, and high density and multi-family residential areas. Other land uses within the subwatershed include forest, crop land, and wetlands.

MassDEP's *Hudson River Watershed 2002 Water Quality Assessment Report³* for Hoosic River lists Secondary Contact and Aesthetics as "support" because they meet surface water quality standards. Primary Contact is listed as "impaired" due to fecal coliform bacteria. The source of the impairment is

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/depl/water/resources/07v5/12list2.pdf>

² MassDOT, December 2012. Impaired Waters Assessment for Impaired Waters with Impairments Unrelated to Stormwater. Available at: http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year3/Year3_ImpairedWatersAssessment_1.pdf#page=308

³ MassDEP, June 2006. Hudson River Watershed 2002 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/depl/water/resources/07v5/11wqar06.pdf>

listed as “source unknown” but suspected sources include discharges from municipal separate storm sewer systems (MS4s) and crop production. Fish Consumption is listed as not assessed for this waterbody. Aquatic Life status is listed as “mixed.” The upper 4.8 miles of Hoosic River is listed as “support” because it meets surface water quality standards. The lower 0.6 miles is listed as “impaired” due to other flow regime alterations and stream bank alterations. The source of these impairments is channelization and stream bank modification.

MassDOT’s property within the urban area with the potential to directly contribute stormwater runoff to Hoosic River (MA11-04) is comprised of portions of Route 8 and a bridge on Route 8A. Refer to Figure 1B for the location of these roadways within the subwatershed to Hoosic River. Route 2 is within the Hoosic River subwatershed, however it is not within an urban area regulated under the MS4 permit.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁴ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁵ MassDOT assessed Hoosic River (MA11-04) using the methodologies described below.

MassDOT has identified a subset of water body impairments in the Hoosic River watershed that are not related to stormwater runoff. These impairments include alteration in stream-side or littoral vegetative covers and other flow regime alterations. In accordance with MassDOT’s *Impaired Waters Assessment for Impaired Waters with Impairments Unrelated to Stormwater* in the December 8, 2012 EPA submittal, the non-stormwater related impairments are not specifically addressed as part of the Impaired Waters Program.²

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁶ The condition of Hoosic River is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7U⁵ of MassDOT’s Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific

⁴ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁵ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁶ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b),

314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14wlistp.pdf>

assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7U Pathogen Methodology.⁷

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

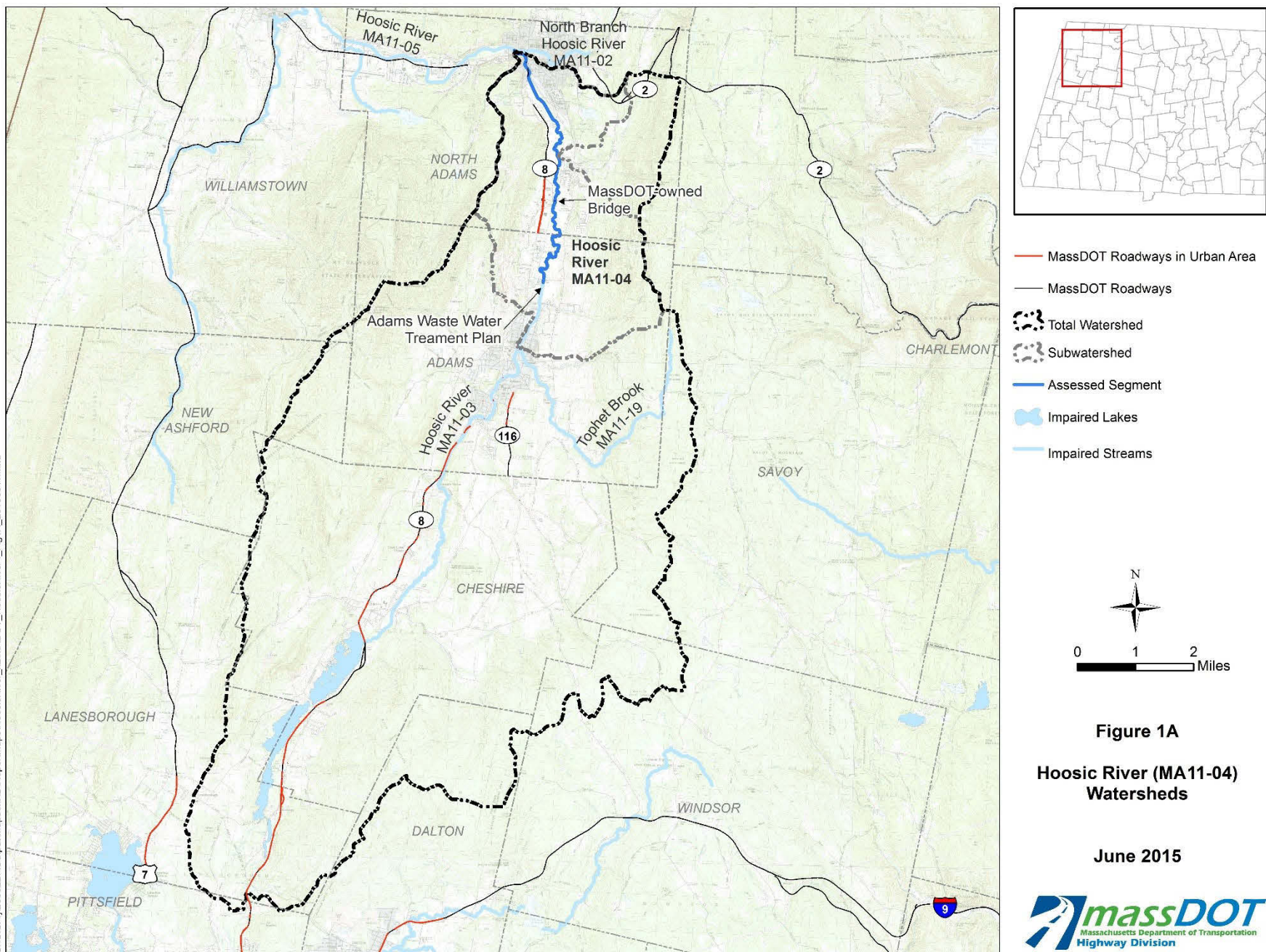
Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Hoosic River. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Hoosic River, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

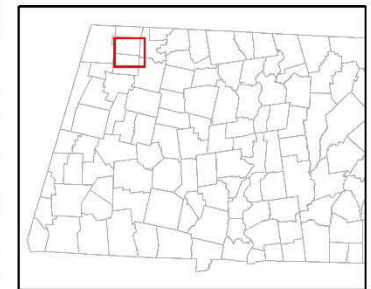
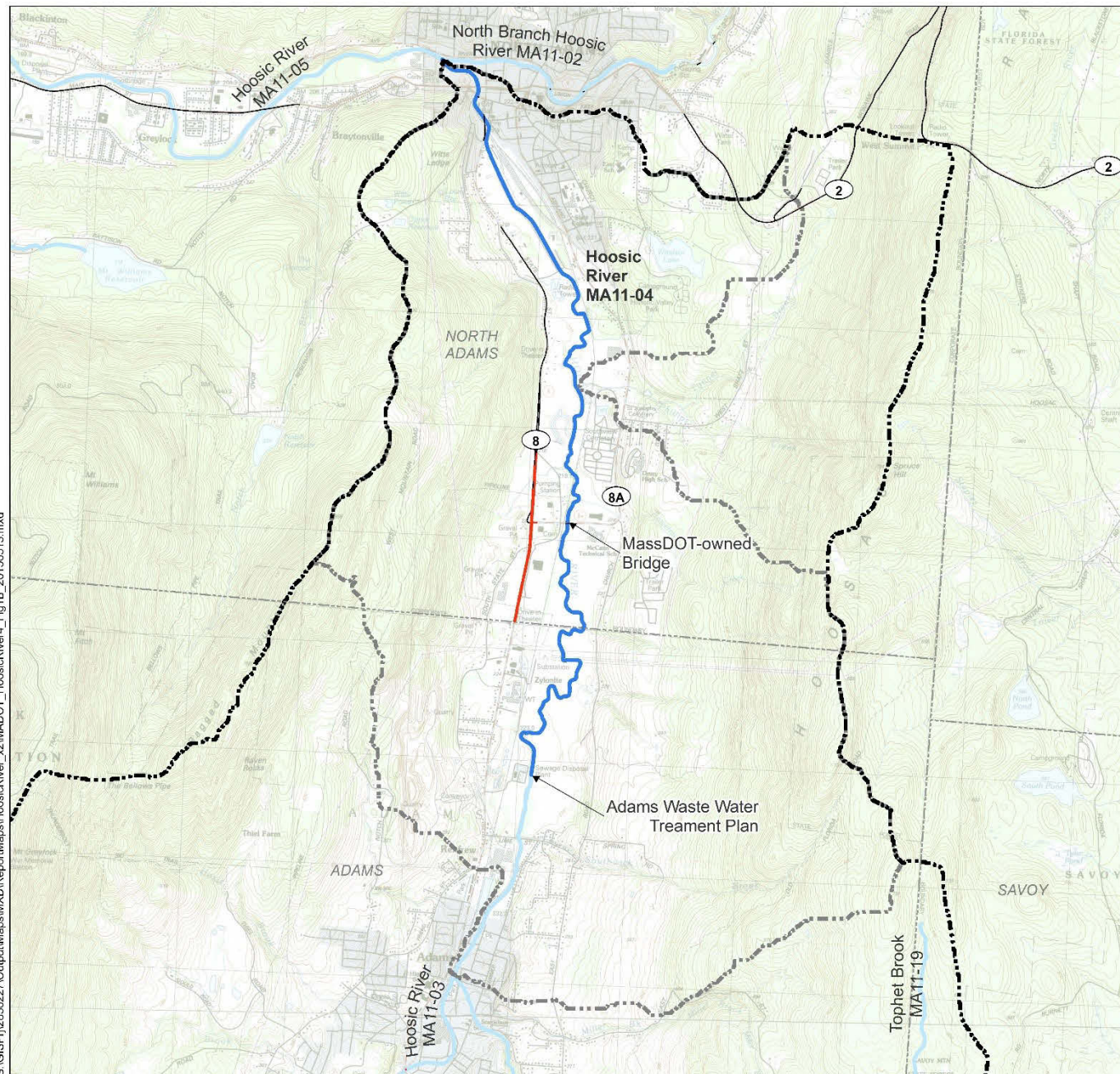
⁷ MassDOT, December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year5/Attachment5.pdf>

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- MassDOT Roadways in Urban Area
- MassDOT Roadways
- Total Watershed
- Subwatershed
- Assessed Segment
- Impaired Lakes
- Impaired Streams

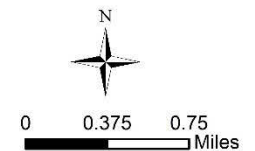


Figure 1B

**Hoosic River (MA11-04)
Subwatershed**

June 2015



Impaired Waters Assessment for Little River (MA32-08)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Escherichia coli, Fecal Coliform</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>
	Final TMDLs:	<i>None</i>
	WQ Assessment:	<i>Westfield River Watershed 2001 Water Quality Assessment Report²</i>
Location	Towns:	<i>Westfield</i>
	MassDOT Roads:	<i>Interstate 90, US Route 20, Route 23, US Route 202</i>
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Little River (MA32-08) is a 5.4-mile segment located in Westfield, Massachusetts. This segment of the Little River starts at Horton's Bridge (Granville Road) in Westfield and ends at the confluence with Westfield River (MA32-05) in Westfield. The river is located south of US Route 20. It crosses US Route 202 under a MassDOT-owned bridge located between Mill Street and City View Road. This is the only MassDOT-owned segment of US Route 202 within the watershed. The land use for the watershed of this segment is comprised mostly of forest. Other prominent land uses within the watershed include residential and agricultural areas. Little River is classified as Class B because it is designated as a habitat for fish and is used for primary and secondary contact recreation. This segment is also a Warm Water Fishery with Combined Sewer Overflows (CSOs). The *Westfield River Watershed 2001 Water Quality Assessment Report²* recommends the CSO designation be removed for this segment of the Little River in future revisions of the Massachusetts Surface Water Quality Standards since CSOs are not permitted in the City of Westfield. The total watershed is approximately 85 square miles and the subwatershed is approximately 4.9 square miles. Both are shown in Figure 1A.

MassDEP's *Westfield River Watershed 2001 Water Quality Assessment Report²* for Little River lists Aquatic Life, Secondary Contact, and Aesthetics as "support" because they meet surface water quality standards. Primary Contact is listed as "impaired" due to fecal coliform bacteria. The source of

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, April 2005. Westfield River Watershed 2001 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/32wqar.pdf>

this impairment is listed as “source unknown” but suspected sources include storm drains and runoff. Fish Consumption is listed as “not assessed” for this waterbody.

MassDOT’s property within the urban area with the potential to directly contribute stormwater runoff to Little River (MA32-08) is comprised of portions of US Route 20 and a bridge on US Route 202. Refer to Figure 1B for the location of these roadways within the subwatershed to Little River.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.³ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁴ MassDOT assessed Little River (MA32-08) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁵ The condition of Little River is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*, fecal coliform) impairment using the approach described in BMP 7U⁴ of MassDOT’s Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT’s BMP 7U Pathogen Methodology.⁶

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control.

³ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁴ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁵ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

⁶ MassDOT, December 2014. Description of MassDOT’s Application of BMP 7U for Pathogen Related Impairments. Available at:

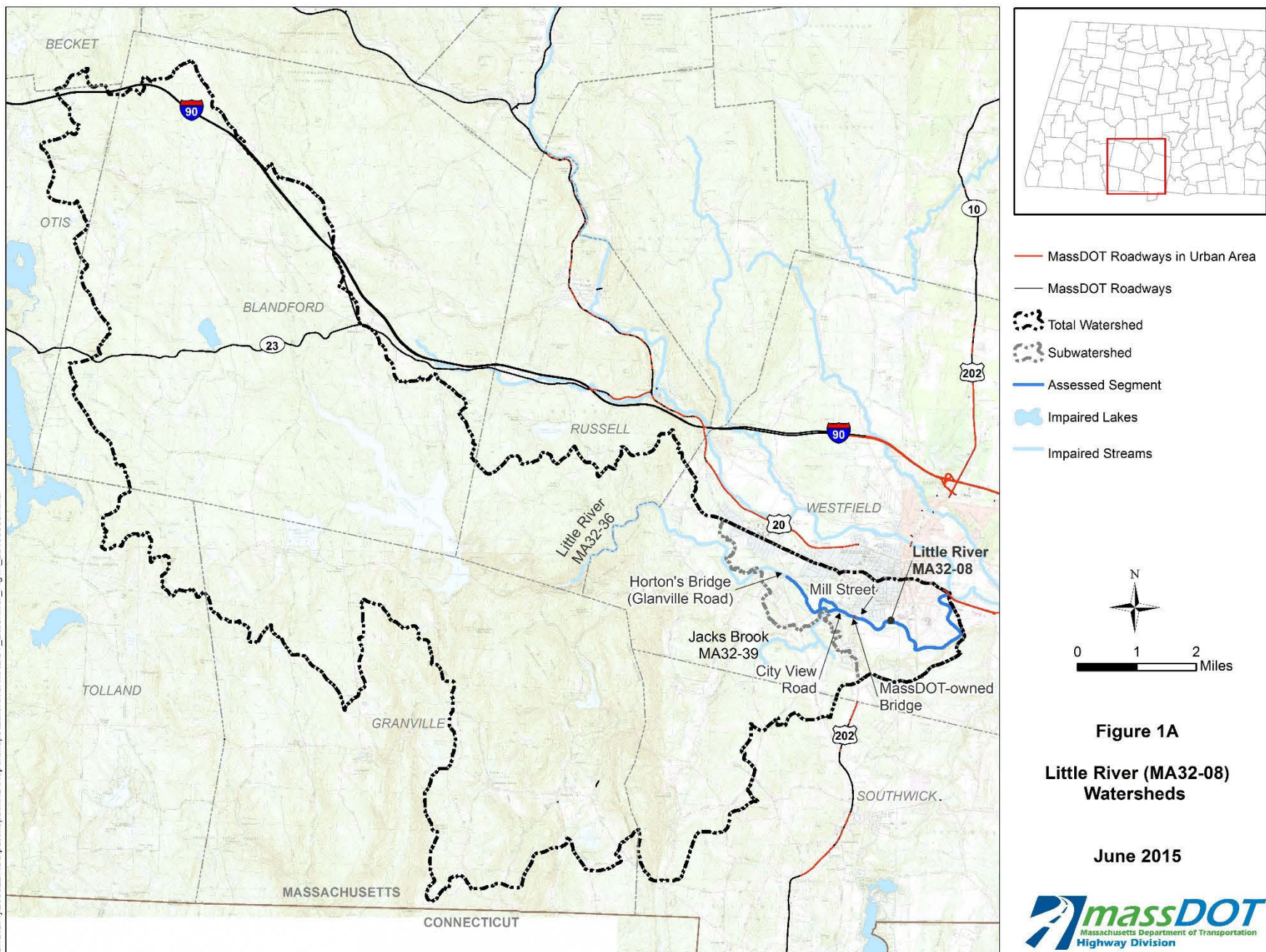
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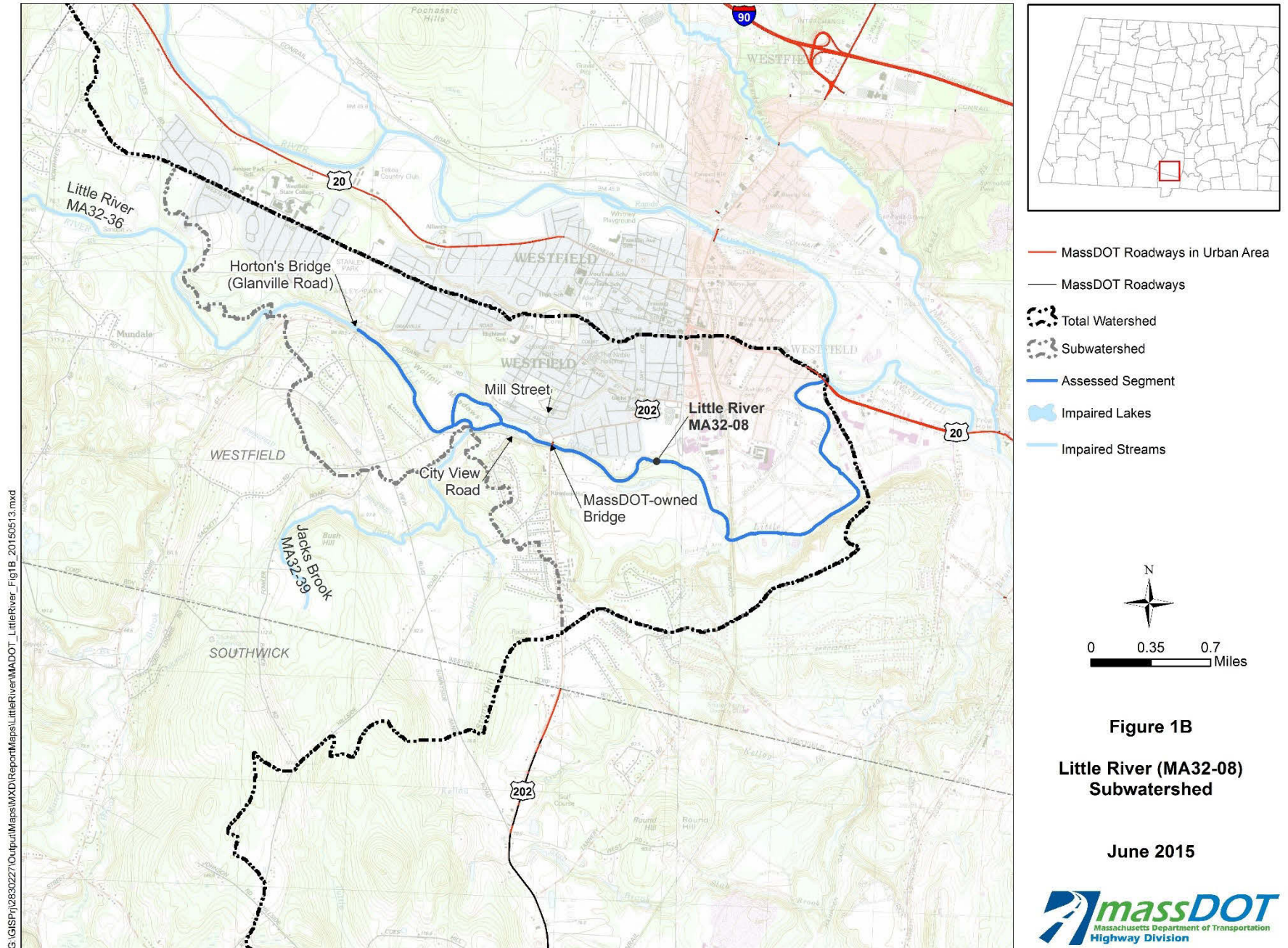
As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Little River. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Little River, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.





Impaired Waters Assessment for Potash Brook (MA32-22)

Summary

Impaired Water¹	Stormwater	<i>Escherichia coli</i>
	Impairments:	
	Category:	5 (Waters requiring a TMDL)
	Final TMDLs:	None
	WQ Assessment:	Westfield River Watershed 2001 Water Quality Assessment Report ²
Location	Towns:	Blandford, Russell
	MassDOT Roads:	US Route 20, Route 23, Interstate 90
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Potash Brook (MA32-22) is a 5.2-mile segment located in Blandford and Russell, Massachusetts. Potash Brook begins at the outlet of Dunlap Pond in Blandford and ends at the confluence with Westfield River (MA32-05) in the village of Woronoco in Russell. The brook begins north of Interstate 90 and flows east, weaving across Route 23 and Interstate 90 before crossing US Route 20 and reaching the Westfield River. The land use for the drainage area of this segment is comprised of mostly forest, as well as residential and transport areas. Potash Brook is classified as Class B because it is designated as a habitat for fish and is used for primary and secondary contact recreation. The total watershed and subwatershed for Potash Brook are the same and cover approximately 6.6 square miles. It is shown in Figure 1.

MassDEP's *Westfield River Watershed 2001 Water Quality Assessment Report*² for Potash Brook lists Aquatic Life as "support" because it meets surface water quality standards. Fish Consumption, Primary Contact, Secondary Contact, and Aesthetics are listed as "not assessed" for this waterbody. Additionally, the EPA's *2012 Waterbody Report for Potash Brook*³ lists Primary Contact as "impaired" and Secondary Contact as "good." The source of the impairment is listed as "source unknown."

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, April 2005. Westfield River Watershed 2001 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/32wqar.pdf>

³ EPA, 2012, 2012 Waterbody Report for Potash Brook, Available at: http://ofmpub.epa.gov/tmdl_waters10/attains_waterbody.control?p_au_id=MA32-22&p_cycle=2012&p_state=MA&p_report_type=

MassDOT's property within the urban area with the potential to directly contribute stormwater runoff to Potash Brook (MA32-22) is comprised of portions of US Route 20, Route 23, and Interstate 90. However, some portions of Interstate 90 that are within the watershed are not within an urban area regulated under the MS4 program. Refer to Figure 1 for the location of these roadways within the watershed to Potash Brook.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁴ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁵ MassDOT assessed Potash Brook (MA32-22) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁶ The condition of Potash Brook is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁵ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7U Pathogen Methodology.⁷

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control.

⁴ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁵ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁶ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

⁷ MassDOT, December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year5/Attachment5.pdf>

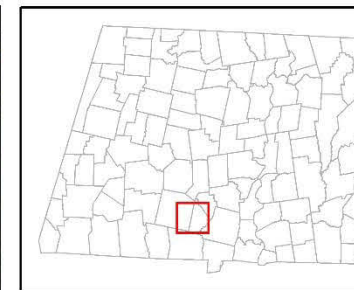
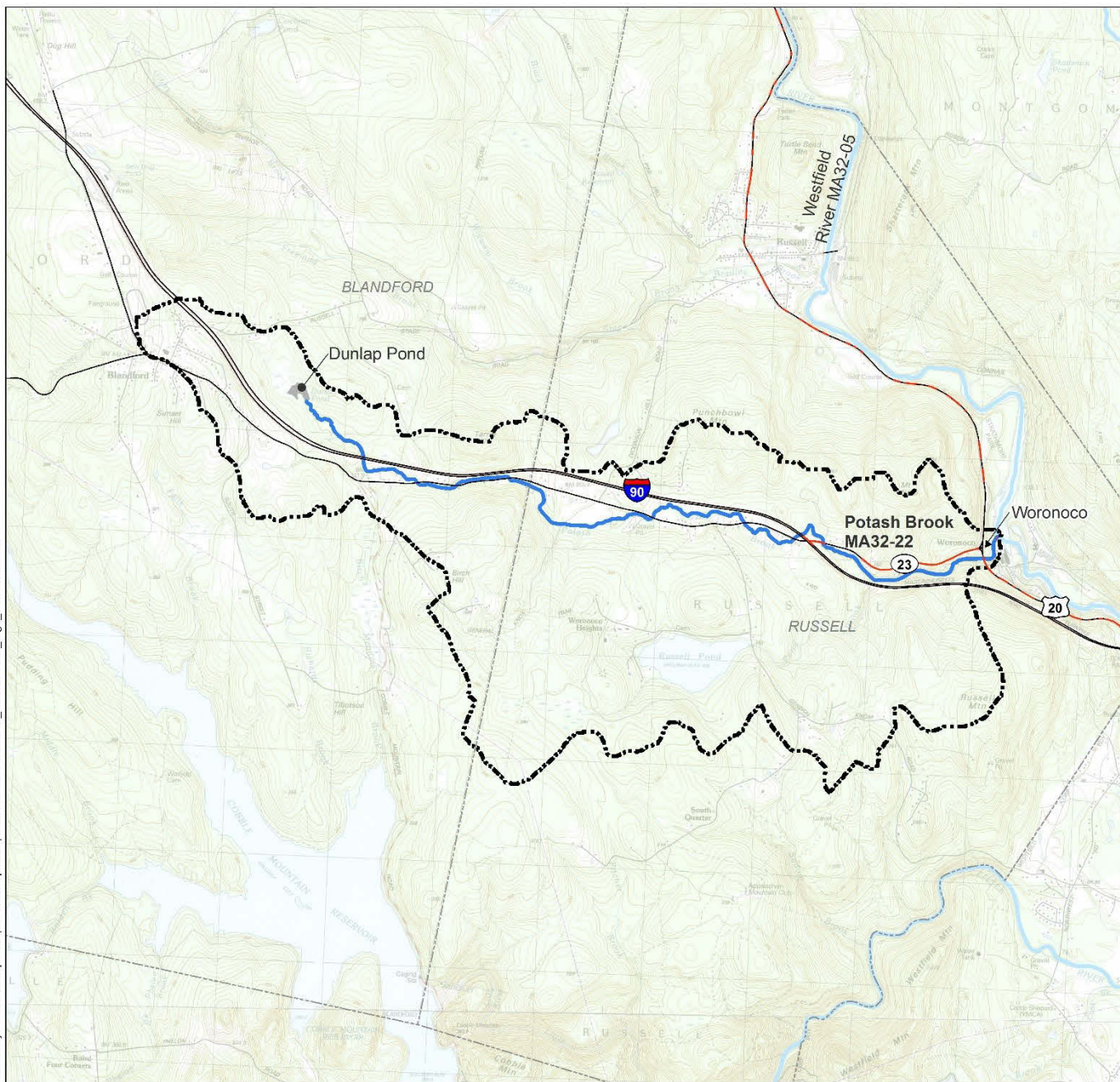
As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Potash Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Potash Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

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- MassDOT Roadways in Urban Area
- MassDOT Roadways
- Watershed
- Assessed Segment
- Impaired Lakes
- Impaired Streams
- Non-Impaired Lake

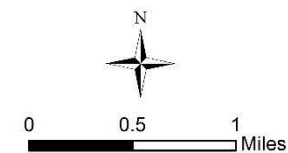


Figure 1
Potash Brook (MA32-22)
Watershed

June 2015



Impaired Waters Assessment for Mill River (MA34-25)

Summary

Impaired Water¹	Stormwater	<i>Escherichia coli</i>
	Impairments:	
	Category:	5 (Waters requiring a TMDL)
	Final TMDLs:	None
	WQ Assessment:	Connecticut River Watershed 2003 Water Quality Assessment Report ²
Location	Towns:	Amherst, Hadley
	MassDOT Roads:	Route 9, Route 63, Route 116
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Mill River (MA34-25) is a 5.2-mile segment located in Amherst and Hadley, Massachusetts. The headwaters of Mill River start at the outlet of Factory Hollow Pond (MA34021), a category 3 waterbody, in Amherst and the segment ends at the inlet of Lake Warner (MA34098) in Hadley. The river crosses Route 63 and Route 116 just beyond its headwaters and then flows primarily south and parallel to Route 116 before it turns west towards Lake Warner. Mill River is classified as Class B because it is designated as a habitat for fish and is used for primary and secondary contact recreation. The total watershed is approximately 30 square miles and the subwatershed is approximately 12 square miles, as shown in Figure 1. Land use in the subwatershed consists mostly of crop land and institutional area. Other land uses within the subwatershed include medium density residential, commercial, and recreational areas.

MassDEP's *Connecticut River Watershed 2003 Water Quality Assessment Report*² for Mill River lists Aquatic Life, Secondary Contact, and Aesthetics as "support" because they meet surface water quality standards. Primary Contact is listed as "impaired" due to *Escherichia coli* bacteria. The source of the impairment is listed as unknown but suspected sources include agriculture and unspecified urban stormwater. Fish Consumption is listed as "not assessed" for this waterbody.

MassDOT's property within the urban area with the potential to directly contribute stormwater runoff to Mill River (MA34-25) is comprised of portions of Route 63, Route 116, and Route 9. Other portions

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, October 2008. Connecticut River Watershed 2003 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/34wqar07.pdf>

of MassDOT-owned Route 116 within the Mill River subwatershed are not within an urbanized area and therefore not regulated under the MS4 program. Refer to Figure 1 for the location of these roadways within the subwatershed to Mill River.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.³ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁴ MassDOT assessed Mill River (MA34-25) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁵ The condition of Mill River is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁴ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7U Pathogen Methodology.⁶

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

³ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁴ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁵ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14/wlistp.pdf>

⁶ MassDOT, December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments. Available at:

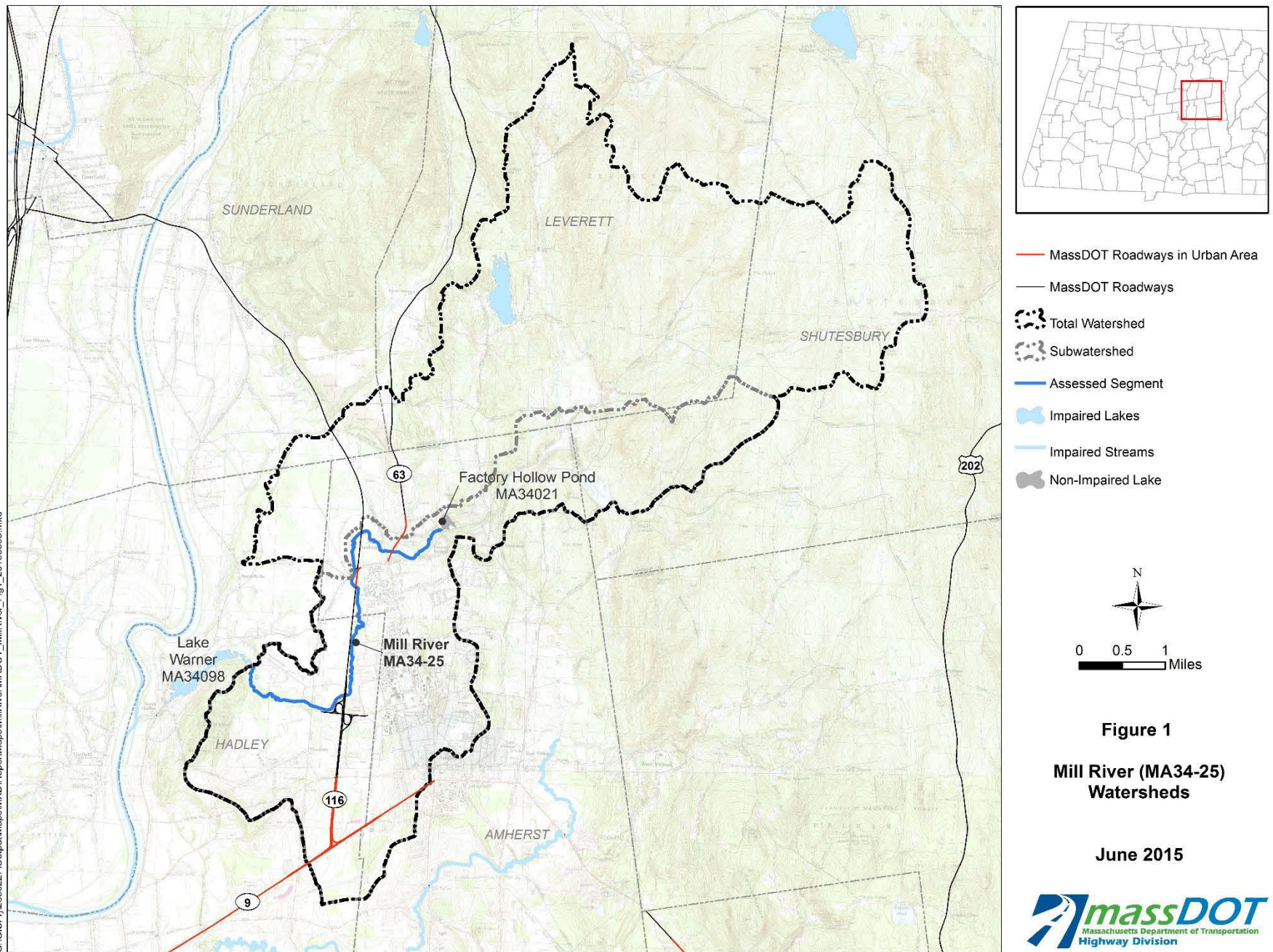
<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairment/Waters/Year5/Attachment5.pdf>

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Mill River. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Mill River, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

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Impaired Waters Assessment for Buttery Brook (MA34-42)

Summary

Impaired Water¹	Stormwater	<i>Escherichia coli</i>
	Impairments:	
	Category:	5 (Waters requiring a TMDL)
	Final TMDLs:	None
	WQ Assessment:	Connecticut River Watershed 2003 Water Quality Assessment Report ² and U.S. EPA Water Quality Assessment Report 2012 Waterbody Report ³
Location	Towns:	South Hadley
	MassDOT Roads:	Route 33, Route 116, US Route 202
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Buttery Brook (MA34-42) is a 1.6-mile segment located in South Hadley, Massachusetts. The perennial portion of Buttery Brook begins west of Haig Avenue and ends at the confluence with the Connecticut River (MA34-05). The brook flows through urban areas where portions are culverted. Buttery Brook is located west of Route 116 and crosses US Route 202 at the interchange with Route 116. The total watershed and subwatershed for Buttery Brook are the same and are approximately 3.2 square miles as shown in Figure 1. Land use within the watershed is comprised mostly of medium-density residential areas. Other land uses within the watershed include multi-family residences, industrial areas and forest.

Buttery Brook was added as a new segment in the Massachusetts Year 2010 Integrated List of Waters⁴ and therefore is not included in the MassDEP's *Connecticut River Watershed 2003 Water Quality Assessment Report*². The EPA's *2012 Waterbody Report for Buttery Brook*³ lists Secondary

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, October 2008. Connecticut River Watershed 2003 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/34wqar07.pdf>

³ EPA, 2012, 2012 Waterbody Report for Buttery Brook. Available at: http://ofmrpub.epa.gov/tmdl_waters10/attains_waterbody.control?p_au_id=MA34-42&p_cycle=2012&p_state=MA&p_report_type=

⁴ MassDEP, November 2011. Massachusetts Year 2010 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/10list6.pdf>

Contact as “good” and Primary Contact as “impaired” due to *Escherichia coli*. The source of the impairment is listed as “source unknown”. Aesthetics and Fish Consumption are listed as “not assessed” for this waterbody. MassDOT’s property within the urban area with the potential to directly contribute stormwater runoff to Buttery Brook (MA34-42) is comprised of portions of Route 116, US Route 202, and Route 33. Refer to Figure 1 for the location of these roadways within the watershed to Buttery Brook.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁵ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁶ MassDOT assessed Buttery Brook (MA34-42) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁷ The condition of Buttery Brook is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁶ of MassDOT’s Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT’s BMP 7U Pathogen Methodology.⁸

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control.

⁵ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁶ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁷ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

⁸ MassDOT, December 2014. Description of MassDOT’s Application of BMP 7U for Pathogen Related Impairments. Available at:

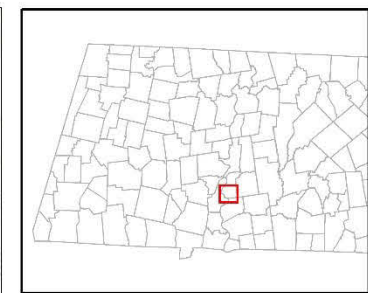
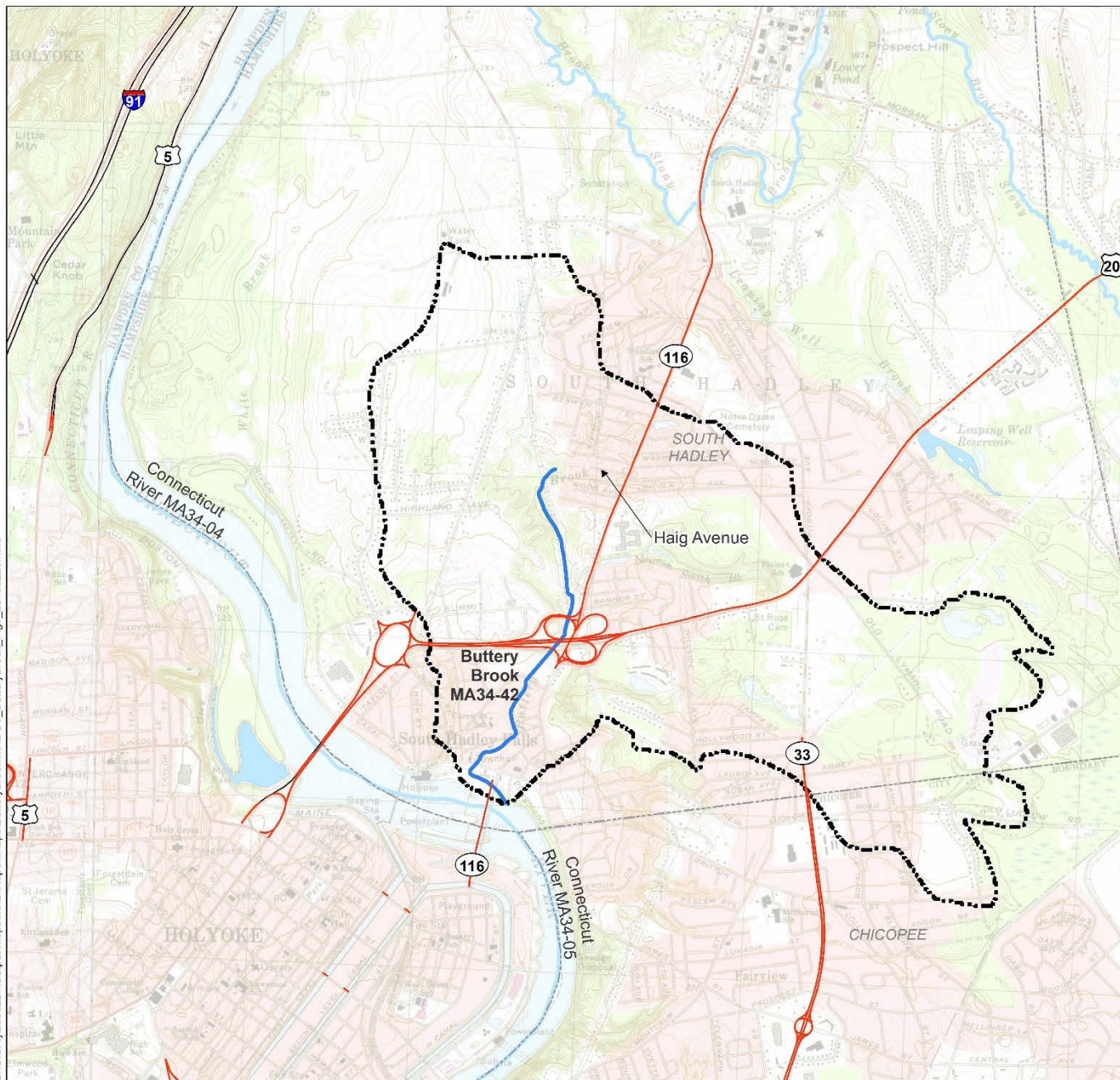
<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairmentWaters/Year5/Attachment5.pdf>

As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Buttery Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Buttery Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.



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

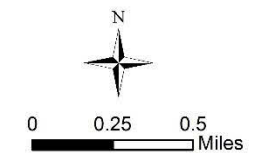


Figure 1
Buttery Brook (MA34-42)
Watershed

June 2015



Impaired Waters Assessment for Unnamed Tributary (MA36-39)

Summary

Impaired Water¹	Stormwater	<i>Escherichia coli</i>
	Impairments:	
	Category:	5 (Waters requiring a TMDL)
	Final TMDLs:	None
	WQ Assessment:	Chicopee River Watershed 2003 Water Quality Assessment Report ²
Location	Towns:	Chicopee, Springfield
	MassDOT Roads:	Interstate 291, US Route 20
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Unnamed Tributary (MA36-39) is a 2.2-mile segment located in Springfield and Chicopee, Massachusetts and is locally known as Poor Brook. Unnamed Tributary flows from headwaters south of the Conrail tracks in Springfield to the confluence with the Chicopee River (MA36-24) in Chicopee. The tributary is located south of the Chicopee River and crosses Interstate 291 at the interchange with US Route 20. Unnamed Tributary is classified as Class B because it is designated as a habitat for fish and is used for primary and secondary contact recreation. The total watershed and subwatershed for Unnamed Tributary are the same and is approximately 1.7 square miles, as shown in Figure 1. Land uses within the watershed are primarily industrial, commercial, and high-density residential areas.

MassDEP's *Chicopee River Watershed 2003 Water Quality Assessment Report*² for Unnamed Tributary lists Aquatic Life, Secondary Contact, and Aesthetics as "support" because they meet surface water quality standards. Primary Contact is listed as "impaired" due to elevated *Escherichia coli* levels. The source of the impairment is listed as unknown but suspected sources include illicit connection/hook-ups to storm sewers and unspecified urban stormwater. Fish Consumption is listed as "not assessed" for this waterbody.

MassDOT's property within the urban area with the potential to directly contribute stormwater runoff to Unnamed Tributary (MA36-39) is comprised of the Interstate 291 interchange with US Route 20

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, October 2008. Chicopee River Watershed 2003 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/36wqar03.pdf>

and portions of Interstate 291 and US Route 20. Refer to Figure 1 for the location of these roadways within the watershed to Unnamed Tributary.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.³ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁴ MassDOT assessed Unnamed Tributary (MA36-39) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁵ The condition of Unnamed Tributary is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁴ of MassDOT’s Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT’s BMP 7U Pathogen Methodology.⁶

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT’s BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will

³ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:
http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁴ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:
http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

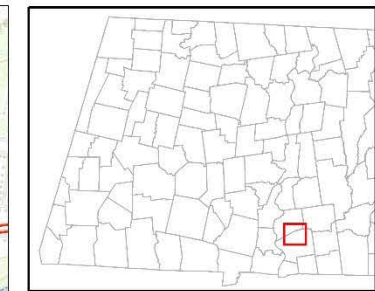
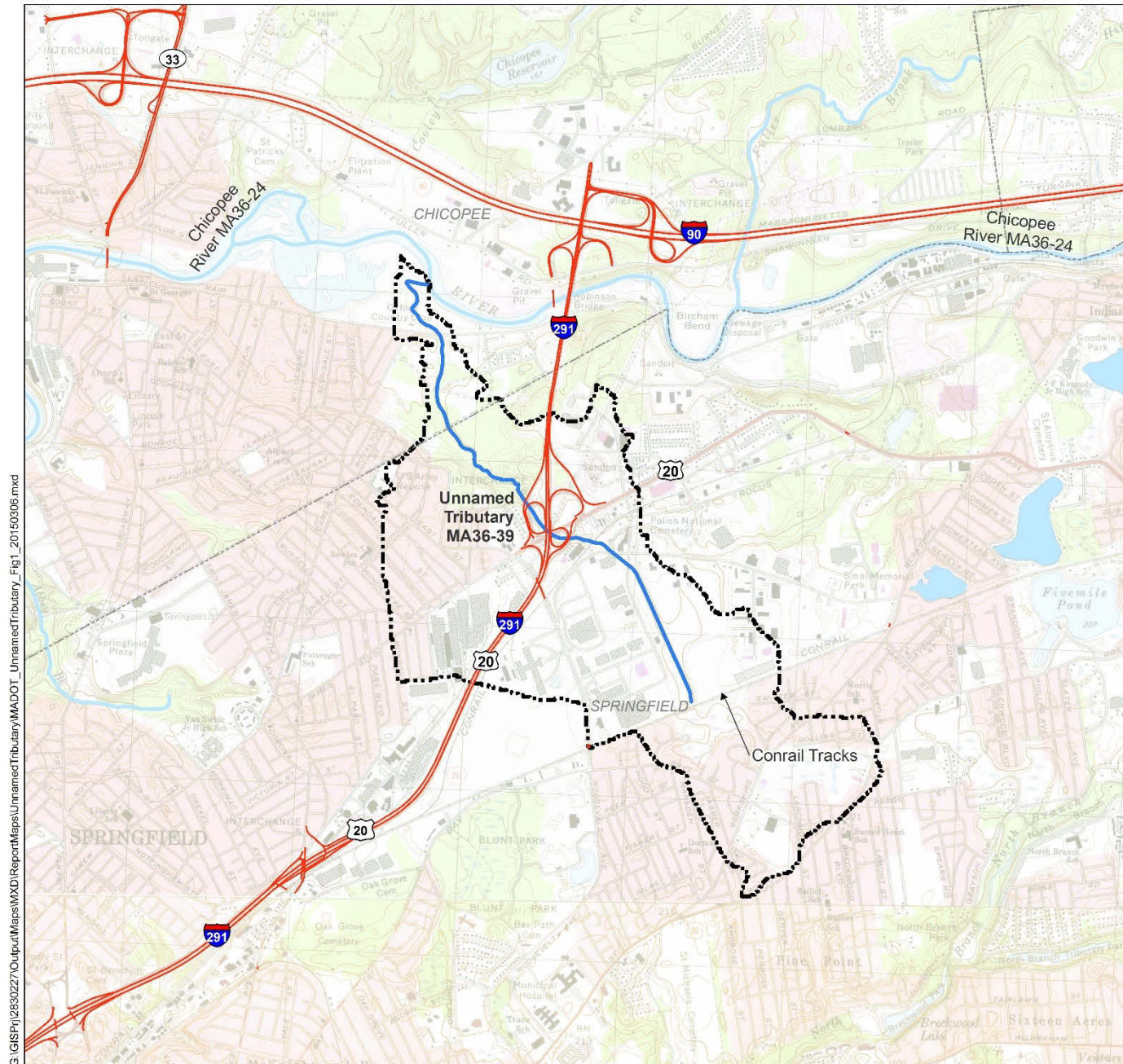
⁵ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

⁶ MassDOT, December 2014. Description of MassDOT’s Application of BMP 7U for Pathogen Related Impairments. Available at:
<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairmentWaters/Year5/Attachment5.pdf>

be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Unnamed Tributary. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Unnamed Tributary, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.



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

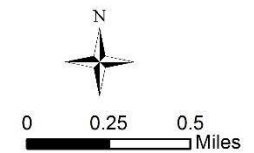


Figure 1
Unnamed Tributary (MA36-39)
Watershed

June 2015



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Impaired Waters Assessment for Fuller Brook (MA36-41)

Summary

Impaired Water¹	Stormwater	<i>Escherichia coli</i>
	Impairments:	
	Category:	5 (Waters requiring a TMDL)
	Final TMDLs:	None
	WQ Assessment:	Chicopee River Watershed 2003 Water Quality Assessment Report ²
Location	Towns:	Chicopee
	MassDOT Roads:	Interstate 90
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Fuller Brook (MA36-41) is a 1.9-mile segment located in Chicopee, Massachusetts. Fuller Brook starts at the Ludlow/Chicopee corporate boundary, where the stream name changes from Higher Brook (MA36-42), a category 2 water, and it ends at the confluence with the Chicopee River (MA36-24) in Chicopee. The brook is located north of the Chicopee River and crosses Interstate 90 east of the Interstate 90 and Interstate 291 interchange. Fuller Brook is classified as a Class B segment because it is designated as a habitat for fish and is used for primary and secondary contact recreation. The total watershed is the same as the subwatershed for Fuller Brook and covers approximately 11 square miles and is shown in Figure 1. Land use within the watershed is primarily high and medium-density residential areas. Other land uses within the watershed include commercial areas, forest, and wetlands.

MassDEP's *Chicopee River Watershed 2003 Water Quality Assessment Report*² lists Aquatic Life, Secondary Contact, and Aesthetics as "support" because they meet surface water quality standards. Primary Contact is listed as "impaired" due to elevated *Escherichia coli*. The assessment report lists the source of the impairment as "source unknown" but suspected sources are illicit connections/hook-ups to storm sewers and unspecified urban stormwater. Fish Consumption was listed as "not assessed" for this waterbody.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, October 2008. Chicopee River Watershed 2003 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/36wqar03.pdf>

MassDOT's property within the urban area with the potential to directly contribute stormwater runoff to Fuller Brook (MA36-41) is comprised of portions of Interstate 90. Refer to Figure 1 for the location of this roadway within the watershed to Fuller Brook.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.³ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁴ MassDOT assessed Fuller Brook (MA36-41) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁵ The condition of Fuller Brook is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁴ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7U Pathogen Methodology.⁶

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

³ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁴ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁵ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14wlistp.pdf>

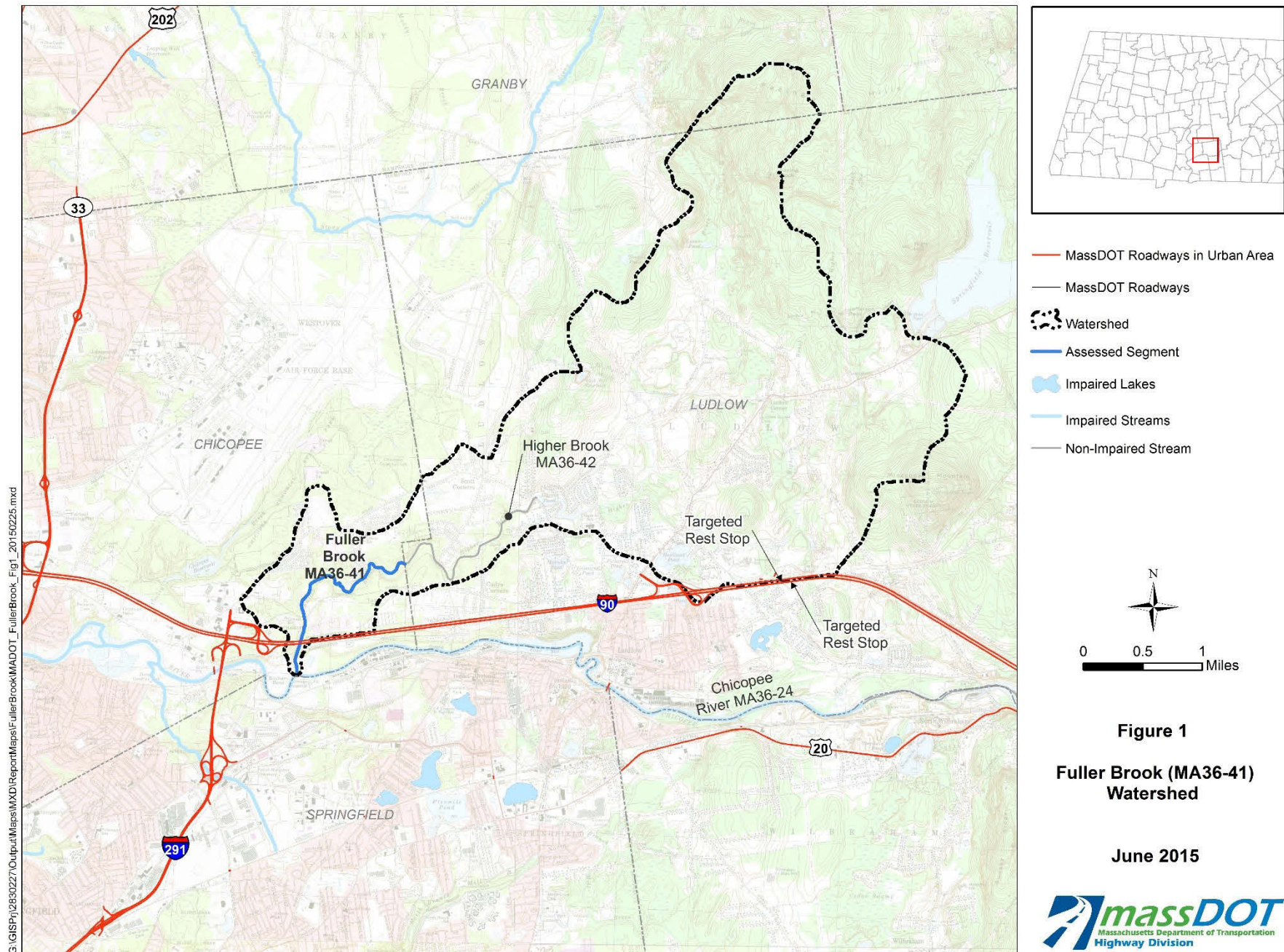
⁶ MassDOT, December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairmentWaters/Year5/Attachment5.pdf>

In addition, as part of its pet waste management program, MassDOT has determined that there are two targeted rest stops located within the watershed to Fuller Brook. Rest stops are located on the eastbound and westbound sides of Interstate 90 in Ludlow. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Fuller Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Fuller Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.



Impaired Waters Assessment for McKinstry Brook (MA41-13)

Summary

Impaired Water ¹	Impairments:	Stormwater:	<i>Escherichia coli</i>
		Non-Stormwater: ²	<i>Debris/Floatables/Trash</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>	
	Final TMDLs:	<i>None</i>	
	WQ Assessment:	<i>French and Quinebaug River Watersheds 2004-2008 Water Quality Assessment Report³</i>	
Location	Towns:	<i>Charlton, Southbridge and Sturbridge</i>	
	MassDOT Roads:	<i>Interstate 90, Route 20, Route 49 and Route 131</i>	
Assessment Method(s)			
	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>	

Site Description

McKinstry Brook (MA41-13) originates east of Brookfield Road near the Charlton and Sturbridge town line and flows south for approximately 7.3 miles to its confluence with Quinebaug River (MA41-02) in Southbridge, Massachusetts (Figure 1).

MassDEP's *French and Quinebaug River Watersheds 2004-2008 Water Quality Assessment Report³* identified the Primary Contact, Secondary Contact and Aesthetics uses with an "impaired" status for the lower 0.3 miles of the brook due to elevated *Escherichia coli* bacteria counts and aesthetically objectionable conditions associated with trash and debris, which are likely associated with the densely developed reach of the river. The upper 7.0-mile segment of the water body was identified as "support" for both Secondary Contact and Aesthetics but was "not assessed" for Primary Contact use. The Aquatic Life use was identified as "support" with an "alert" status given the hyperdominance of filter feeders. Upstream wetlands and beaver activity are the likely cause of the nutrient enrichment that is affecting the invertebrate community. Fish Consumption use was "not assessed".

Figure 1 shows the total and subwatershed, which are the same, totaling approximately 8.0 square miles and are located in the towns of Charlton, East Brookfield, Southbridge and Sturbridge,

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDOT, December 2012. Impaired Waters Assessment for Impaired Waters with Impairments Unrelated to Stormwater. Available at: http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year3/Year3_ImpairedWatersAssessment_1.pdf#page=308

³ MassDEP, November 2009. French and Quinebaug River Watersheds 2004-2008 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/3baapp/4142wqar04.pdf>

Massachusetts. The watershed to McKinstry Brook is comprised of low density residential areas, cropland and wetlands with the majority of the watershed consisting of forested land.

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to McKinstry Brook (MA41-13) is comprised of portions of Route 131. Refer to Figure 1 for the location of this roadway within the subwatershed to McKinstry Brook. It should be noted that MasDOT-owned roadways Interstate 90, Route 20 and Route 49 in the McKinstry Brook subwatershed are not within an MS4-regulated urban area.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁴ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁵ MassDOT assessed McKinstry Brook (MA41-13) using the methodologies described below.

MassDOT has identified a water body impairment in the McKinstry Brook watershed that is not related to stormwater runoff. This impairment is debris, floatables, and trash. In accordance with MassDOT's *Impaired Waters Assessment for Impaired Waters with Impairments Unrelated to Stormwater* in the December 8, 2012 EPA submittal, the non-stormwater related impairments are not specifically addressed as part of the Impaired Waters Program.²

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁶ The condition of McKinstry Brook is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁵ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition

⁴ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁵ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁶ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b),

314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7U Pathogen Methodology.⁷

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

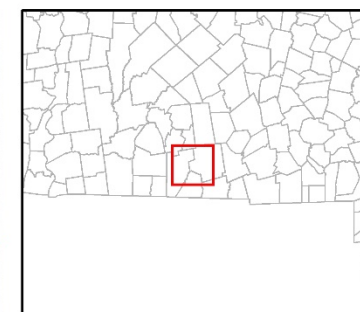
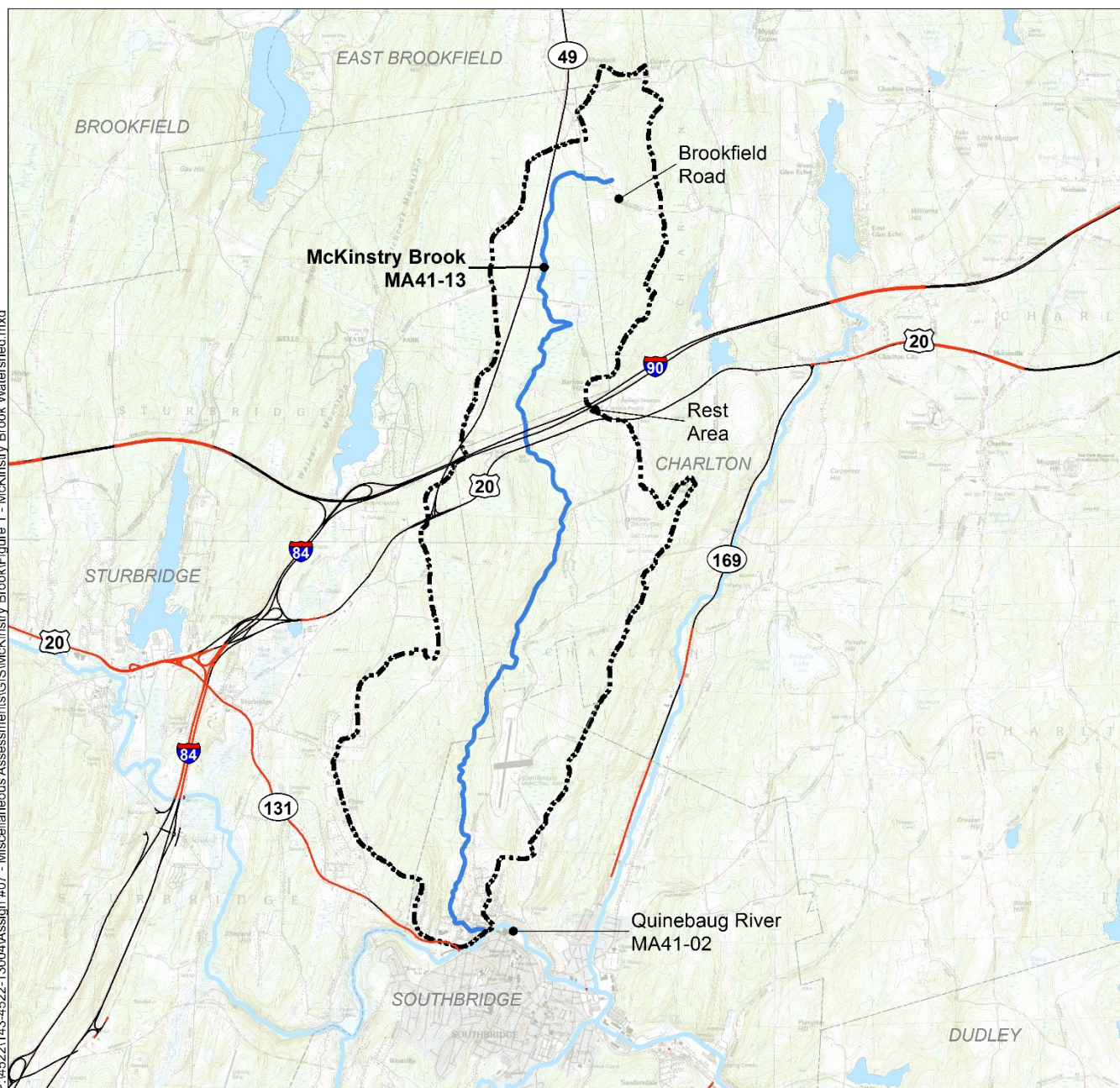
In addition, as part of its pet waste management program, MassDOT has determined that a portion of one MassDOT targeted rest stop is located within the subwatershed of this water body. The rest stop is located south of Interstate 90 westbound, approximately 0.6 miles west of the McKinstry Brook crossing with Interstate 90. This stretch of Interstate 90, which passes through the McKinstry Brook subwatershed, is not considered urban. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for McKinstry Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of McKinstry Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

⁷ MassDOT, December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year5/Attachment5.pdf>



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

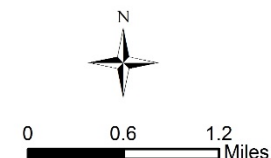


Figure 1
McKinstry Brook
(MA41-13)
Watershed
June 2015



Impaired Waters Assessment for Torrey Creek (MA53-17)

Summary

Impaired Water ¹	Stormwater Impairments:	<i>Fecal Coliform</i>
	Category:	4A (TMDL is completed)
	Final TMDLs:	<i>Bacteria TMDL for the Palmer River Basin</i> ²
	WQ Assessment:	<i>Narragansett and Mount Hope Bay Watersheds 2004-2008 Water Quality Assessment Report</i> ³
Location	Towns:	<i>Rehoboth</i>
	MassDOT Roads:	<i>I-195, Route 6, Barney Avenue</i>
Assessment Method(s)	7R (TMDL Method) <input checked="" type="checkbox"/>	7U (Non-TMDL Method) <input type="checkbox"/>

Site Description

Torrey Creek (MA53-17) is a 2.56 acre tidally-influenced, Class SA waterway located in Rehoboth, Massachusetts. The creek flows generally east to the Palmer River (MA53-03). The flow path of this segment is sinuous as it winds through an open tidal wetland for the 1,900 feet between Barney Avenue and its confluence with the Palmer River. The total and subwatershed to Torrey Creek are the same and are shown on Figure 1. Land use estimates for the 2.4 square mile watershed are forest (60%), residential (17%), and agriculture (12%).³

MassDEP's *Narragansett and Mount Hope Bay Watersheds 2004-2008 Water Quality Assessment Report* identified the Shellfish Harvesting use with an "impaired" status because the shellfish growing area is prohibited based on elevated total fecal coliform concentrations.³ The source of the fecal coliform is unknown. All other uses were not assessed. According to the MassDEP *Bacteria TMDL for the Palmer River Basin* report, there are several sources of fecal coliforms. Wildfowl populations (including geese, gulls, and ducks) and agricultural inputs (primarily from cows, pigs, and horses) are speculated to be major bacterial sources.²

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to Torrey Creek is comprised of portions of Interstate 195, Route 6, Anthony Street, School Street, and

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, April 2004. Bacteria TMDL for the Palmer River Basin, Available at: http://www.epa.gov/waters/tmdl/docs/35085_palmer.pdf

³ MassDEP, March 2009. Narragansett and Mount Hope Bay Watersheds 2004-2008 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/3baapp/6153wq08.pdf>

Barney Avenue. Refer to Figure 1 for the location of these roadways within the subwatershed to Torrey Creek.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁴ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁵ MassDOT assessed Torrey Creek (MA53-17) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁶ The condition of Torrey Creek (MA53-17) is not proposed to change.

BMP 7R for Pathogen TMDL (CN 182.0)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R⁴ of MassDOT’s Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body covered by a final TMDL. Torrey Creek (MA53-17) is covered by the *Final Pathogen TMDL for the Palmer River Watershed*.²

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to be consistent with relevant TMDLs and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT’s BMP 7R Pathogen Methodology.⁷

The Palmer River watershed has no documented point sources of bacteria pollution but numerous non-point contributions are identified in the TMDL report. The primary bacteria source identified in the TMDL report is agricultural runoff, due to livestock contributions. The report states that the findings of water quality sampling “point strongly toward agriculture as the primary source of bacterial pollution in the dry-weather source categories evaluated in the TMDL”. Other potential dry weather sources identified included poorly performing septic systems, wildlife directly contributing fecal matter to the receiving water (versus contributions via stormwater inputs), and livestock. Stormwater runoff, including agricultural runoff, was the primary wet-weather source category evaluated in the TMDL report.

⁴ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁵ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁶ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14/wlisp.pdf>

⁷ MassDOT, December 2014. Description of MassDOT’s Application of BMP 7R for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year5/Attachment4.pdf>

The TMDL report states the following on Page 19:

“several sub-basins in the Palmer River watershed stand out as likely priority areas to address bacteria pollution sources. These sub-basins tend to be located in the southern and western portions of the watershed, where relatively dense residential development is increasing, major roads and highways are present, intensive agriculture is practiced, golf courses and the waterfowl that frequent them are plentiful, and stream channels are less buffered by forested and otherwise vegetated zones than they are in the upper Palmer.”

Segment MA53-17 is located in the southern portion of the watershed.

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the Palmer River TMDL report (Section 8.0, page 27) recommends the following specific BMPs to address elevated fecal coliform levels in the watershed:

- Correction of failing septic systems
- Controls for agricultural runoff, such as improved cattle fencing and feeding operations
- Stream bank, riparian wetland, and floodplain restoration in the riparian zone where residential development and roadways are predominant land uses

The TMDL report also indicates that structural BMPs may be appropriate to address runoff from impervious areas in instances where fecal coliform concentrations cannot be reduced by other means.

The following BMPs are specifically identified as being ongoing and/or planned in order to meet the bacteria TMDL for the Palmer River:

- Agricultural BMPs
- Septic tank controls
- Documentation of storm drain outfall locations
- Watershed resident education
- Additional monitoring

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7R Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements and TMDL recommendations in regard to pathogens.

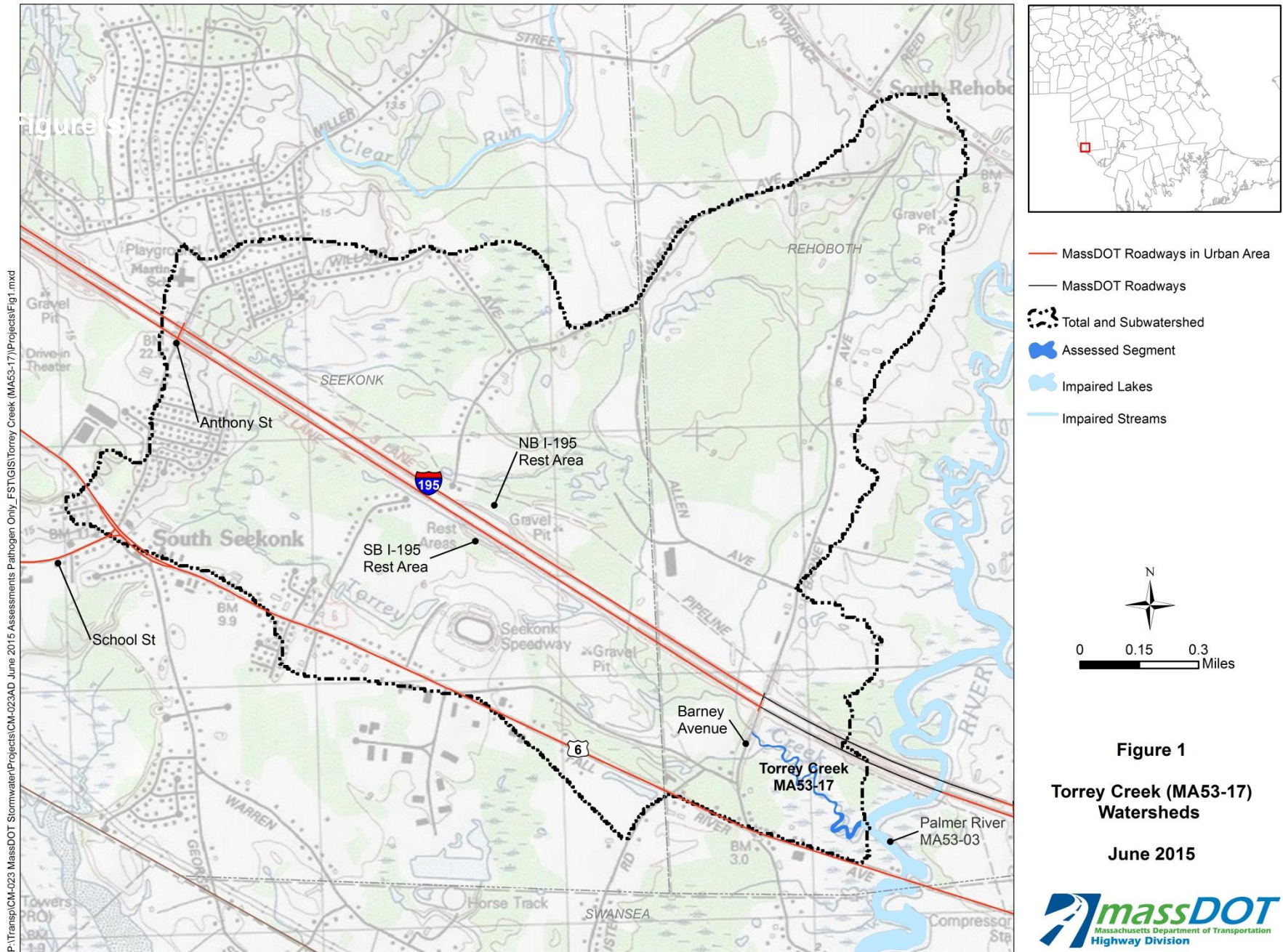
In accordance with the BMPs identified in the *Bacteria TMDL for the Palmer River Basin* report, MassDOT has documented the locations of its stormwater outfalls. In addition, as part of its pet waste management program, MassDOT has determined that MassDOT rest stops are located within the subwatershed of this water body, along both the northbound and southbound lanes of Interstate 195 (Figure 1). These rest stops are currently closed to traffic. MassDOT will be installing signs at active rest stops within the subwatersheds of pathogen-impaired waterbodies. The signs will inform the

public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Although the TMDL report also identifies the benefits of riparian restoration and structural BMPs to address runoff from impervious areas in some instances, MassDOT feels that it is not a beneficial approach to implement these BMPs in advance of other ongoing BMP efforts identified in the watershed, given the documented variability of pathogen concentrations in highway runoff, and the low probability of achieving substantial gains towards meeting the TMDL with solely implementing IC reductions and controls.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Torrey Creek. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit and the applicable Pathogen TMDLs. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Torrey Creek, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.



Impaired Waters Assessment for Rocky Run (MA53-18)

Summary

Impaired Water ¹	Stormwater Impairments:	<i>Fecal Coliform</i>
	Category:	<i>4A (TMDL is completed)</i>
	Final TMDLs:	<i>Bacteria TMDL for the Palmer River Basin</i> ²
	WQ Assessment:	<i>Narragansett and Mount Hope Bay Watersheds 2004-2008 Water Quality Assessment Report</i> ³
Location	Towns:	<i>Rehoboth</i>
	MassDOT Roads:	<i>I-195, Route 6, Route 136</i>
Assessment Method(s)	7R (TMDL Method) <input checked="" type="checkbox"/>	7U (Non-TMDL Method) <input type="checkbox"/>

Site Description

Rocky Run (MA53-18) is the westernmost segment of Rocky Run (located downstream of Rocky Run segment MA53-16), and begins at Mason Street and ends at the confluence with the Palmer River (MA53-05) approximately 660 feet to the northwest. This segment is tidally influenced and has an area of 1.3 acres. The total and subwatershed to Rocky Run are the same and are shown on Figures 1a and 1b. Based on review of aerial imagery, land use within the 10.7-square mile watershed primarily consists of wetlands, undeveloped forest, agricultural fields, and residential development.

MassDEP's *Narragansett and Mount Hope Bay Watersheds 2004-2008 Water Quality Assessment Report*³ identified the Shellfish Harvesting use with an "impaired" status because the shellfish growing area is prohibited based on elevated total fecal coliform concentrations. The source of the fecal coliform is listed as unknown. All other uses were not assessed. According to the MassDEP *Bacteria TMDL for the Palmer River Basin Final Report*, agricultural inputs (primarily from cows, pigs, and horses) are speculated to be bacterial sources.²

MassDOT's property within the urban area with the potential to directly contribute stormwater runoff to Rocky Run (MA53-18) is comprised of portions of I-195, Route 6, and Route 136. Refer to Figure 1 for the location of these roadways within the subwatershed to Rocky Run.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, April 2004. Bacteria TMDL for the Palmer River Basin, Available at: http://www.epa.gov/waters/tmdl/docs/35085_palmer.pdf

³ MassDEP, March 2009. Narragansett and Mount Hope Bay Watersheds 2004-2008 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/3baapp/6153wq08.pdf>

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁴ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁵ MassDOT assessed Rocky Run (MA53-18) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁶ The condition of Rocky Run is not proposed to change.

BMP 7R for Pathogen TMDL (CN 182.0)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R⁴ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body covered by a final TMDL. Rocky Run (MA53-18) is covered by the *Final Pathogen TMDL for the Palmer River Basin Watershed*.²

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to be consistent with relevant TMDLs and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7R Pathogen Methodology.⁷

The Palmer River watershed has no documented point sources of bacteria pollution but numerous non-point contributions are identified in the TMDL report. The bacterial sources identified in the TMDL report include poorly performing septic systems, waterfowl, livestock, and stormwater runoff contributions. The report states that the findings of water quality sampling "point strongly toward agriculture as the primary source of bacterial pollution in the dry-weather source categories evaluated in the TMDL". Other potential dry weather sources identified included poorly performing septic systems, wildlife directly contributing fecal matter to the receiving water (versus contributions via stormwater inputs), and livestock. Stormwater runoff, including agricultural runoff, was the primary wet-weather source category evaluated in the TMDL report.

⁴ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁵ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁶ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

⁷ MassDOT, December 2014. Description of MassDOT's Application of BMP 7R for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year5/Attachment4.pdf>

The TMDL report states the following on Page 19:

“several sub-basins in the Palmer River watershed stand out as likely priority areas to address bacteria pollution sources. These sub-basins tend to be located in the southern and western portions of the watershed, where relatively dense residential development is increasing, major roads and highways are present, intensive agriculture is practiced, golf courses and the waterfowl that frequent them are plentiful, and stream channels are less buffered by forested and otherwise vegetated zones than they are in the upper Palmer.”

Segment MA53-18 is located in the southern portion of the watershed.

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the Palmer River TMDL report (Section 8.0, page 26) recommends the following specific BMPs to address elevated fecal coliform levels in the watershed:

- Correction of failing septic systems
- Controls for agricultural runoff, such as improved cattle fencing and feeding operations
- Stream bank, riparian wetland, and floodplain restoration in the riparian zone where residential development and roadways are predominant land uses

The TMDL report also indicates that structural BMPs may be appropriate to address runoff from impervious areas in instances where fecal coliform concentrations cannot be reduced by other means.

The following BMPs are specifically identified as being ongoing and/or planned in order to meet the bacteria TMDL for the Palmer River:

- Agricultural BMPs
- Septic tank controls
- Documentation of storm drain outfall locations
- Watershed resident education
- Additional monitoring

Proposed Mitigation Plan

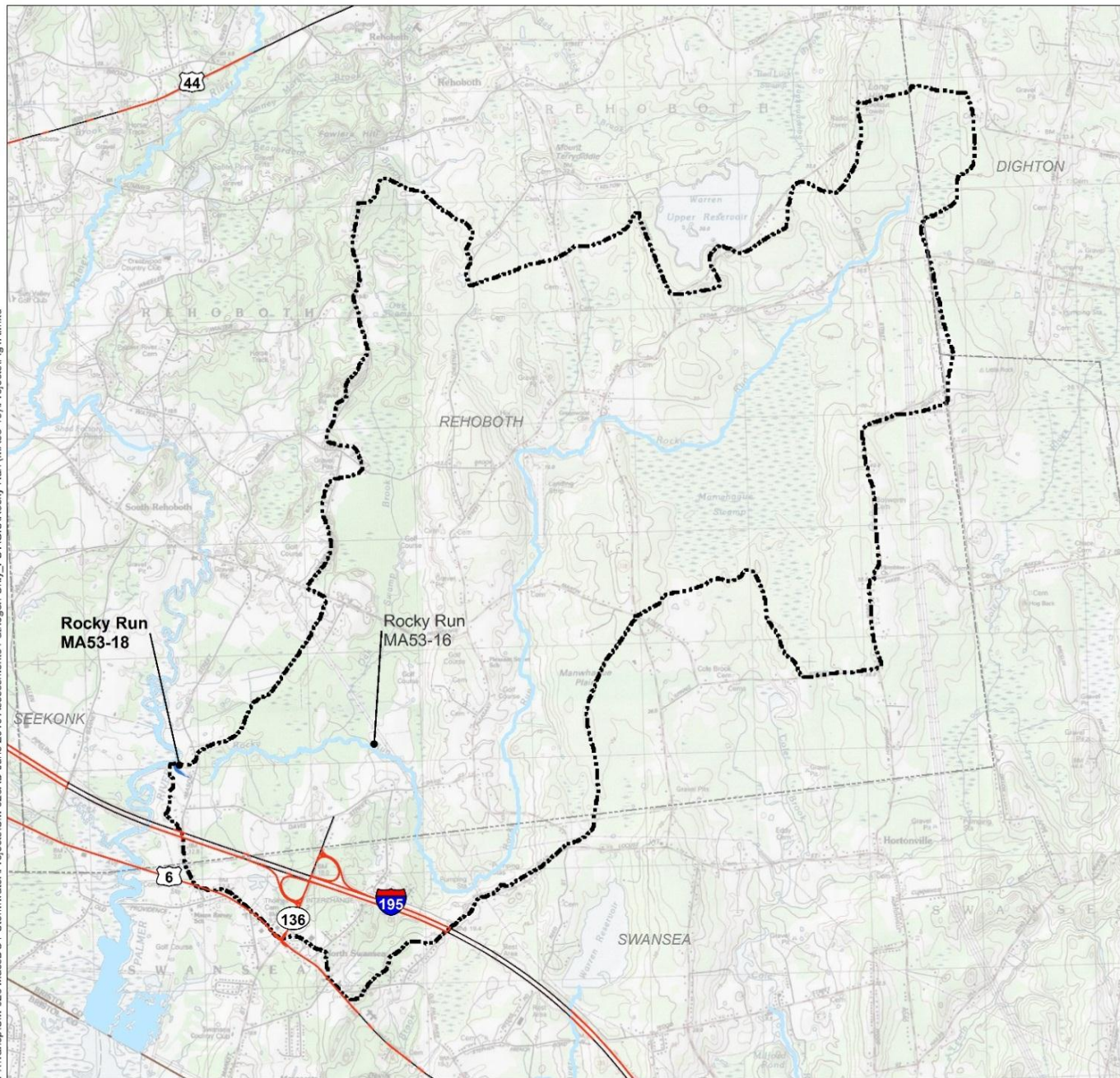
MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7R Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements and TMDL recommendations in regard to pathogens.

In accordance with the BMPs identified in the *Bacteria TMDL for the Palmer River Basin* report, MassDOT has documented the locations of its stormwater outfalls. In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen-impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Although the TMDL report also identifies the benefits of riparian restoration and structural BMPs to address runoff from impervious areas in some instances, MassDOT feels that it is not a beneficial approach to implement these BMPs in advance of other ongoing BMP efforts identified in the watershed, given the documented variability of pathogen concentrations in highway runoff, and the low probability of achieving substantial gains towards meeting the TMDL with solely implementing IC reductions and controls.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Rocky Run. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit and the applicable Pathogen TMDLs. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Rocky Run, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.



- MassDOT Roadways in Urban Area
- MassDOT Roadways
- Total and Subwatershed
- Assessed Segment
- Impaired Lakes
- Impaired Streams

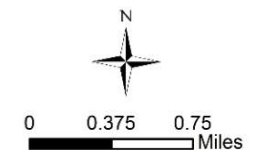
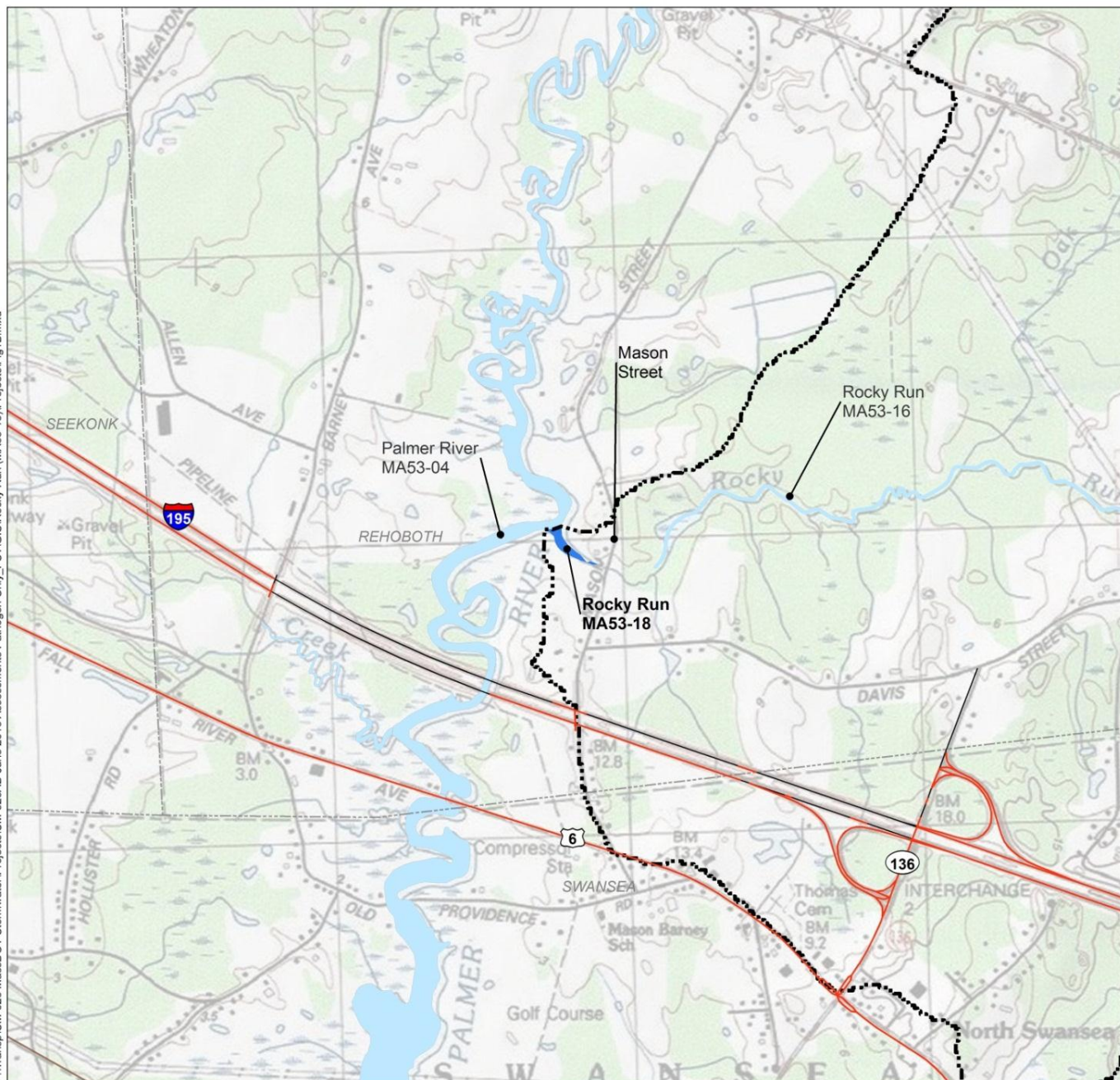


Figure 1A
Rocky Run (MA53-18)
Watersheds
June 2015





- MassDOT Roadways in Urban Area
- MassDOT Roadways
- Total and Subwatershed
- Assessed Segment
- Impaired Lakes
- Impaired Streams

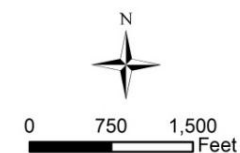


Figure 1B
Rocky Run (MA53-18)
Watersheds
June 2015

massDOT
 Massachusetts Department of Transportation
 Highway Division

Impaired Waters Assessment for Beaver Brook (MA62-09)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Fecal Coliform</i>
	Category:	<i>4A (TMDL is completed)</i>
	Final TMDLs:	<i>Final Pathogen TMDL for the Taunton River Watershed²</i>
	WQ Assessment:	<i>Taunton River Watershed 2001 Water Quality Assessment Report³</i>
Location	Towns:	<i>Abington, Brockton, East Bridgewater</i>
	MassDOT Roads:	<i>Route 27, Route 123, and Route 139</i>
Assessment Method(s)	7R (TMDL Method) <input checked="" type="checkbox"/>	7U (Non-TMDL Method) <input type="checkbox"/>

Site Description

Beaver Brook (MA62-09) is a Class B waterway that is part of the subwatershed for the Matfield River (MA62-32). The Matfield River and its tributaries drain 77 square miles in the northeast portion of the Taunton River watershed through some of the most densely developed areas of the Commonwealth. Beaver Brook runs for a length of 6.8 miles starting from its outlet at Cleveland Pond (MA62042) in Abington, MA. From this point, the Brook flows south to the confluence with the Salisbury Plain River (MA62-05), forming the Matfield River in East Bridgewater, MA. The drainage area of this segment is approximately 9.4 square miles. The total and subwatershed to Beaver Brook are the same and is shown on Figure 1. Land use estimates for the watershed include forest (49.6%), residential (28.4%) and open land (10.2%).³

MassDEP's *Taunton River Watershed 2001 Water Quality Assessment Report* for this receiving water identified two designated use groups as having an "impaired" status.³ Primary and Secondary Contact Recreation was deemed as "impaired" due to fecal coliform bacteria. The source of pollution is reported as unknown. Suspected sources of this impairment is discharge from municipal separate storm sewer systems. The Aesthetics Use was assessed as a "support" status. The Aquatic Life and Fish Consumptions Uses were not assessed.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, June 2011. Final Pathogen TMDL for the Taunton River Watershed Available at: <http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/taunton1.pdf>

³ MassDEP, 2001, Taunton River Watershed 2001 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/3baapp/62wqar1.pdf>

MassDOT's property within the urban area with the potential to directly contribute stormwater runoff to Beaver Brook is comprised of portions of Routes 27, Route 123, and Route 139. Refer to Figure 1 for the location of these roadways within the subwatershed to Beaver Brook.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁴ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁵ MassDOT assessed Beaver Brook (MA62-09) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁶ The condition of Beaver Brook is not proposed to change.

BMP 7R for Pathogen TMDL (CN 0256.0)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R⁴ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body covered by a final TMDL. Beaver Brook (MA62-09) is covered by the *Final Pathogen TMDL for the Taunton River Watershed*.²

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to be consistent with relevant TMDLs and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7R Pathogen Methodology.⁷

The Taunton River watershed includes numerous point and non-point contributions that are identified in the TMDL report. The report lists leaking sewer pipes, stormwater drainage systems, failing septic systems, recreational activities, wildlife including birds, and inadequately treated boat wastes as some of the dry weather sources of pollution. Stormwater runoff including municipal sewer systems, combined sewer overflows, sanitary sewer overflows, and wildlife and domesticated animals were the primary wet-weather sources listed in the TMDL report.

⁴ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁵ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁶ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

⁷ MassDOT, December 2014. Description of MassDOT's Application of BMP 7R for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year5/Attachment4.pdf>

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the Taunton River TMDL report (Section 8.0, page 56) recommends the following specific BMPs to address elevated fecal coliform levels in the watershed:

- Correction of failing septic systems
- Controls for stormwater runoff

The TMDL report also indicates that structural BMPs may be appropriate to address runoff from impervious areas in instances where fecal coliform concentrations cannot be reduced by other means.

The following BMPs are specifically identified as being ongoing and/or planned in order to meet the bacteria TMDL for the Taunton River Watershed:

- Elimination of illicit sewer connections
- Regulation of stormwater runoff and develop SWMP for MS4s
- Documentation of storm drain outfall locations
- Septic tank controls
- Regulation of WWTP discharges

Proposed Mitigation Plan

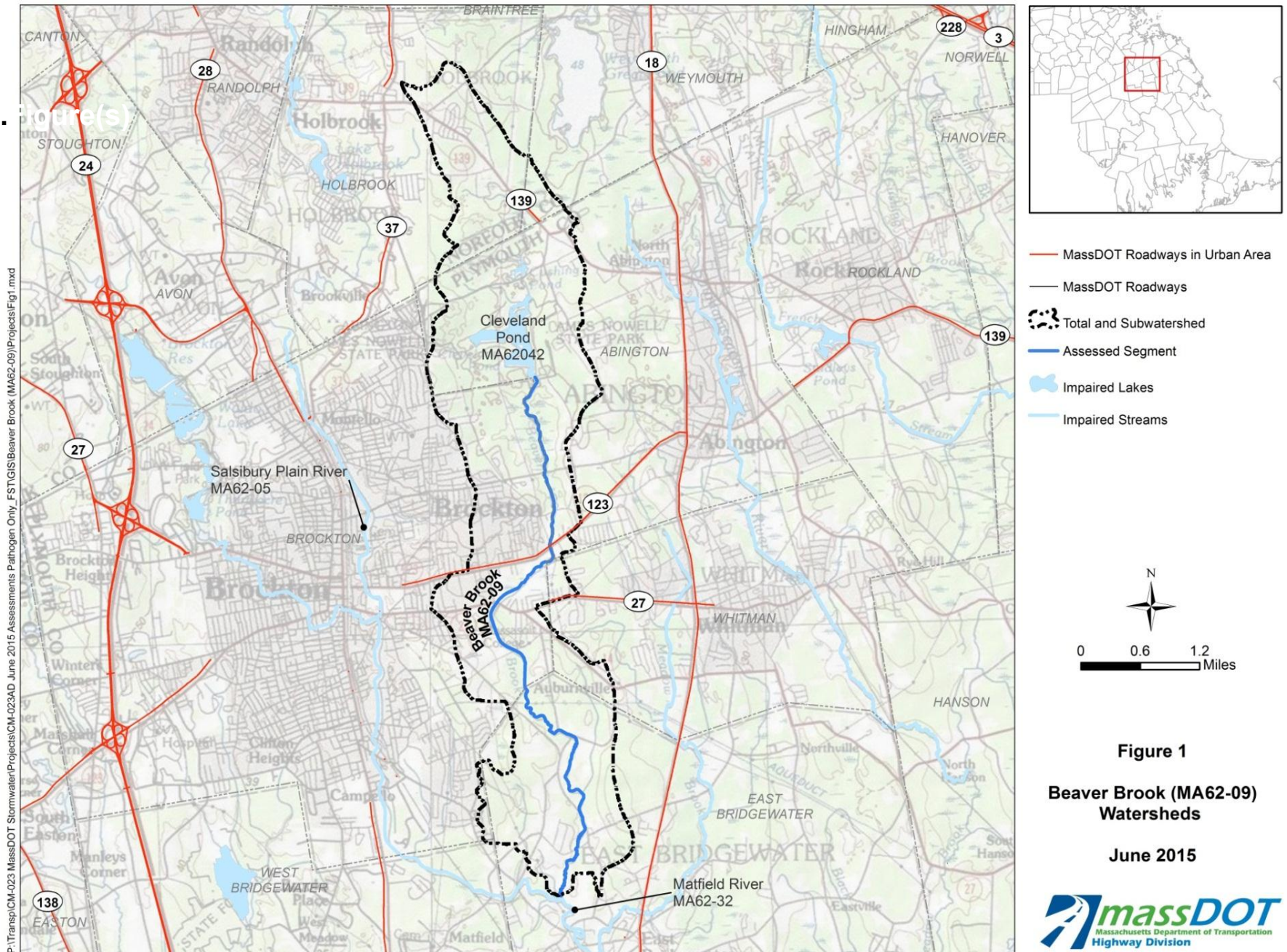
MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7R Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements and TMDL recommendations in regard to pathogens.

In accordance with the BMPs identified in the *Final Pathogen TMDL for the Taunton River Watershed*, MassDOT has documented the locations of its stormwater outfalls.² In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen-impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Although the TMDL report also identifies the benefits of structural BMPs to address runoff from impervious areas in some instances, MassDOT feels that it is not a beneficial approach to implement these BMPs in advance of other ongoing BMP efforts identified in the watershed, given the documented variability of pathogen concentrations in highway runoff, and the low probability of achieving substantial gains towards meeting the TMDL with solely implementing IC reductions and controls.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Beaver Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit and the applicable Pathogen TMDLs. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Beaver Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.



Impaired Waters Assessment for Pecunit Brook (MA73-25)

Summary

Impaired Water¹	<p>Stormwater Impairments: <i>Escherichia Coli</i> Category: <i>5 (Waters requiring a TMDL), proposed to be change to Category 4a (TMDL is Completed) in the proposed 2014 303(d) list²</i></p> <p>Final TMDLs: <i>Final Total Maximum Daily Loads of Bacteria for Neponset River Basin³ and Addendum: Final Total Maximum Daily Loads of Bacteria for Neponset River Basin⁴</i></p> <p>WQ Assessment: <i>Neponset River Watershed 2004 Water Quality Assessment Report⁵</i></p>
Location	<p>Towns: <i>Canton</i></p> <p>MassDOT Roads: <i>Interstate 95</i></p>
Assessment Method(s)	<p>7R (TMDL Method) <input checked="" type="checkbox"/> 7U (Non-TMDL Method) <input type="checkbox"/></p>

Site Description

Pecunit Brook (MA73-25) is a 1.8-mile long brook located in Canton, MA. Pecunit Brook begins east of Carey Circle and flows north to the confluence with the Neponset River (MA73-02). The total and subwatershed of Pecunit Brook are the same and are shown on Figure 1. Based on a review of aerial imagery, land use in the watershed consists of open space (golf course, cemetery), residential development, and transportation (I-95).

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14wlistp.pdf>

³ MassDEP, May 2002 Final Total Maximum Daily Load of Bacteria for Neponset River Basin. Available at <http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/neponset.pdf>

⁴ MassDEP, December 2012 Addendum: Final Total Maximum Daily Load of Bacteria for Neponset River Basin. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/heptmdla.pdf>

⁵ MassDEP, Neponset River Watershed 2004 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/73wqar10.pdf>

MassDEP's *Neponset River Watershed 2004 Water Quality Assessment Report* for this receiving water identified the Primary Contact use as having an "impaired" status due to *escherichia coli*. The source of this impairment was reported as unknown. The Secondary Contact use was deemed as "support". All other designated uses were not assessed.

MassDOT's property within the urban area with the potential to directly contribute stormwater runoff to Pecunit Brook is comprised of a portion of Interstate 95. Refer to Figure 1 for the location of this roadway within the subwatershed to Pecunit Brook.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R⁶ methodology. MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁷ MassDOT assessed Pecunit Brook (MA73-25) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.² The condition of Pecunit Brook is proposed to change to Category 4a (TMDL is Completed) as it is covered under the Final Bacteria TMDL for the Neponset River.^{3,4}

BMP 7R for Pathogen TMDL (CN 121.5)

MassDOT assessed the indicator bacteria (*escherichia coli*) impairment using the approach described in BMP 7R⁶ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body covered by a final TMDL. Pecunit Brook (MA73-25) is covered by the *Final Total Maximum Daily Load for Neponset River Basin* and the *Addendum: Final Total Maximum Daily Loads of Bacteria for Neponset River Basin*.^{4,4} The 2012 TMDL Addendum added four pathogen impaired segments to the original Neponset River TMDL including the Neponset River ((MA73-01), Unnamed Tributary (MA 73-32), Unnamed Tributary (MA83-33), and Pecunit Brook (MA73-25).

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to be consistent with relevant TMDLs and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7R Pathogen Methodology.⁸

⁶ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁷ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁸ MassDOT, December 2014. Description of MassDOT's Application of BMP 7R for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year5/Attachment4.pdf>

The Neponset River TMDL report documents point and non-point sources of bacteria pollution identified in the watershed. The report (page 29) states that point sources of fecal coliform in the Neponset River watershed include overflows from stormwater and sanitary sewer systems. A variety of sources of non-point sources of fecal coliform exist in the watershed including “stormwater runoff, leaking sewers, and failing or inadequate septic systems...”

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the Neponset River Basin TMDL report (TMDL Implementation, page 37) recommends the following specific BMPs to address elevated fecal coliform levels in the watershed:

- Correction of illicit discharge connections
- Repair of failing septic systems
- Elimination of combined/sanitary sewer overflows
- Controls for stormwater runoff

Due to the impact of stormwater runoff on pathogen levels, the TMDL report recommends intensive application of non-structural BMPs throughout the watershed. Structural controls may be necessary if non-structural BMPs are not successful. The following BMPs are specifically identified as being ongoing and/or planned in order to meet the bacteria TMDL for the Neponset River Basin watershed, which includes Pecunit Brook

- Illicit discharge detection and elimination
- Implementation of stormwater management plans by MS4s
- Septic system upgrades
- Watershed resident education
- Additional monitoring

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT’s BMP 7R Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements and TMDL recommendations in regard to pathogens.

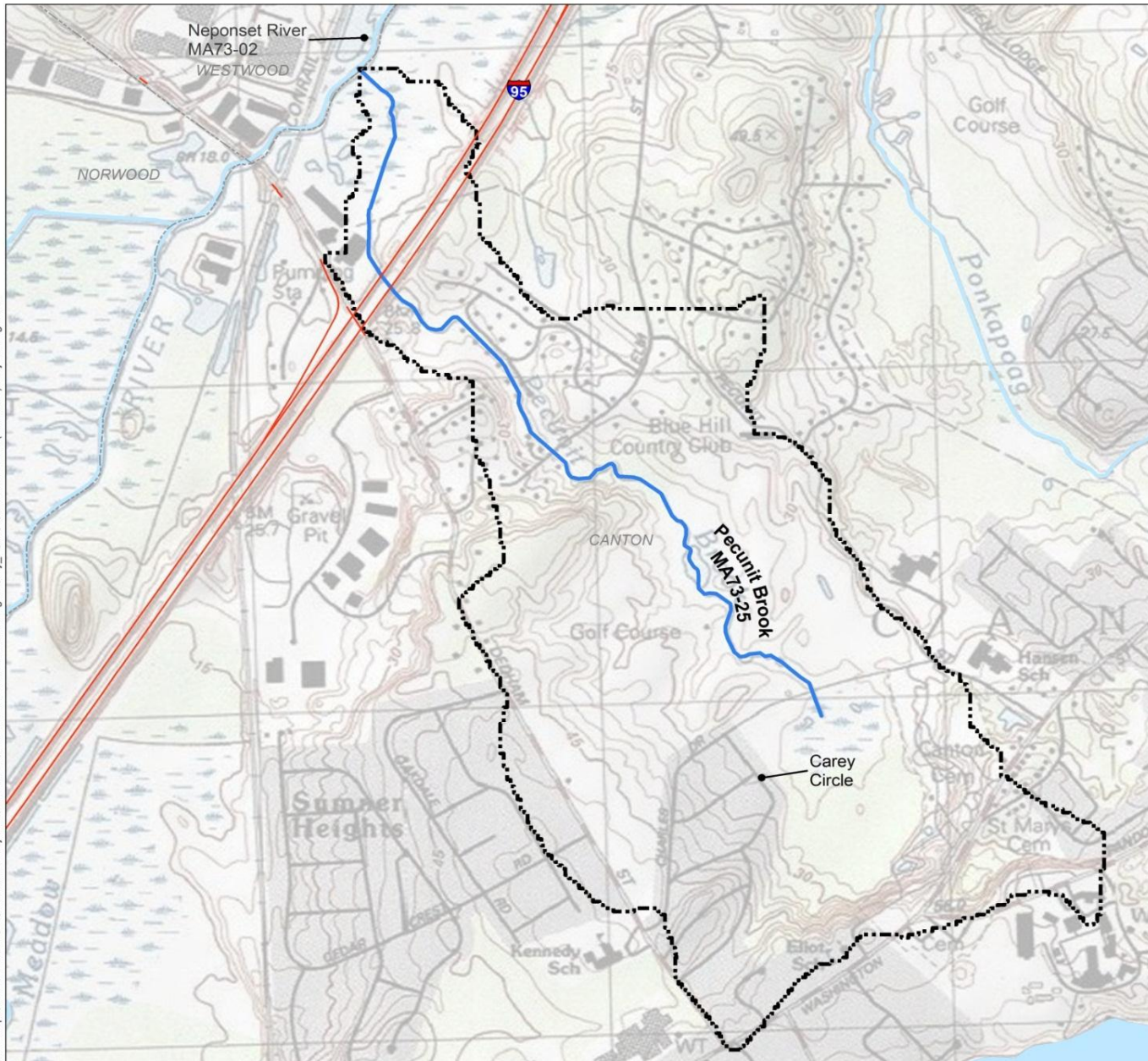
As part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen-impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Although the TMDL report also identifies the benefits of structural BMPs to address runoff from impervious areas in some instances, MassDOT feels that it is not a beneficial approach to implement these BMPs in advance of other ongoing BMP efforts identified in the watershed, given the documented variability of pathogen concentrations in highway runoff, and the low probability of achieving substantial gains towards meeting the TMDL with solely implementing IC reductions and controls.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Pecunit Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit and the *Escherichia coli* TMDLs. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Pecunit Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

P:\Transp\CM-023 MassDOT Stormwater\Projects\CM-023AD June 2015 Assessments\Pathogen Only_FST\GIS\Pecunit Brook (MA73-25)\Projects\Fig1.mxd



- MassDOT Roadways in Urban Area
- MassDOT Roadways
- - - Total and Subwatershed
- Assessed Segment
- Impaired Lakes
- Impaired Streams

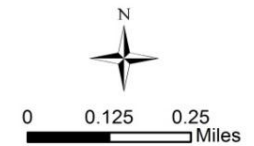


Figure 1
Pecunit Brook (MA73-25)
Watersheds

June 2015



Impaired Waters Assessment for Monoosnuc Brook (MA81-13)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Escherichia coli</i>
	Category:	5 (Waters requiring a TMDL)
	Final TMDLs:	None
	WQ Assessment:	Nashua River Watershed 2003 Water Quality Assessment Report ²
Location	Towns:	Fitchburg and Leominster
	MassDOT Roads:	Route 2, Fifth Massachusetts Turnpike and Merriam Avenue
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Monoosnuc Brook (MA81-13) originates at the outlet of Simonds Pond and flows southeast for approximately 6.1 miles through former pond segments Pierce Pond and Rockwell Pond to its confluence with the North Nashua River (MA81-03) in Leominster, Massachusetts (Figure 1).

MassDEP's *Nashua River Watershed 2003 Water Quality Assessment Report*² identified the Primary Contact use with an "impaired" status due to elevated *Escherichia coli* bacteria levels detected during sampling. The suspected source of this impairment is wet weather discharges (non-point sources). Both the Secondary Contact use and Aesthetics use have been identified as "support" with an "alert" status due to very dense aquatic plant coverage. Aquatic Life use was identified with "support" status and the Fish Consumption use was "not assessed". According to the report the City of Leominster Department of Public Works (MAG640016) was issued with authorization to discharge 0.15 MGD from the Notown Water Treatment Plant to Monoosnuc Brook in November 2004.

Figure 1 shows the total and subwatershed, which are the same, totaling approximately 11 square miles and are located in Leominster, Princeton and Westminster, Massachusetts. The watershed to Monoosnuc Brook is comprised of high, medium and low density residential, commercial and industrial areas with the majority of the watershed consisting of forested land.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, August 2008. Nashua River Watershed 2003 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/81wqar08.pdf>

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to Monoosnuc Brook (MA81-13) is comprised of portions of Route 2, Fifth Massachusetts Turnpike and Merriam Avenue. Refer to Figure 1B for the location of these roadways within the subwatershed to Monoosnuc Brook.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.³ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁴ MassDOT assessed Monoosnuc Brook (MA81-13) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁵ The condition of Monoosnuc Brook is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁴ of MassDOT’s Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT’s BMP 7U Pathogen Methodology.⁶

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT’s BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

³ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁴ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁵ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

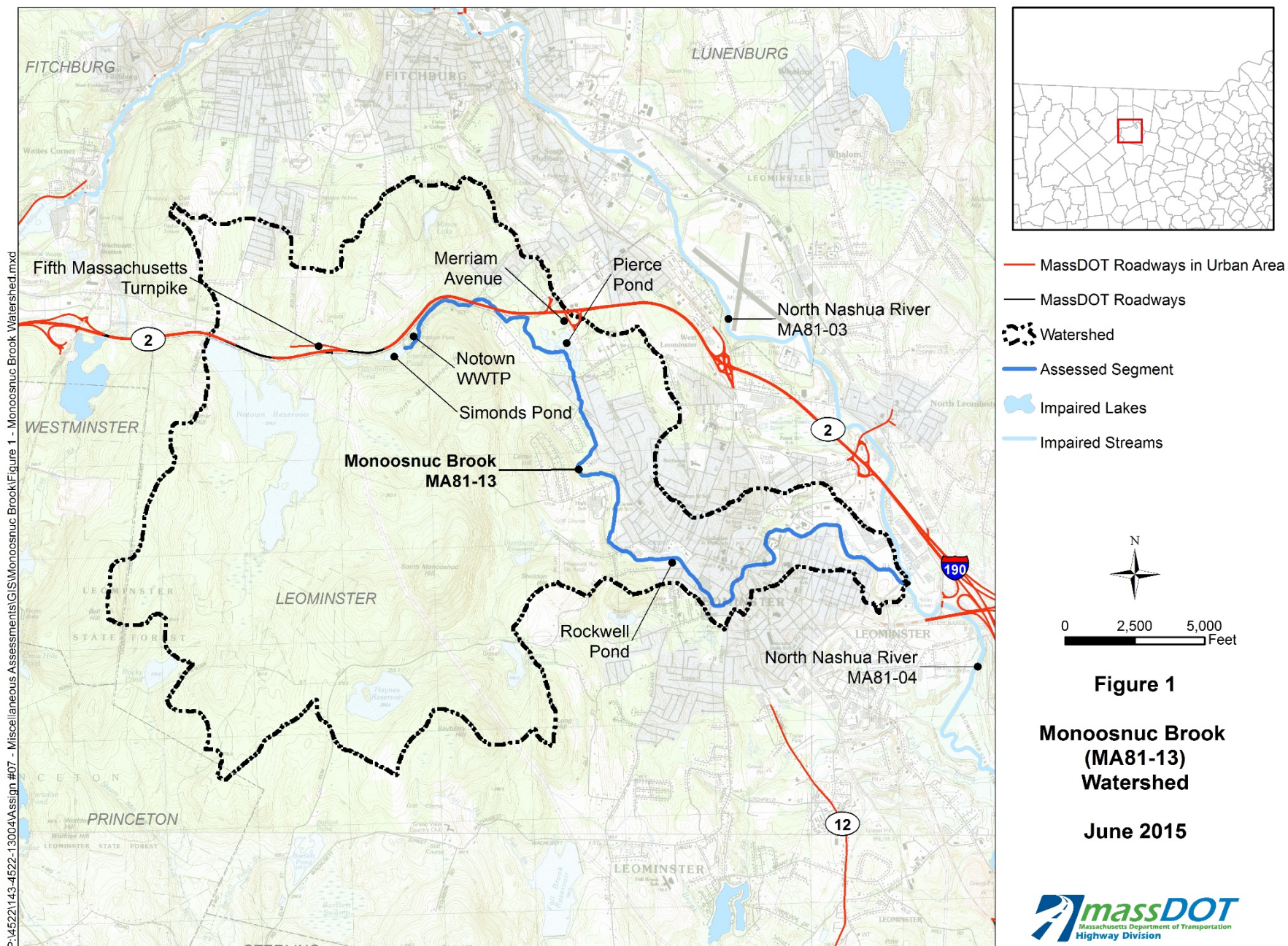
⁶ MassDOT, December 2014. Description of MassDOT’s Application of BMP 7U for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year5/Attachment5.pdf>

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Monoosnuc Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Monoosnuc Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.



Impaired Waters Assessment for James Brook (MA81-20)

Summary

Impaired Water¹	Stormwater	<i>Escherichia coli</i>
	Impairments:	
	Category:	5 (Waters requiring a TMDL)
	Final TMDLs:	None
	WQ Assessment:	Nashua River Watershed 2003 Water Quality Assessment Report ²
Location	Towns:	Ayer and Groton
	MassDOT Roads:	Route 119
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

James Brook (MA81-20) originates south of the Route 119 and Route 225 intersection and flows approximately 3.9 miles southwest to its confluence with the Nashua River (MA81-06) at the Ayer and Groton town line (Figure 1).

MassDEP's *Nashua River Watershed 2003 Water Quality Assessment Report²* identifies the Aquatic Life use as "support" with an "alert" status due to low pH. The Primary Contact use, Secondary Contact use and Aesthetics use were all characterized as "support" and the Fish Consumption use was "not assessed". According to the EPA's *Water Quality Assessment 2012 Waterbody Report³* for James Brook the status for this receiving water identified the Primary Contact Recreation Use with an "impaired" status due to *Escherichia coli* with sources unknown.

Figure 1 shows the total and subwatershed, which are the same, totaling approximately 4.4 square miles and are located in the towns of Ayer and Groton, Massachusetts. The watershed to James Brook is comprised of low and medium density residential areas, cropland, pastures, orchards and wetlands with the majority of the watershed consisting of forested land.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, August 2008. Nashua River Watershed 2003 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/81wqar08.pdf>

³ EPA online database 2012 Waterbody Report for James Brook. Available at: http://ofmpub.epa.gov/tmdl_waters10/attains_waterbody.control?p_list_id=&p_au_id=MA81-20&p_cycle=2012&p_state=MA

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to James Brook (MA81-20) is comprised of portions of Route 119. Refer to Figure 1 for the location of this roadway within the subwatershed to James Brook.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁴ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁵ MassDOT assessed James Brook (MA81-20) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁶ The condition of James Brook is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁵ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7U Pathogen Methodology.⁷

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

⁴ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁵ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁶ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlisp.pdf>

⁷ MassDOT, December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year5/Attachment5.pdf>

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for James Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of James Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

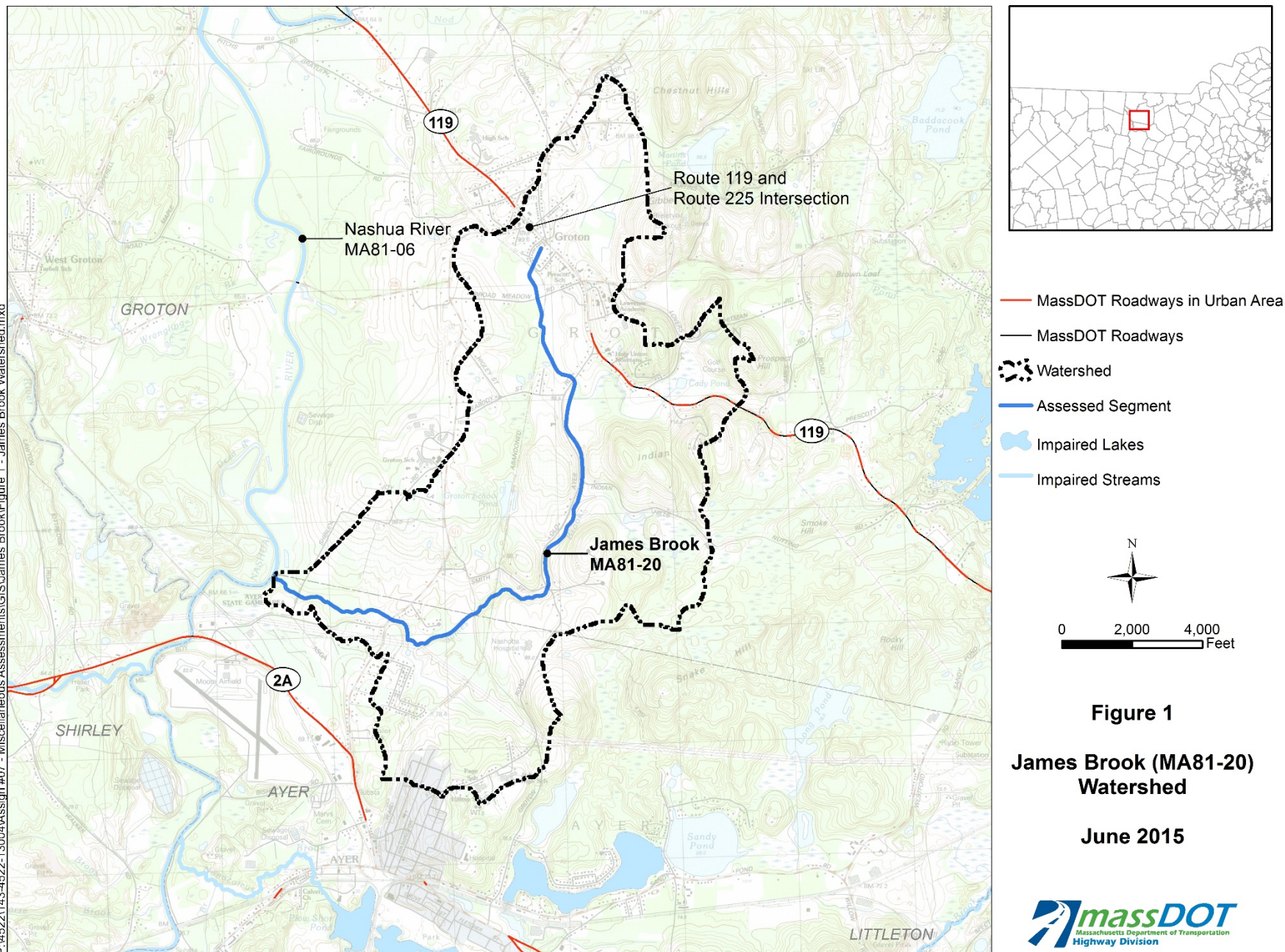


Figure 1

**James Brook (MA81-20)
Watershed**

June 2015



Impaired Waters Assessment for Richardson Brook (MA84A-12)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Escherichia Coli</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>
	Final TMDLs:	<i>None</i>
	WQ Assessment:	<i>Merrimack River Watershed 2004 Water Quality Assessment Report²</i>
Location	Towns:	<i>Dracut</i>
	MassDOT Roads:	<i>Route 113, Route 110</i>
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Richardson Brook (MA84A-12) is located in Dracut and flows south for 1.9 miles, ultimately discharging into the Merrimack River (MA84A-03). Richardson Brook also receives flow from Trout Brook (MA84A-13). Its subwatershed is the same as its total watershed and covers 4.3 square miles, all of which is in Dracut. Land use within the watershed is primarily forest with a mixture of low density residential areas, wetlands, and cropland. Pockets of higher density residential areas, industry, and commerce border Route 113 in the western portion of the watershed.

According to the *Merrimack River Watershed 2004 Water Quality Assessment Report*,² Richardson Brook is a Class B waterbody, indicating that it is a habitat for fish, other aquatic life, and wildlife. Richardson Brook is assessed as “support” for Aquatic Life based on the slightly impacted benthic macroinvertebrate community. Aquatic Life also has an “alert” status due to the low number of fish and the absence of fluvial fish. Primary Contact is assessed as “impaired” as the result of elevated *E. coli* counts. Secondary Contact is assessed as “support” with an “alert” status because elevated bacteria samples were collected during a wet weather event. Aesthetics is assessed as “support,” since there was no field evidence of deposits, odors, turbidity, or excessive growth of aquatic plants. Fish Consumption is designated as “not assessed.”

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, January 2010. Merrimack River Watershed 2004 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/84wqar09.pdf>

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to Richardson Brook (MA84A-12) is comprised of portions of Route 113 and Route 110. Refer to Figure 1 for the location of these roadways within the watershed to Richardson Brook.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.³ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁴ MassDOT assessed Richardson Brook (MA84A-12) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁵ The condition of Richardson Brook is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁴ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7U Pathogen Methodology.⁶

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the watershed of this water body. MassDOT will be

³ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁴ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁵ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlistp.pdf>

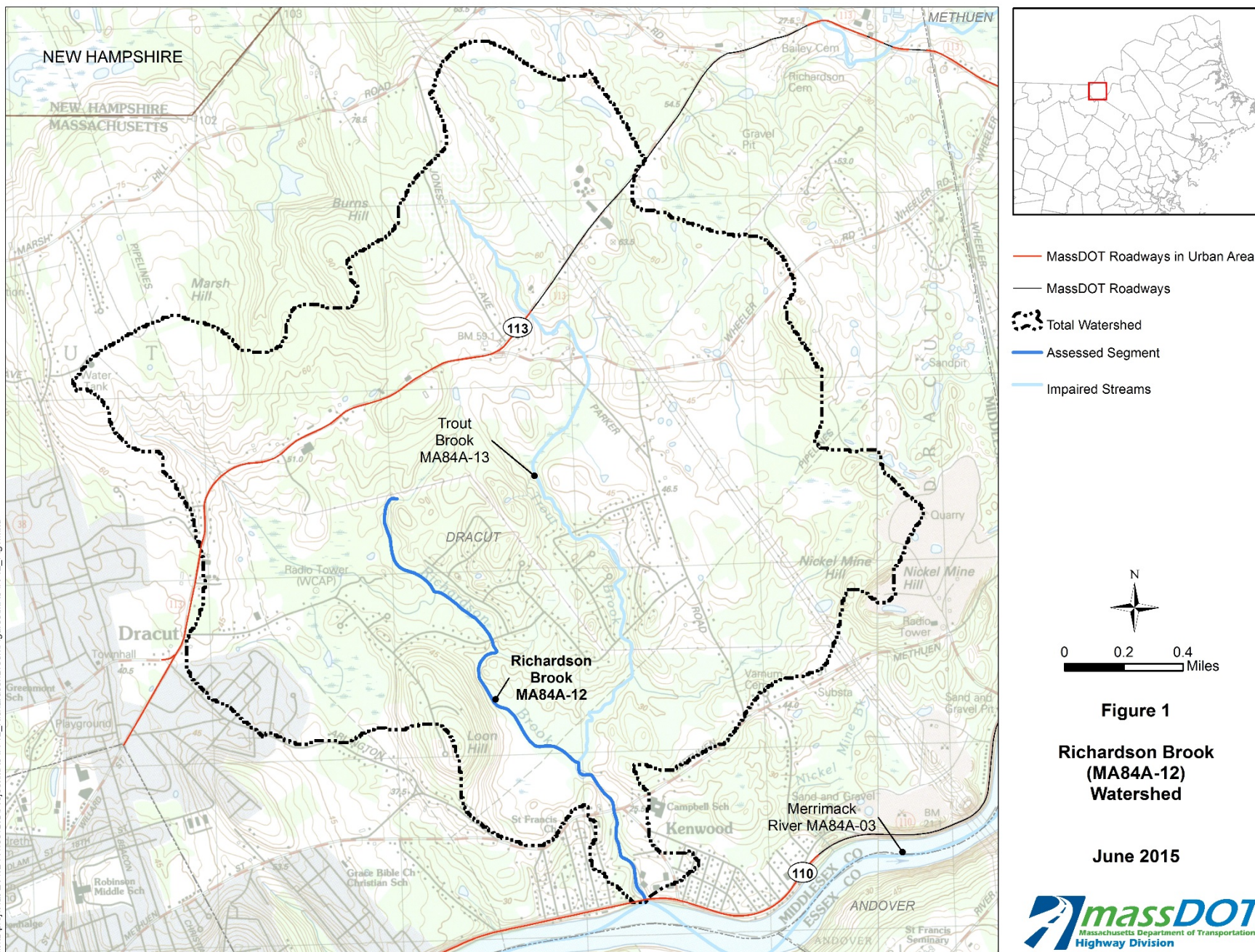
⁶ MassDOT, December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments.

installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the watershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Richardson Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Richardson Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

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Impaired Waters Assessment for Trout Brook (MA84A-13)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Escherichia Coli</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>
	Final TMDLs:	<i>None</i>
	WQ Assessment:	<i>Merrimack River Watershed 2004 Water Quality Assessment Report²</i>
Location	Towns:	<i>Dracut</i>
	MassDOT Roads:	<i>Route 113</i>
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Trout Brook (MA84A-13) is located in Dracut and flows for a total of 2.6 miles to the south until it converges with Richardson Brook (MA84A-12). The subwatershed to Trout Brook is the same as its total watershed and covers 2.4 square miles, all of which is in Dracut. Land use within the watershed is primarily forest with a mixture of low density residential areas, wetlands, and cropland. Additionally, a power line right-of-way bisects the watershed.

According to the *Merrimack River Watershed 2004 Water Quality Assessment Report*,² Trout Brook is a Class B waterbody, indicating that it is a habitat for fish, other aquatic life, and wildlife. Trout Brook, although “not assessed,” has an “alert” status for Aquatic Life based on the diversity and low population of fish, the lack of brook trout, and habitat quality issues. Primary Contact is assessed as “impaired” due to elevated *E. coli* counts. Secondary Contact is assessed as “support” with an “alert” status because elevated bacteria samples were collected during a wet weather event. Aesthetics is assessed as “support,” since there was no field evidence of deposits, odors, turbidity, or excessive growth of aquatic plants. Fish Consumption is designated as “not assessed.”

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to Trout Brook (MA84A-13) is comprised of a portion of Route 113. Refer to Figure 1 for the location of this roadway within the watershed to Trout Brook.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, January 2010. Merrimack River Watershed 2004 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/84wqar09.pdf>

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.³ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁴ MassDOT assessed Trout Brook (MA84A-13) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁵ The condition of Trout Brook is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁴ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7U Pathogen Methodology.⁶

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the watershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

³ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁴ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

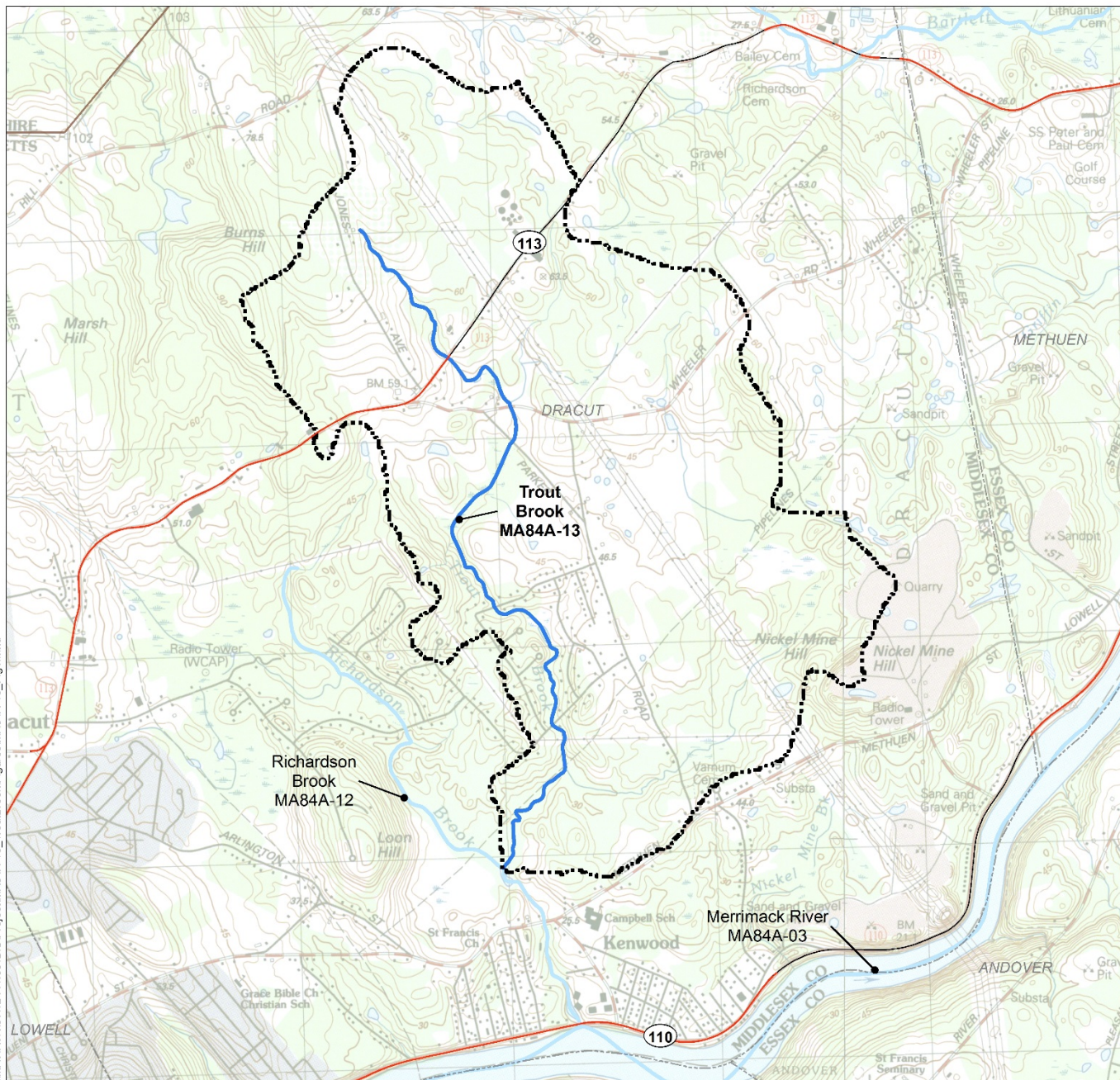
⁵ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlisp.pdf>

⁶ MassDOT, December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the watershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Trout Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Trout Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

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- MassDOT Roadways in Urban Area
- MassDOT Roadways
- Total Watershed
- Assessed Segment
- Impaired Streams

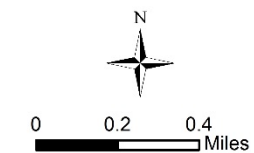


Figure 1
Trout Brook (MA84A-13)
Watershed

June 2015



Impaired Waters Assessment for Trull Brook (MA84A-14)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Escherichia Coli</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>
	Final TMDLs:	<i>None</i>
	WQ Assessment:	<i>Merrimack River Watershed 2004 Water Quality Assessment Report²</i>
Location	Towns:	<i>Tewksbury</i>
	MassDOT Roads:	<i>I-495, Route 38</i>
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Trull Brook (MA84A-14) is located in Tewksbury and flows for a total of 2.1 miles north into the Merrimack River (MA84A-03). Its subwatershed is the same as its total watershed and covers 4.8 square miles, 4.0 square miles of which is in Tewksbury, and the remainder of which is in Lowell and Andover. Land use within the watershed is primarily residential with a mixture of forested areas, wetlands, industry, and commerce. The northwest portion of the watershed, which is in Lowell, is the most urbanized portion of the watershed.

According to the *Merrimack River Watershed 2004 Water Quality Assessment Report*,² Trull Brook is designated as a Class B waterbody, indicating that it is a habitat for fish, other aquatic life, and wildlife. Trull Brook was assessed as “support” for Aquatic Life based on the slightly impacted benthic macroinvertebrate community. Aquatic Life was also given an “alert” status due to the low number of fish in the brook. Primary and Secondary Contact were assessed as “impaired” as the result of elevated *E. coli* counts. Sources of the bacteria are unknown, though geese droppings were found in the surrounding area where the samples were being taken. Aesthetics was assessed as “support” because there was no field evidence of deposits, odors, turbidity, or excessive growth of aquatic plants. Fish Consumption was designated as “not assessed.”

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, January 2010. Merrimack River Watershed 2004 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/84wqar09.pdf>

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to Trull Brook (MA84A-14) is comprised of portions of I-495 and Route 38. Refer to Figure 1 for the location of these roadways within the watershed to Trull Brook.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.³ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁴ MassDOT assessed Trull Brook (MA84A-14) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁵ The condition of Trull Brook is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁴ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7U Pathogen Methodology.⁶

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the watershed of this water body. MassDOT will be

³ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁴ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁵ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlistp.pdf>

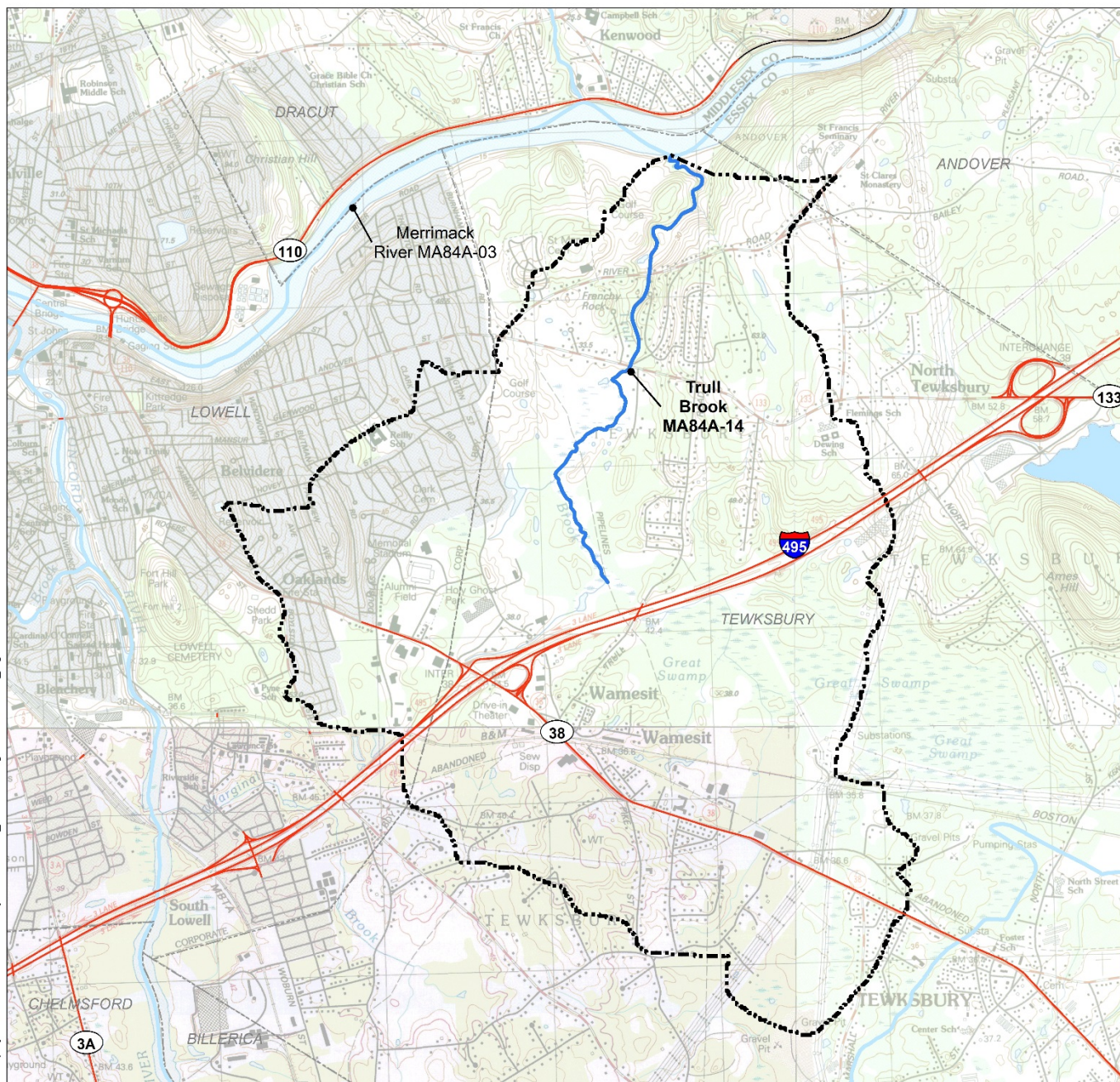
⁶ MassDOT, December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments.

installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the watershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Trull Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Trull Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

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- MassDOT Roadways in Urban Area
- MassDOT Roadways
- Total Watershed
- Assessed Segment
- Impaired Lakes
- Impaired Streams

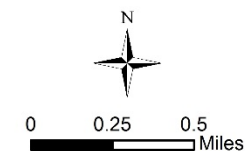


Figure 1
Trull Brook (MA84A-14)
Watershed

June 2015



Impaired Waters Assessment for Bartlett Brook (MA84A-36)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Escherichia Coli</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>
	Final TMDLs:	<i>None</i>
	WQ Assessment:	<i>Merrimack River Watershed 2004 Water Quality Assessment Report²</i>
Location	Towns:	<i>Methuen, Dracut</i>
	MassDOT Roads:	<i>Route 113</i>
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Bartlett Brook (MA84A-36) is located in Dracut and flows 3.7 miles southeast into Mill Pond (an unimpaired lake), which continues to the Merrimack River (MA84A-03). The subwatershed to Bartlett Brook covers 3.9 square miles, of which 2.0 square miles is in Dracut, 1.4 square miles is in Methuen, and 0.5 square miles is in New Hampshire. Its total watershed is 6.8 square miles in size, extending north beyond the limits of the subwatershed. Land use within the subwatershed is primarily forest and residential areas with a mixture of cropland, wetlands, and some industrial areas.

In the *Merrimack River Watershed 2004 Water Quality Assessment Report*,² Bartlett Brook is listed as a Class B waterbody, indicating that it is a habitat for fish, other aquatic life, and wildlife. Aquatic Life is classified as “support” because the benthic macroinvertebrate community was assessed as “slightly impacted.” Aquatic Life also has an “alert” status because of the low number of fluvial fish and concerns about the flow, erosion, and deposition of the brook. Primary Contact is assessed as “impaired” because of elevated *E. coli* counts. Secondary Contact and Aesthetics are assessed as “support.”

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to Bartlett Brook (MA84A-36) is comprised of portions of Route 113. Refer to Figure 1 for the location of this roadway within the subwatershed to Bartlett Brook.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, January 2010. Merrimack River Watershed 2004 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/84wqar09.pdf>

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.³ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁴ MassDOT assessed Bartlett Brook (MA84A-36) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁵ The condition of Bartlett Brook is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁴ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7U Pathogen Methodology.⁶

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

³ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁴ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

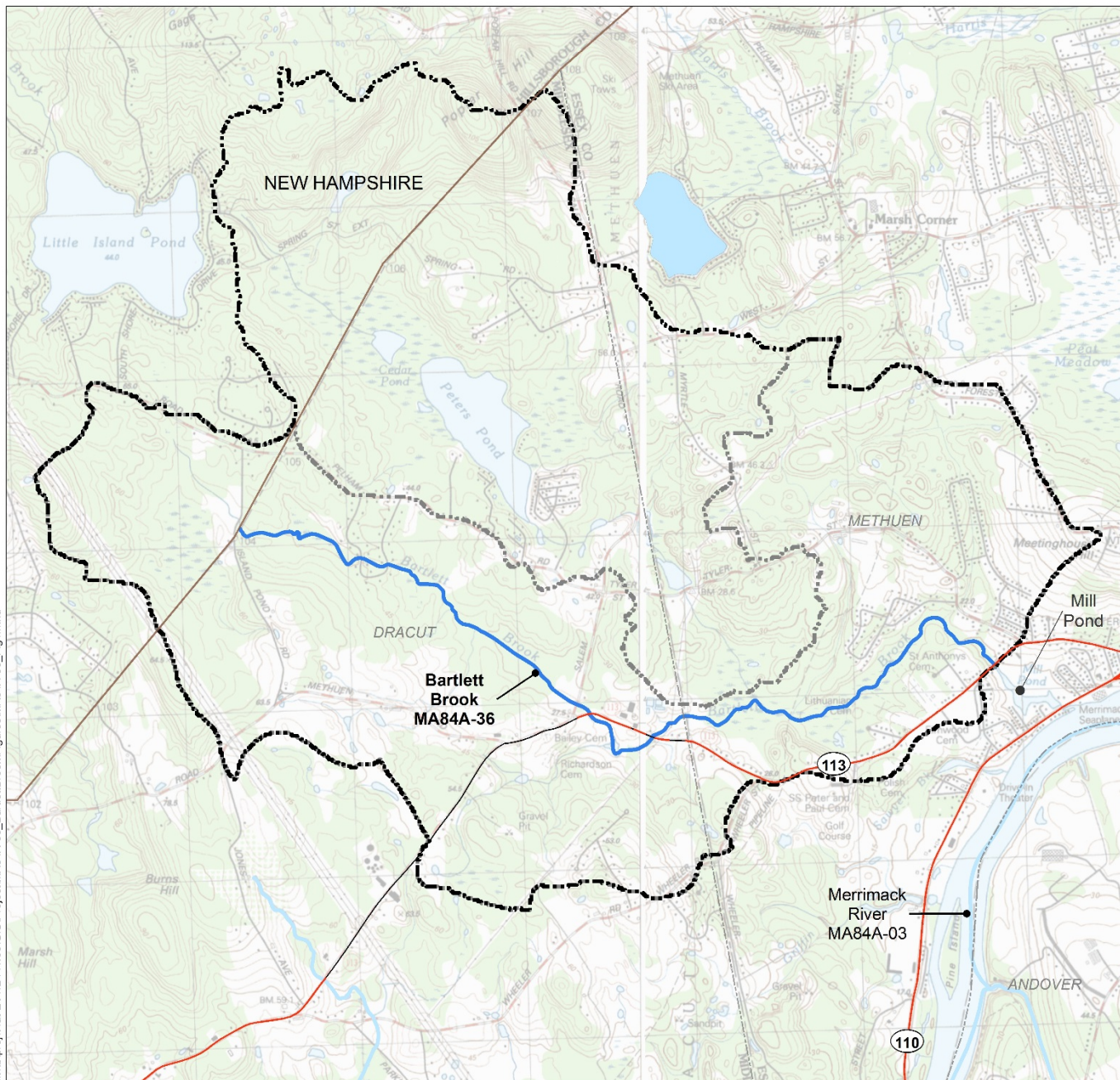
⁵ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlisp.pdf>

⁶ MassDOT, December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Bartlett Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed Bartlett Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

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- MassDOT Roadways in Urban Area
- MassDOT Roadways
- Total Watershed
- Subwatershed
- Assessed Segment
- Impaired Lakes
- Impaired Streams

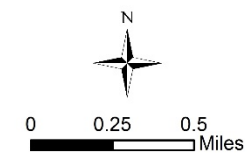


Figure 1
Bartlett Brook (MA84A-36)
Watersheds

June 2015



Impaired Waters Assessment for Creek Brook (MA84A-37)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Escherichia Coli</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>
	Final TMDLs:	<i>None</i>
	WQ Assessment:	<i>Merrimack River Watershed 2004 Water Quality Assessment Report²</i>
Location	Towns:	<i>Haverhill</i>
	MassDOT Roads:	<i>I-495, Route 110, Route 97, North Broadway</i>
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Creek Brook (MA84A-37) is located in Haverhill and flows 2.3 miles from Crystal Lake (MA84010) south into the Merrimack River (MA84A-04). The subwatershed to Creek Brook is the same as its total watershed and covers 5.5 square miles, of which 5.0 square miles is in Haverhill and 0.5 square miles is in New Hampshire. Land use within the watershed is primarily forest with a mixture of low and medium density residential areas, wetlands, cropland, and open water. Additionally, the Crystal Springs Golf Club, which is located to the east of Crystal Lake, occupies approximately 3% of the watershed.

According to the *Merrimack River Watershed 2004 Water Quality Assessment Report*,² Creek Brook is listed as a Class B waterbody, indicating that it is a habitat for fish, other aquatic life, and wildlife. Aquatic Life is classified as "support" because the benthic macroinvertebrate community was assessed as "slightly impacted." Primary Contact was assessed as "impaired" due to elevated *E. coli* counts. Secondary Contact is assessed as "support" with an "alert" status because elevated bacteria samples were collected during a wet weather event. Aesthetics was assessed as "support" because MassDEP observed no field evidence of deposits, odors, turbidity, or excessive growth of aquatic plants.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, January 2010. Merrimack River Watershed 2004 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/84wqar09.pdf>

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to Creek Brook (MA84A-37) is comprised of portions of I-495, Route 110, Route 97, and North Broadway. Refer to Figure 1 for the location of these roadways within the watershed to Creek Brook.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.³ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁴ MassDOT assessed Creek Brook (MA84A-37) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁵ The condition of Creek Brook is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁴ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7U Pathogen Methodology.⁶

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the watershed of this water body. MassDOT will be

³ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁴ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁵ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlistp.pdf>

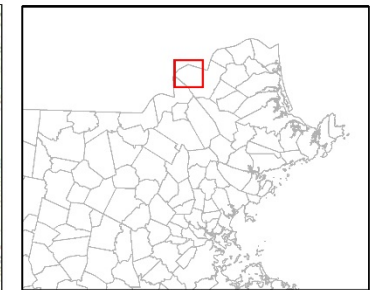
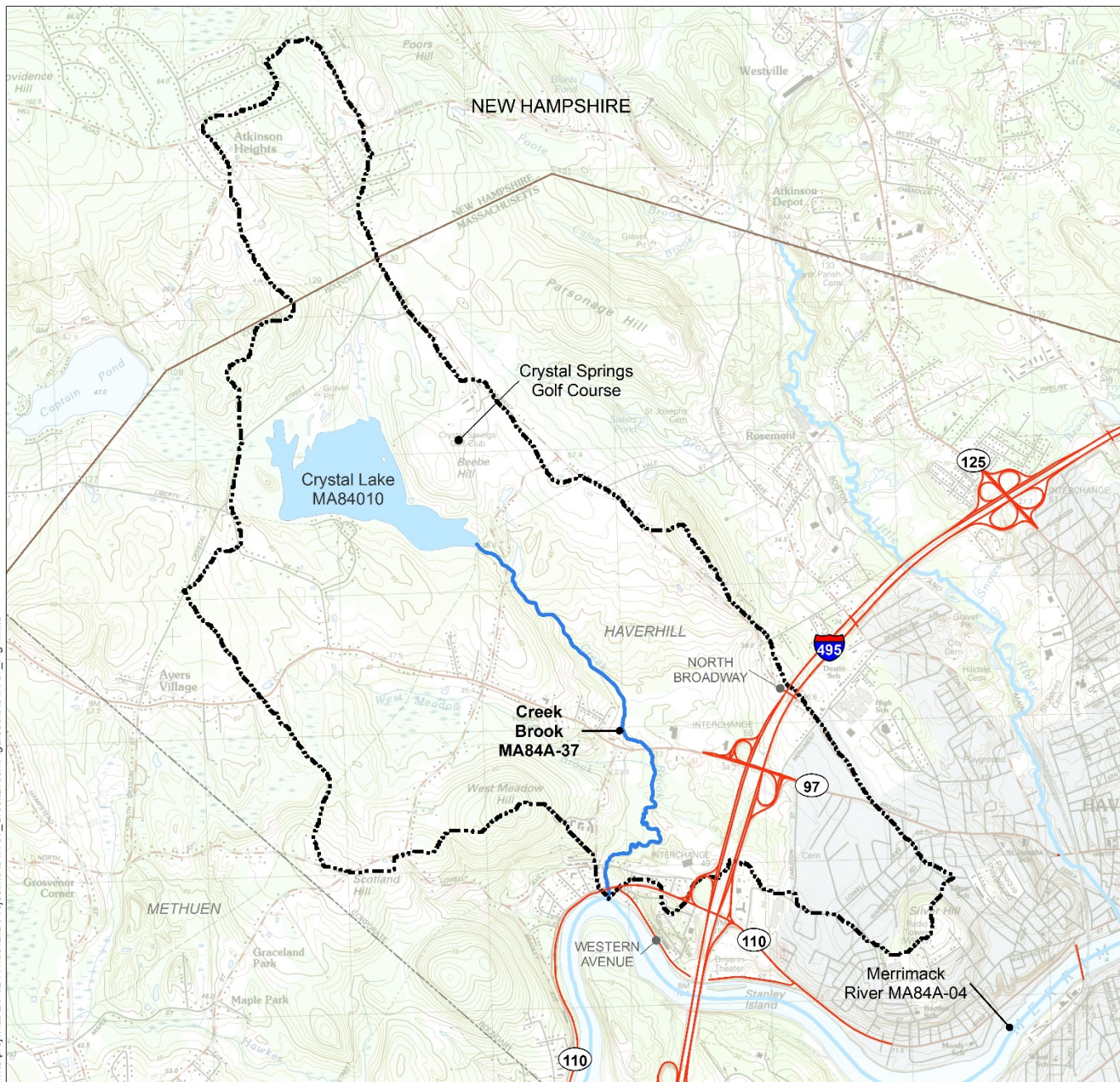
⁶ MassDOT, December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments.

installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the watershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Creek Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Creek Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

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- MassDOT Roadways in Urban Area
- MassDOT Roadways
- Total Watershed
- Assessed Segment
- Impaired Lakes
- Impaired Streams

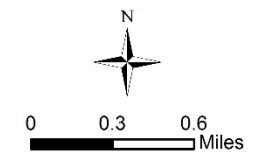


Figure 1
Creek Brook (MA84A-37)
Watershed

June 2015



Impaired Waters Assessment for East Meadow River (MA84A-39)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Escherichia Coli</i>
	Category:	5 (<i>Waters requiring a TMDL</i>)
	Final TMDLs:	<i>None</i>
	WQ Assessment:	<i>Merrimack River Watershed 2004 Water Quality Assessment Report²</i>
Location	Towns:	<i>Haverhill</i>
	MassDOT Roads:	<i>I-495, Route 110, Amesbury Line Road, Middle Road</i>
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

East Meadow River (MA84A-39) is located in Haverhill and flows 3.0 miles south from Neal Pond, which is unimpaired, into Millvale Reservoir (MA84041). The subwatershed to East Meadow River is the same as its total watershed and covers 7.1 square miles, of which 3.9 square miles is in Haverhill, 2.1 square miles is in Merrimac, and 1.2 square miles is in New Hampshire. Approximately half of the watershed is forested, and the remaining land use is primarily a mixture of wetlands, low density residential areas, and cropland.

In the *Merrimack River Watershed 2004 Water Quality Assessment Report*,² East Meadow River is listed as a Class A waterbody, which indicates that it is a habitat for fish, other aquatic life, and wildlife. It is also designated as a Public Water Supply (PWS) and an Outstanding Resource Water (ORW), which ensures that the quality of the water is protected and maintained. Aquatic Life is assessed as "support" with an "alert" status because of the extremely low dissolved oxygen measurements. However, MassDEP DWM fishery biologists indicate in the report that "these conditions are considered to be naturally occurring given the influence of the wetlands and beaver activity." Primary Contact is assessed as "impaired" because of elevated *E. coli* counts. Secondary Contact and Aesthetics are assessed as "support."

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, January 2010. Merrimack River Watershed 2004 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/84wqar09.pdf>

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to East Meadow River (MA84A-39) is comprised of portions of I-495, Route 110, Middle Road, and Amesbury Line Road. Refer to Figure 1 for the location of these roadways within the watershed to East Meadow River.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.³ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁴ MassDOT assessed East Meadow River (MA84A-37) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁵ The condition of East Meadow River is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁴ of MassDOT’s Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT’s BMP 7U Pathogen Methodology.⁶

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT’s BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

³ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁴ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁵ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

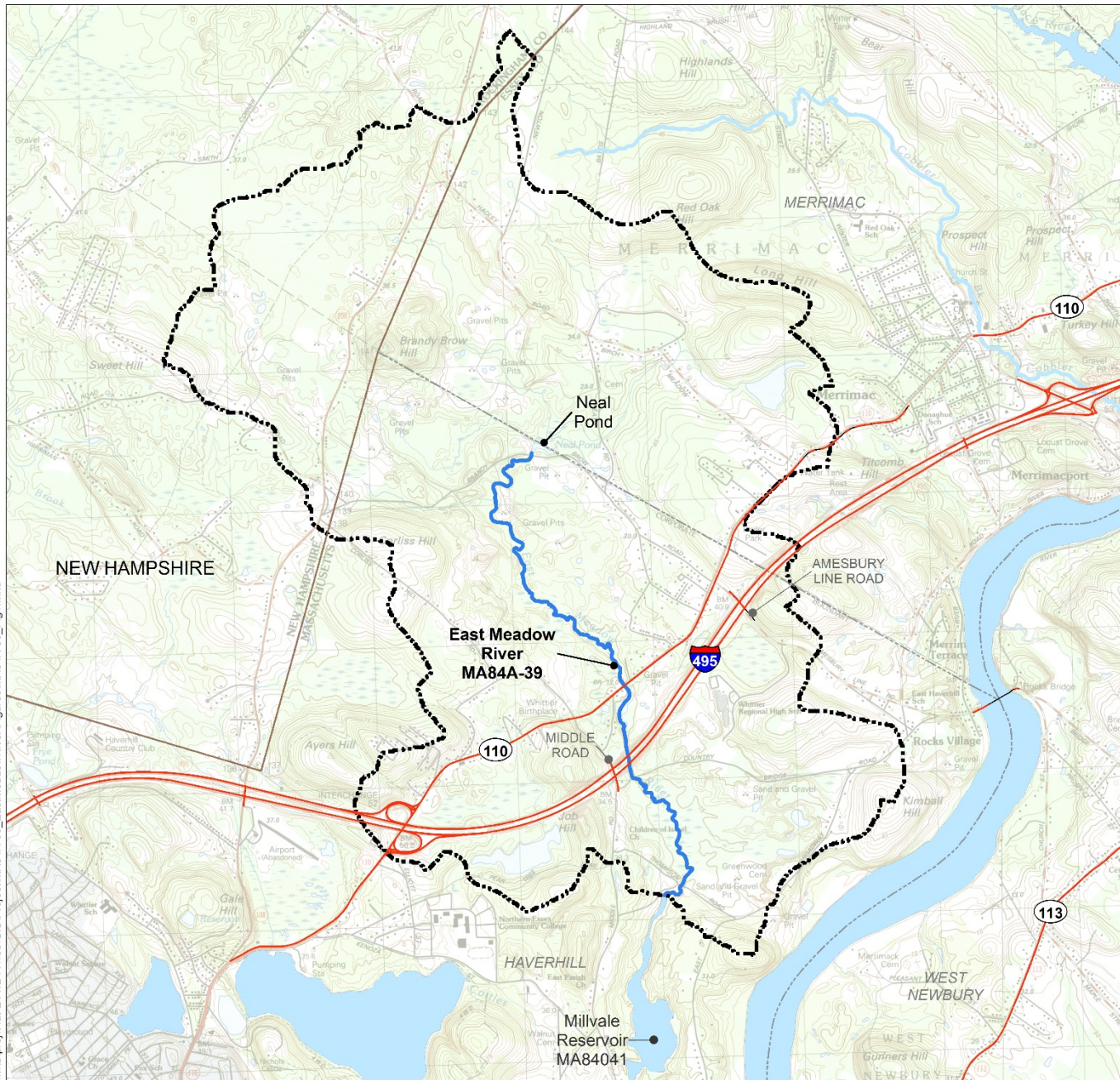
⁶ MassDOT, December 2014. Description of MassDOT’s Application of BMP 7U for Pathogen Related Impairments.

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the watershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the watershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for East Meadow River. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of East Meadow River, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

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- MassDOT Roadways in Urban Area
- MassDOT Roadways
- Total Watershed
- Assessed Segment
- Impaired Lakes
- Impaired Streams

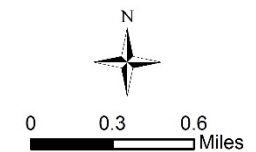


Figure 1
East Meadow River
(MA84A-39)
Watershed

June 2015



Impaired Waters Assessment for Bennetts Brook (MA84B-06)

Summary

Impaired Water¹	Stormwater	<i>Escherichia coli</i>
	Impairments:	
	Category:	5 (Waters requiring a TMDL)
	Final TMDLs:	None
	WQ Assessment:	Merrimack River Watershed 2004 Water Quality Assessment Report ²
Location	Towns:	Ayer, Harvard and Littleton
	MassDOT Roads:	Route 2, Route 2A and Littleton Road
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Bennetts Brook (MA84B-06) originates north of Route 2 and west of the Littleton Road bridge (Figure 1). The brook flows northeast for approximately 4.3 miles to its outlet at Spectacle Pond (MA84089) at the Ayer and Littleton town line.

MassDEP's *Merrimack River Watershed 2004 Water Quality Assessment Report*² has identified the Primary Contact use with an "impaired" status due to elevated *Escherichia coli* levels encountered during sampling. The suspected source of this impairment is wet weather discharges (non-point sources). The Aquatic Life use was identified as "support" with an "alert" status due to the lack of any fluvial fish species. The Secondary Contact use was assessed as "support" with an "alert" status because of elevated bacterial levels during a wet weather sampling event. Field observations did not indicate any objectionable deposits, odors, colors or overabundant growths of aquatic plants or algae, so the Aesthetics use was classified as "support", while the Fish Consumption use was "not assessed".

Figure 1 shows the total and subwatershed, which are the same, totaling approximately 4.7 square miles and are located in Ayer, Harvard and Littleton, Massachusetts. The watershed to Bennetts Brook is comprised of low density residential areas, recreational land, industrial, open land and wetlands with the majority of the watershed consisting of forested land.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, January 2010. Merrimack River Watershed 2004-2009 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/84wqar09.pdf>

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to Bennetts Brook (MA84B-06) is comprised of portions of Route 2A. Refer to Figure 1 for the location of these roadways within the subwatershed to Bennetts Brook. It should be noted that MassDOT-owned roadways Route 2 and Littleton Road in the Bennetts Brook subwatershed are not within an MS4-regulated urban area.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.³ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁴ MassDOT assessed Bennetts Brook (MA84B-06) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁵ The condition of Bennetts Brook is not proposed to change.

BMP 7U for Pathogen Impairment

MassDOT assessed the indicator bacteria (*Escherichia coli*) impairment using the approach described in BMP 7U⁴ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body not covered by a final TMDL.

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to address impaired waters and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7U Pathogen Methodology.⁶

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control.

³ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁴ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁵ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

⁶ MassDOT, December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments. Available at:

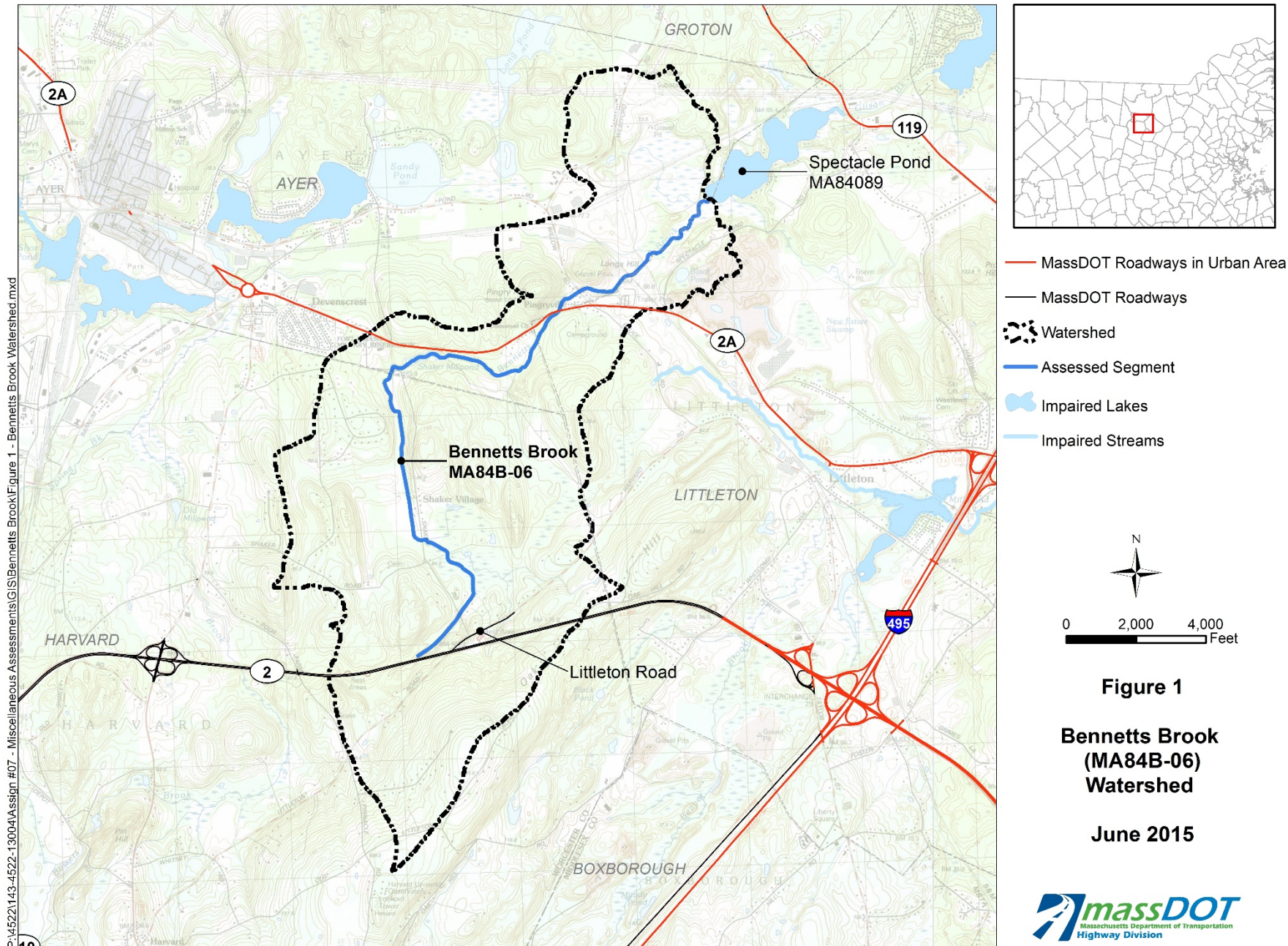
<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year5/Attachment5.pdf>

As discussed in MassDOT's BMP 7U Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements in regard to pathogens.

In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Bennetts Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Bennetts Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.



Impaired Waters Assessment for Crane Brook (MA93-02)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Fecal Coliform</i>
	Category:	<i>5 (Waters requiring a TMDL), pending change to 4A (TMDL is completed) in proposed 2014 list²</i>
	Final TMDLs:	<i>Final Pathogen TMDL for the North Coastal Watershed³</i>
	WQ Assessment:	<i>North Shore Coastal Watersheds 2002 Water Quality Assessment Report⁴</i>
Location	Towns:	<i>Danvers</i>
	MassDOT Roads:	<i>I-95, Route 1, Route 114, Southside Road, Armory Road</i>
Assessment Method(s)	7R (TMDL Method) <input checked="" type="checkbox"/>	7U (Non-TMDL Method) <input type="checkbox"/>

Site Description

Crane Brook (MA93-02) is located in Danvers, Massachusetts and flows 1.8 miles east into Mill Pond, which is an unimpaired waterbody. Mill Pond discharges into Crane River (MA93-38), a Category 2 segment, which in turn becomes Crane River (MA93-41), a Category 5 segment impaired for fecal coliform. The subwatershed to Crane Brook (MA93-02) is the same as its total watershed and covers 2.8 square miles, of which 2.2 square miles is in Danvers and 0.6 square miles is in Peabody (Figure 1). Land use within the watershed is a mixture of commercial areas, medium and high density residential areas, and industrial areas with pockets of forest and wetland throughout.

According to the *North Shore Coastal Watersheds 2002 Water Quality Assessment Report*,⁴ Crane Brook is listed as Class B, Warm Water Fishery, indicating that it is a habitat for fish, other aquatic life, and wildlife during summer months. Crane Brook is assessed as “support” for its Aquatic Life

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

³ MassDEP, March 2012. Final Pathogen TMDL for the North Coastal Watershed. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/ncoastl1.pdf>

⁴ MassDEP, March 2007. North Shore Coastal Watersheds 2002 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/93wqar06.pdf>

designated use because most of the data collected met standards, and observations of the brook indicated good water quality conditions. Primary Contact is assessed as “impaired” due to elevated fecal coliform. The source of the bacteria is reported as unknown, but discharges from separate storm sewer systems is identified as a suspected source. Secondary Contact is assessed as “support” with an “alert” status due to individual samples collected with very high bacteria counts. Aesthetics is assessed as “support,” since there was no field evidence of odors, oils, turbidity, or growth of aquatic plants.

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to Crane Brook (MA93-02) is comprised of portions of I-95, Route 1, Route 114, Southside Road, and Armory Road. Refer to Figure 1 for the location of these roadways within the watershed to Crane Brook.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁵ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁶ MassDOT assessed Crane Brook (MA93-02) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.² Crane Brook is proposed to change to a Category 4A water (TMDL is completed) because it is now covered under the *Final Pathogen TMDL for the North Coastal Watershed*.³

BMP 7R for Pathogen TMDL (CN 155.0)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R⁵ of MassDOT’s Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body covered by a final TMDL. Crane Brook (MA93-02) is covered by the *Final Pathogen TMDL for the North Coastal Watershed*.³

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to be consistent with relevant TMDLs and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT’s BMP 7R Pathogen Methodology.⁷

⁵ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁶ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁷ MassDOT, December 2014. Description of MassDOT’s Application of BMP 7R for Pathogen Related Impairments.

The North Coastal Watershed has documented both point and non-point sources of bacteria pollution in the TMDL report. The report states that the “prime bacterial sources in the stormwater appear to be from failing sewer line infrastructure, failing septic systems, and animal (pet, bird) waste. Boat wastes also contribute to water quality issues in the harbor areas.” According to three water samples taken by the MassDEP in 1998, 2002, and 2007, the quality of the water has been steadily improving. Crane Brook (MA93-02) is located in southern Danvers near the Danvers/Peabody border. It is listed as medium priority for dry weather because of possible illicit discharges. It is listed as medium priority for wet weather because of high wet weather bacteria concentrations in the 2002 survey.

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the North Coastal TMDL report (Section 8.3, page 105) recommends the following specific BMPs to address elevated fecal coliform levels in the watershed:

- Address pet waste as a water quality issue.
- Reduce public geese feeding, especially along lakes where both geese and people congregate.
- Provide technical and funding assistance for the implementation of municipal stormwater plans and ensure that consent judgments are completed in a timely manner.
- Encourage communities and watershed groups to take advantage of the U.S. Department of Agriculture’s Natural Resources Conservation service’s interest in working with communities to identify sources of stormwater contamination, and evaluate remedial options.
- Educate communities to consider permit and development strategies that address stormwater runoff – implement BMPs, and Low Impact Development (LID).

The TMDL report also indicates that structural BMPs may be appropriate to address runoff from impervious areas in instances where fecal coliform concentrations cannot be reduced by other means.

The following BMPs are specifically identified as being ongoing and/or planned in order to meet the Pathogen TMDL for the North Coastal Watershed in Danvers and Peabody:

- Public education includes a stormwater newsletter with information on town regulations sent to residents each year (Danvers) or placed in City Hall and all Public Libraries (Peabody).
- Residents can view updated stormwater information on their town’s website (Danvers).
- Fact sheets on dog waste disposal are sent out in annual dog license renewal reminders (Danvers) and waste disposal signs are posted in public parks (Danvers, Peabody).
- The stormwater advisory committee meets twice yearly (Danvers).
- Street sweeping is done once or twice annually and catch basin cleaning occurs once annually or as needed (Danvers, Peabody).
- The stormwater collection systems with all major outfalls have been mapped on GIS (Danvers, Peabody).
- Plans have been developed and/or implemented to detect and correct illicit stormwater connections (Danvers, Peabody).

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7R Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements and TMDL recommendations in regard to pathogens.

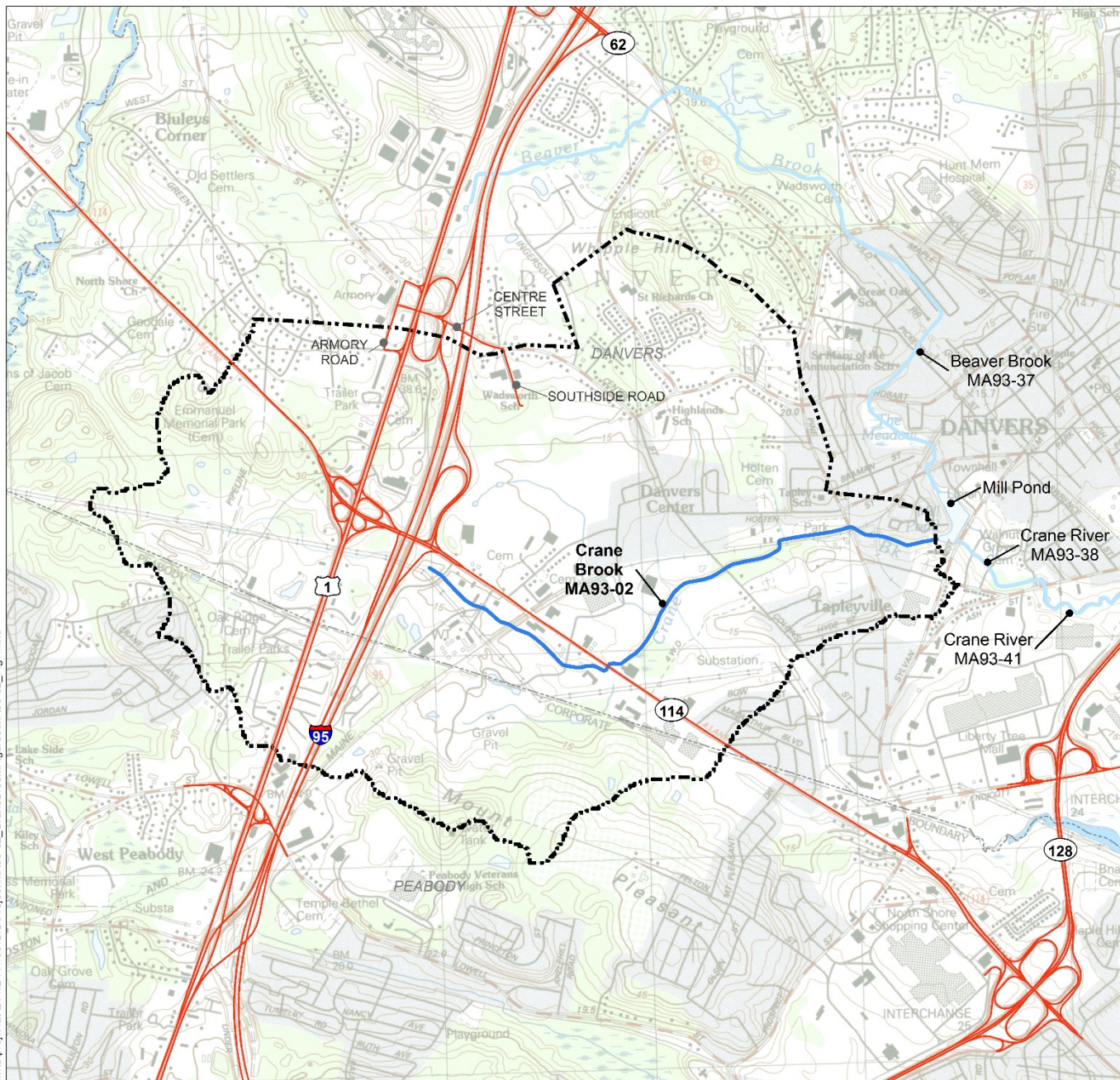
In accordance with the BMPs identified in the TMDL report as planned measures to reach compliance with the *Final Pathogen TMDL for the North Coastal Watershed*,³ MassDOT has documented the locations of its stormwater outfalls. In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the watershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Although the TMDL report also identifies the benefits of structural BMPs to address runoff from impervious areas in some instances, MassDOT feels that it is not a beneficial approach to implement these BMPs in advance of other ongoing BMP efforts identified in the watershed, given the documented variability of pathogen concentrations in highway runoff, and the low probability of achieving substantial gains towards meeting the TMDL with solely implementing IC reductions and controls.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the watershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Crane Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit and the applicable Pathogen TMDLs. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Crane Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

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- MassDOT Roadways in Urban Area
- MassDOT Roadways
- Total Watershed
- Assessed Segment
- Impaired Streams

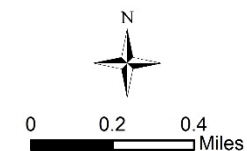


Figure 1
Crane Brook (MA93-02)
Watershed

June 2015



Impaired Waters Assessment for Causeway Brook (MA93-47)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Fecal Coliform</i>
	Category:	<i>5 (Waters requiring a TMDL), pending change to 4A (TMDL is completed) in proposed 2014 list²</i>
	Final TMDLs:	<i>Final Pathogen TMDL for the North Coastal Watershed³</i>
	WQ Assessment:	<i>North Shore Coastal Watersheds 2002 Water Quality Assessment Report⁴</i>
Location	Towns:	<i>Manchester</i>
	MassDOT Roads:	<i>Route 127</i>
Assessment Method(s)	7R (TMDL Method) <input checked="" type="checkbox"/>	7U (Non-TMDL Method) <input type="checkbox"/>

Site Description

Causeway Brook (MA93-47) is located in Manchester, Massachusetts and flows 1.1 miles west from Dexter Pond (an unimpaired waterbody) into Cat Brook (MA93-29). Causeway Brook's subwatershed is the same as its total watershed and covers 0.7 square miles, all of which is in Manchester (see Figure 1). Over half of the watershed is occupied by forest. The other primary land uses include wetlands, low and medium density residential areas, transportation, and the Essex Country Club, which is located near the downstream end of the watershed.

In the *North Shore Coastal Watersheds 2002 Water Quality Assessment Report*,⁴ Causeway Brook is listed as a Class B waterbody, indicating that it is a habitat for fish, other aquatic life, and wildlife. Aquatic Life was "not assessed" for Causeway Brook because of its small drainage area and the low flow conditions at the time of sampling. However, it was given an "alert" status due to low dissolved

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

³ MassDEP, March 2012. Final Pathogen TMDL for the North Coastal Watershed. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/ncoastl1.pdf>

⁴ MassDEP, March 2007. North Shore Coastal Watersheds 2002 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/93wqar06.pdf>

oxygen measurements. Primary Contact was assessed as “impaired” as the result of elevated fecal coliform. The source of the bacteria is reported as unknown, but discharges from separate storm sewer systems are identified as a suspected source. Secondary Contact and Aesthetics were assessed as “support” with an “alert” status because of occasional high bacteria counts and aesthetic quality issues.

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to Causeway Brook (MA93-47) is comprised of a portion of Route 127. Refer to Figure 1 for the location of this roadway within the watershed to Causeway Brook.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁵ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁶ MassDOT assessed Causeway Brook (MA93-47) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.² Causeway Brook is proposed to change to a Category 4A water (TMDL is completed) because it is now covered under the *Final Pathogen TMDL for the North Coastal Watershed*.³

BMP 7R for Pathogen TMDL (CN 155.0)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R⁵ of MassDOT’s Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body covered by a final TMDL. Causeway Brook (MA93-47) is covered by the *Final Pathogen TMDL for the North Coastal Watershed*.³

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to be consistent with relevant TMDLs and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT’s BMP 7R Pathogen Methodology.⁷

The North Coastal Watershed has documented both point and non-point sources of bacteria pollution in the TMDL report. The report states that the “prime bacterial sources in the stormwater appear to be from failing sewer line infrastructure, failing septic systems, and animal (pet, bird) waste. Boat wastes also contribute to water quality issues in the harbor areas.” According to three water samples taken

⁵ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁶ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁷ MassDOT, December 2014. Description of MassDOT’s Application of BMP 7R for Pathogen Related Impairments.

by the MassDEP in 1998, 2002, and 2007, the quality of the water has been steadily improving. Causeway Brook (MA93-47) is located in central Manchester. It is listed as medium priority for dry weather and high priority for wet weather. There might be illegal connections to the sewer system, which could be a source of fecal coliform.

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the North Coastal TMDL report (Section 8.3, page 105) recommends the following specific BMPs to address elevated fecal coliform levels in the watershed:

- Address pet waste as a water quality issue.
- Reduce public geese feeding, especially along lakes where both geese and people congregate.
- Provide technical and funding assistance for the implementation of municipal stormwater plans and ensure that consent judgments are completed in a timely manner.
- Encourage communities and watershed groups to take advantage of the U.S. Department of Agriculture's Natural Resources Conservation service's interest in working with communities to identify sources of stormwater contamination, and evaluate remedial options.
- Educate communities to consider permit and development strategies that address stormwater runoff – implement BMPs, and Low Impact Development (LID).

The TMDL report also indicates that structural BMPs may be appropriate to address runoff from impervious areas in instances where fecal coliform concentrations cannot be reduced by other means.

The following BMPs are specifically identified as being ongoing and/or planned in order to meet the Pathogen TMDL for the North Coastal Watershed in Manchester:

- Public education includes a stormwater newsletter sent to residents each year.
- Waste disposal signs are posted in public parks.
- Street sweeping is done once or twice annually and catch basin cleaning occurs once annually or as needed.
- The stormwater collection systems have been mapped on GIS.
- Plans have been developed and/or implemented to detect and correct illicit stormwater connections.

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7R Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements and TMDL recommendations in regard to pathogens.

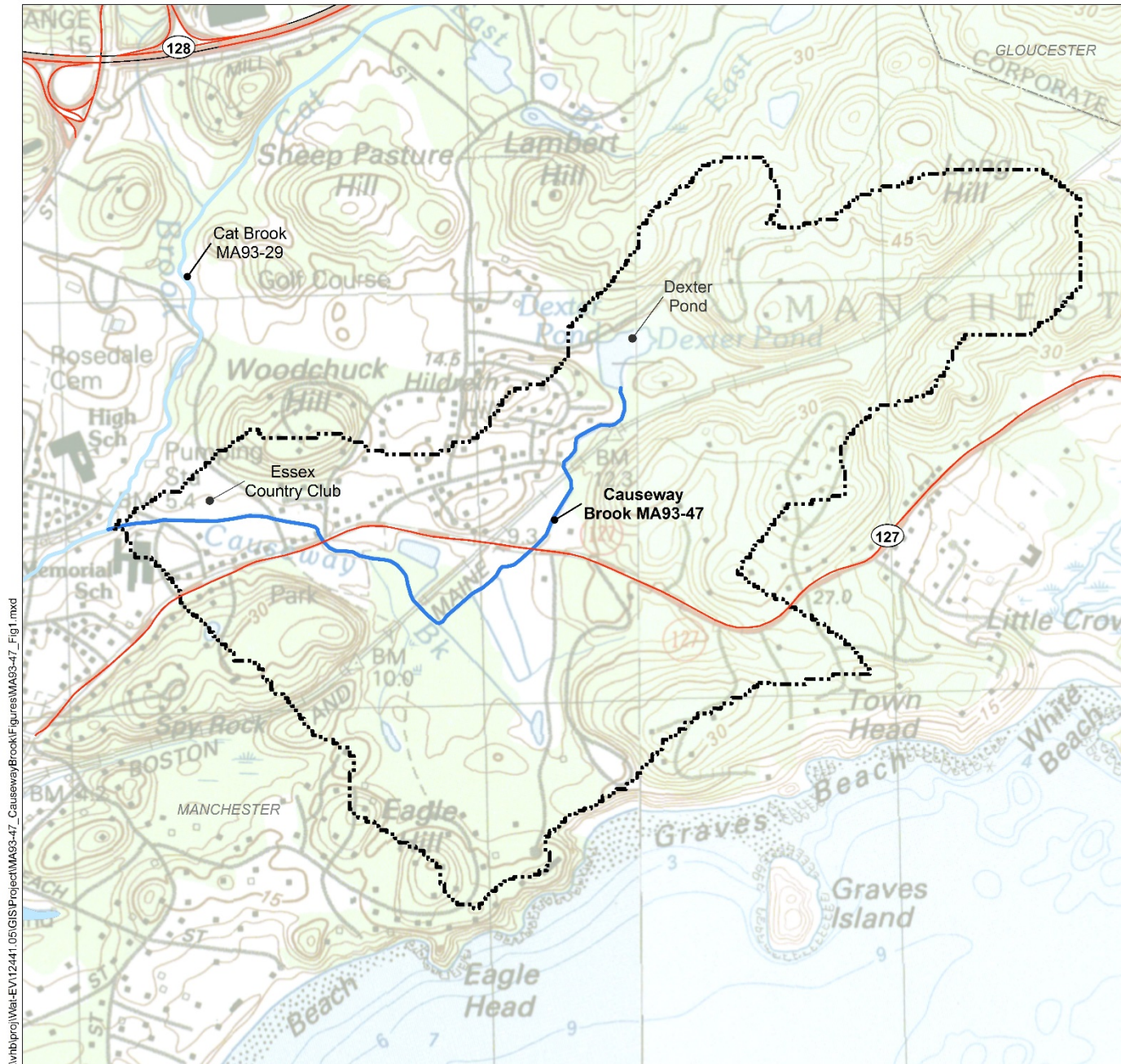
In accordance with the BMPs identified in the TMDL report as planned measures to reach compliance with the *Final Pathogen TMDL for the North Coastal Watershed*,³ MassDOT has documented the locations of its stormwater outfalls. In addition, as part of its pet waste management

program, MassDOT has determined that no MassDOT targeted rest stops are located within the watershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Although the TMDL report also identifies the benefits of structural BMPs to address runoff from impervious areas in some instances, MassDOT feels that it is not a beneficial approach to implement these BMPs in advance of other ongoing BMP efforts identified in the watershed, given the documented variability of pathogen concentrations in highway runoff, and the low probability of achieving substantial gains towards meeting the TMDL with solely implementing IC reductions and controls.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the watershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Causeway Brook. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit and the applicable Pathogen TMDLs. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Causeway Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.



- MassDOT Roadways in Urban Area
- MassDOT Roadways
- Total Watershed
- Assessed Segment
- Impaired Lakes
- Impaired Streams

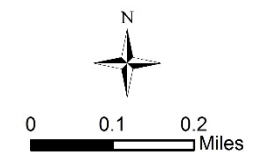


Figure 1

**Causeway Brook
(MA93-47)
Watershed**

June 2015



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Impaired Waters Assessment for Salem Sound (MA93-55)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Fecal Coliform</i>
	Category:	<i>5 (Waters requiring a TMDL), pending change to 4A (TMDL is completed) in proposed 2014 list²</i>
	Final TMDLs:	<i>Final Pathogen TMDL for the North Coastal Watershed³</i>
	WQ Assessment:	<i>North Shore Coastal Watersheds 2002 Water Quality Assessment Report⁴ and EPA 2012 Waterbody Report for Salem Sound⁵</i>
Location	Towns:	<i>Beverly, Manchester, Wenham, Salem</i>
	MassDOT Roads:	<i>Route 128, Route 127</i>
Assessment Method(s)	7R (TMDL Method) <input checked="" type="checkbox"/>	7U (Non-TMDL Method) <input type="checkbox"/>

Site Description

Salem Sound (MA93-55) is a 3.5-square-mile waterbody demarcated as the waters landward of and within imaginary lines connecting Hospital Point, Beverly; Bakers Island, Salem; Gales Point, Manchester; and Chubb Point, Manchester. Refer to Figures 1A and 1B for the waterbody location and its watershed delineations. The extents of waterbody MA93-55 were established in the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ Its seaward boundaries are shared with Salem Harbor (MA93-54) and Salem Sound (MA93-56) to the south and Manchester Harbor (MA93-19) to the north.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlisp.pdf>

³ MassDEP, March 2012. Final Pathogen TMDL for the North Coastal Watershed. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/ncoastl1.pdf>

⁴ MassDEP, March 2007. North Shore Coastal Watersheds 2002 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/93wqar06.pdf>

⁵ EPA, 2012. 2012 Waterbody Report for Salem Sound. Available at: http://ofmpub.epa.gov/tmdl_waters10/attains_waterbody.control?p_list_id=&p_au_id=MA93-55&p_cycle=2012&p_state=MA

The Salem Sound (MA93-55) waterbody segment was originally part of former segment Salem Sound (MA93-25), which was divided into three sections as of the 2012 version of the Integrated List of Waters to form part of Salem Harbor (MA93-54), and all of Salem Sound (MA93-55 and MA93-56). Former segment Salem Sound (MA93-25), which was included in the list of potential impaired water bodies receiving MassDOT stormwater runoff in the 2010 EPA enforcement order, is fully covered under the assessments for these three waterbodies.

The section targeting Salem Sound in the *North Shore Coastal Watersheds 2002 Water Quality Assessment Report* is written for former waterbody MA93-25.⁴ Based on the EPA's 2012 *Waterbody Report for Salem Sound* (MA93-55), Aesthetics, Primary Contact Recreation, Secondary Contact Recreation, and Fish, Other Aquatic Life, and Wildlife are in "good" standing. Fish Consumption and Shellfish Harvesting are "impaired," with the probable source listed as discharges from municipal separate storm sewer systems.⁵

The subwatershed to Salem Sound (MA93-55) covers 5.9 square miles, of which 4.9 square miles is in Beverly, 0.7 square miles is in Manchester, and 0.3 square miles is in Wenham. Its total watershed covers 12.2 square miles, extending northeast beyond the subwatershed into Essex and Gloucester. Over half of the subwatershed is forested, and the remaining land use is primarily low and medium density residential areas and wetlands.

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to Salem Sound (MA93-55) is comprised of portions of Route 128 and Route 127. Refer to Figures 1A and 1B for the location of these roadways within the subwatershed to Salem Sound.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁶ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁷ MassDOT assessed Salem Sound (MA93-55) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.² Salem Sound is proposed to change to a Category 4A water (TMDL is completed) because it is now covered under the *Final Pathogen TMDL for the North Coastal Watershed*.³

BMP 7R for Pathogen TMDL (CN 155.0)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R⁶ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body covered by a final TMDL. Salem Sound (MA93-55) is covered by the *Final Pathogen TMDL for the North Coastal Watershed*.³

⁶ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁷ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to be consistent with relevant TMDLs and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7R Pathogen Methodology.⁸

The North Coastal Watershed has documented both point and non-point sources of bacteria pollution in the TMDL report. The report states that the "prime bacterial sources in the stormwater appear to be from failing sewer line infrastructure, failing septic systems, and animal (pet, bird) waste. Boat wastes also contribute to water quality issues in the harbor areas." According to three water samples taken by the MassDEP in 1998, 2002, and 2007, the quality of the water has been steadily improving.

Waterbody MA93-55 is the northern portion of Salem Sound, located along the Beverly coastline and surrounding Salem's Misery Islands. It is listed as medium priority for both dry and wet weather because it is used for public swimming. Five beaches along Salem Sound conduct weekly summer testing for bacteria, and between 2002 and 2004 there were seven postings due to elevated bacteria. The shoreline was surveyed in 2004 for stormwater pipe outfalls, and bacteria was identified during two rounds of sampling. The possible sources of these bacteria are effluent from the Manchester By-The-Sea Wastewater Treatment Plant (WWTP) and surface waters that are flowing into the sound.

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the North Coastal TMDL report (Section 8.3, page 105) recommends the following specific BMPs to address elevated fecal coliform levels in the watershed:

- Address pet waste as a water quality issue.
- Reduce public geese feeding, especially along lakes where both geese and people congregate.
- Provide technical and funding assistance for the implementation of municipal stormwater plans and ensure that consent judgments are completed in a timely manner.
- Encourage communities and watershed groups to take advantage of the U.S. Department of Agriculture's Natural Resources Conservation service's interest in working with communities to identify sources of stormwater contamination, and evaluate remedial options.
- Educate communities to consider permit and development strategies that address stormwater runoff – implement BMPs, and Low Impact Development (LID).

The TMDL report also indicates that structural BMPs may be appropriate to address runoff from impervious areas in instances where fecal coliform concentrations cannot be reduced by other means.

The following BMPs are specifically identified as being ongoing and/or planned in order to meet the Pathogen TMDL for the North Coastal Watershed in Manchester, Beverly, and Wenham:

- Public education includes a stormwater newsletter sent to residents each year (Manchester, Beverly, and Wenham).

⁸ MassDOT, December 2014. Description of MassDOT's Application of BMP 7R for Pathogen Related Impairments.

- Fact sheets on dog waste disposal are sent out in annual dog license renewal reminders (Beverly) and waste disposal signs are posted in public parks (Beverly, Manchester).
- The stormwater advisory committee meets twice yearly (Beverly).
- Street sweeping is done once or twice annually and catch basin cleaning occurs once annually or as needed (Manchester, Beverly, and Wenham).
- The stormwater collection systems have been mapped on GIS (Manchester, Beverly, and Wenham).
- Plans have been developed and/or implemented to detect and correct illicit stormwater connections (Manchester, Beverly, and Wenham).

Proposed Mitigation Plan

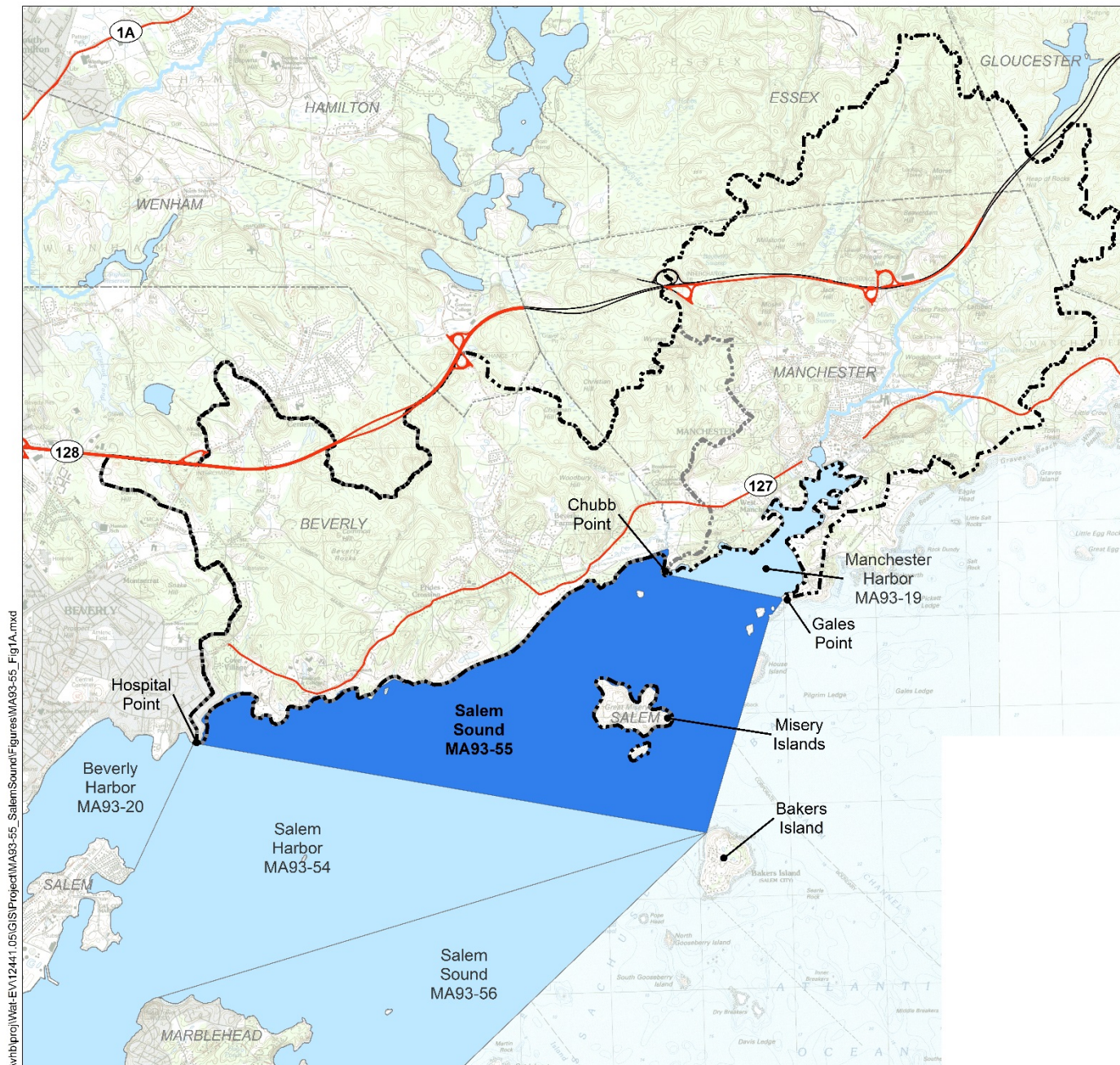
MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7R Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements and TMDL recommendations in regard to pathogens.

In accordance with the BMPs identified in the TMDL report as planned measures to reach compliance with the *Final Pathogen TMDL for the North Coastal Watershed*,³ MassDOT has documented the locations of its stormwater outfalls. In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Although the TMDL report also identifies the benefits of structural BMPs to address runoff from impervious areas in some instances, MassDOT feels that it is not a beneficial approach to implement these BMPs in advance of other ongoing BMP efforts identified in the watershed, given the documented variability of pathogen concentrations in highway runoff, and the low probability of achieving substantial gains towards meeting the TMDL with solely implementing IC reductions and controls.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Salem Sound. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit and the applicable Pathogen TMDLs. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Salem Sound, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.



- MassDOT Roadways in Urban Area
- MassDOT Roadways
- ⬢ Total Watershed
- ⬢ Subwatershed
- ⬢ Assessed Segment
- ⬢ Impaired Lakes
- ⬢ Impaired Streams

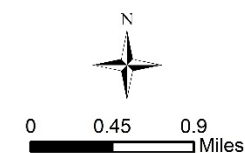


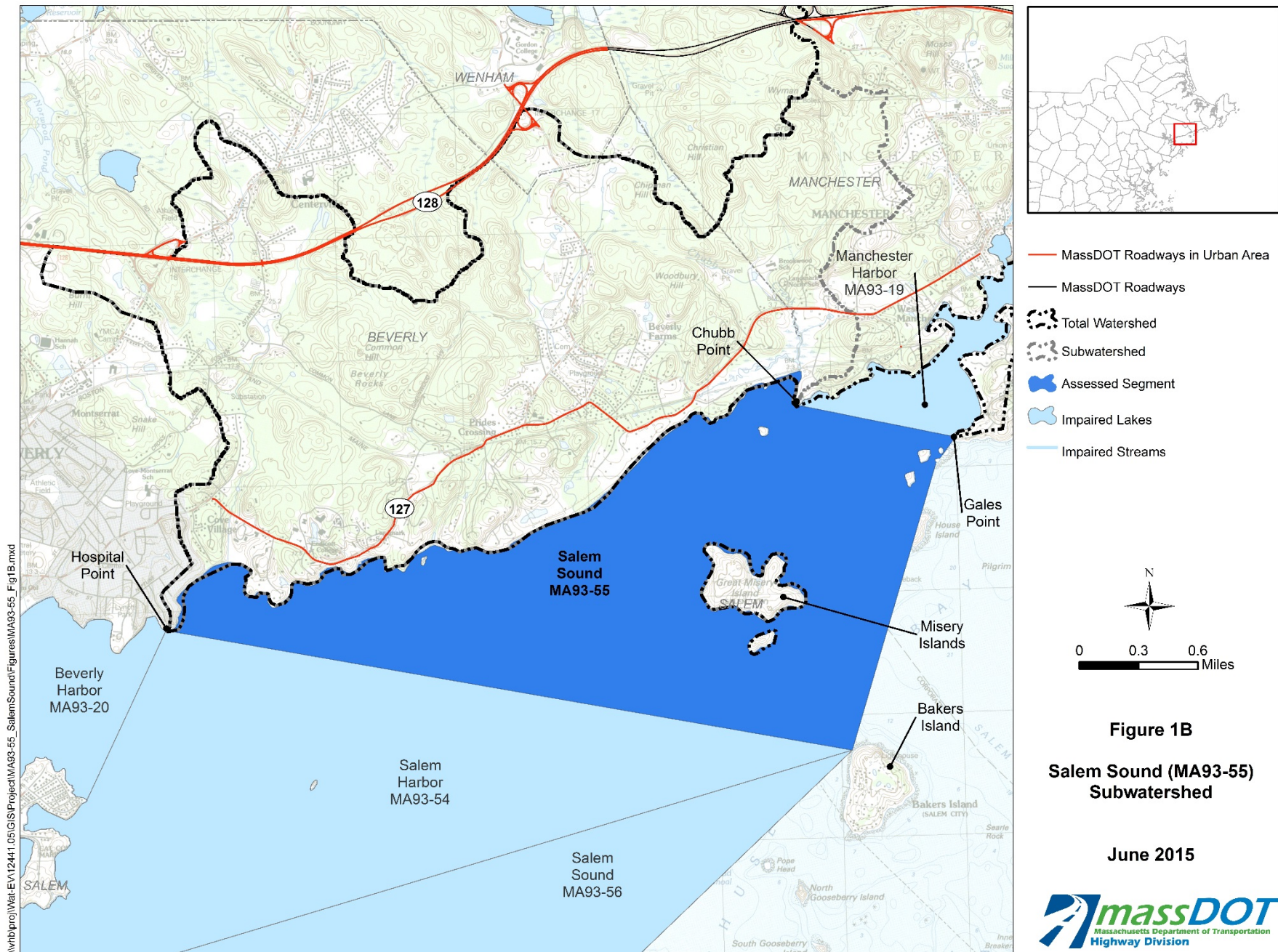
Figure 1A

**Salem Sound (MA93-55)
Watersheds**

June 2015



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Impaired Waters Assessment for Rockport Harbor (MA93-57) and Rockport Harbor (MA93-17)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Fecal Coliform</i>
	Category:	<i>5 (Waters requiring a TMDL), pending change to 4A (TMDL is completed) in proposed 2014 list²</i>
	Final TMDLs:	<i>Final Pathogen TMDL for the North Coastal Watershed³</i>
	WQ Assessment:	<i>North Shore Coastal Watersheds 2002 Water Quality Assessment Report⁴</i>
Location	Towns:	<i>Rockport</i>
	MassDOT Roads:	<i>Route 127</i>
Assessment Method(s)	7R (TMDL Method) <input checked="" type="checkbox"/>	7U (Non-TMDL Method) <input type="checkbox"/>

Site Description

Rockport Harbor (MA93-57) is a 0.4-square-mile waterbody located along the coast of Rockport, Massachusetts that includes the waters landward of an imaginary line from Gully Point to Granite Pier, shown in Figure 1. The waterbody's extents were established in the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ Rockport Harbor (MA93-57) includes former waterbody segment Rockport Harbor (MA93-17), which was combined with segment MA93-57 as of the 2012 version of the list. Rockport Harbor (MA93-17) occupied 0.02 square miles and was designated as the waters landward of an imaginary line between two seawalls in the northeast corner of the inner harbor. The segments are being assessed together herein using the most current extents—those established for Rockport Harbor (MA93-57).

¹ MassDEP, March 2013. *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, June 2014. *Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*. Massachusetts. Available at <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlisp.pdf>

³ MassDEP, March 2012. *Final Pathogen TMDL for the North Coastal Watershed*. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/ncoastl1.pdf>

⁴ MassDEP, March 2007. *North Shore Coastal Watersheds 2002 Water Quality Assessment Report*. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/93wqar06.pdf>

The subwatershed to Rockport Harbor (MA93-57) is the same as its total watershed and covers 2.0 square miles, all of which is in Rockport. Refer to Figure 1 for the watershed delineation. The primary land uses within the watershed are forest and residential areas, but there are also some commercial areas and recreational areas near the harbor coast.

The section targeting Rockport Harbor in the *North Shore Coastal Watersheds 2002 Water Quality Assessment Report* is written for former Segment MA93-17.⁴ The report states that Rockport Harbor is a Class SB waterbody, indicating that it is a habitat for fish, other aquatic life, and wildlife. All of the shellfish growing areas in Rockport Harbor are conditionally approved or prohibited, so Shellfish Harvesting is designated as “impaired.” All other uses are not assessed due to lack of data available. Also, the Clean Vessel Act funds a pump-out boat location with free service in the harbor.

MassDOT property within the urban area with the potential to directly contribute stormwater runoff to Rockport Harbor (MA93-57) is comprised of a portion of Route 127. Refer to Figure 1 for the location of this roadway within the watershed to Rockport Harbor.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁵ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁶ MassDOT assessed Rockport Harbor (MA93-57) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.² Rockport Harbor is proposed to change to a Category 4A water (TMDL is completed) because it is now covered under the *Final Pathogen TMDL for the North Coastal Watershed*.³

BMP 7R for Pathogen TMDL (CN 155.0)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R⁵ of MassDOT’s Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body covered by a final TMDL. Rockport Harbor (MA93-57) is covered by the *Final Pathogen TMDL for the North Coastal Watershed*.³

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to be consistent with relevant TMDLs and permit

⁵ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁶ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7R Pathogen Methodology.⁷

The North Coastal Watershed has documented both point and non-point sources of bacteria pollution in the TMDL report. The report states that the "prime bacterial sources in the stormwater appear to be from failing sewer line infrastructure, failing septic systems, and animal (pet, bird) waste. Boat wastes also contribute to water quality issues in the harbor areas." According to three water samples taken by the MassDEP in 1998, 2002, and 2007, the quality of the water has been steadily improving. Rockport Harbor (MA93-57) is located along the Rockport coastline. The dry and wet weather have not been prioritized due to insufficient data. Sampling for bacteria has been done at Old Garden Beach in the harbor, and it has had no closings from 2003–2010.

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the North Coastal TMDL report (Section 8.3, page 105) recommends the following specific BMPs to address elevated fecal coliform levels in the watershed:

- Address pet waste as a water quality issue.
- Reduce public geese feeding, especially along lakes where both geese and people congregate.
- Provide technical and funding assistance for the implementation of municipal stormwater plans and ensure that consent judgments are completed in a timely manner.
- Encourage communities and watershed groups to take advantage of the U.S. Department of Agriculture's Natural Resources Conservation service's interest in working with communities to identify sources of stormwater contamination, and evaluate remedial options.
- Educate communities to consider permit and development strategies that address stormwater runoff – implement BMPs, and Low Impact Development (LID).

The TMDL report also indicates that structural BMPs may be appropriate to address runoff from impervious areas in instances where fecal coliform concentrations cannot be reduced by other means.

The following BMPs are specifically identified as being ongoing and/or planned in order to meet the Pathogen TMDL for the North Coastal Watershed in Rockport:

- Public education includes a stormwater newsletter sent to residents each year.
- Waste disposal signs are posted in public parks with supply bags.
- Street sweeping and catch basin cleaning occurs once annually.
- Plans have been developed to detect and correct illicit stormwater connections.

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7R Pathogen Methodology, MassDOT believes that existing efforts

⁷ MassDOT, December 2014. Description of MassDOT's Application of BMP 7R for Pathogen Related Impairments.

are consistent with the current and draft MS4 permit requirements and TMDL recommendations in regard to pathogens.

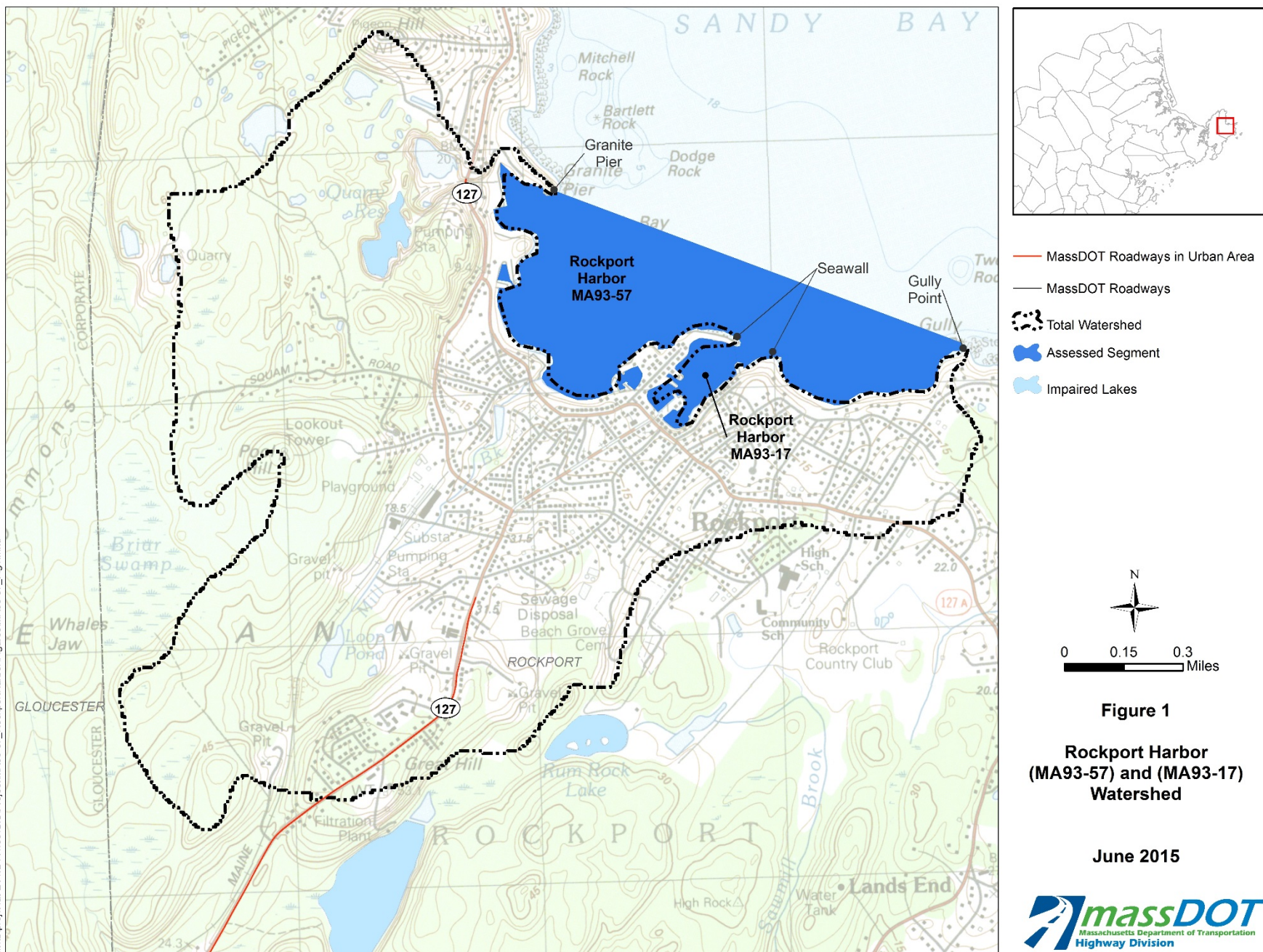
In accordance with the BMPs identified in the TMDL report as planned measures to reach compliance with *Final Pathogen TMDL for the North Coastal Watershed*,³ MassDOT has documented the locations of its stormwater outfalls. In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the watershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Although the TMDL report also identifies the benefits of structural BMPs to address runoff from impervious areas in some instances, MassDOT feels that it is not a beneficial approach to implement these BMPs in advance of other ongoing BMP efforts identified in the watershed, given the documented variability of pathogen concentrations in highway runoff, and the low probability of achieving substantial gains towards meeting the TMDL with solely implementing IC reductions and controls.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the watershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Rockport Harbor. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit and the applicable Pathogen TMDLs. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Rockport Harbor, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

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Impaired Waters Assessment for Cohasset Harbor (MA94-01)

Summary

Impaired Water¹	Stormwater	
	Impairments:	<i>Fecal Coliform</i>
	Category:	<i>4A (TMDL is completed)</i>
	Final TMDLs:	<i>Final Pathogen TMDL for the South Coastal Watershed²</i>
	WQ Assessment:	<i>South Shore Coastal Watersheds 2001 Water Quality Assessment Report³</i>
Location	Towns:	<i>Cohasset, Scituate</i>
	MassDOT Roads:	<i>Route 3A</i>
Assessment Method(s)	7R (TMDL Method) <input checked="" type="checkbox"/>	7U (Non-TMDL Method) <input type="checkbox"/>

Site Description

Cohasset Harbor (MA94-01) is a 450-acre Class SA waterway within Scituate and Cohasset, Massachusetts. Cohasset Harbor is defined by a line drawn from the northwestern point of Scituate Neck, Scituate to just north of Quarry Point, Cohasset (not including Cohasset Cove). The major contributors to Cohasset Harbor are James Brook (a non-impaired waterbody) and Bound Brook (MA94-18), which both feed into Cohasset Cove (MA94-32). The drainage area of this segment is approximately 17.6 square miles. The total and subwatershed to Cohasset Harbor are shown on Figures 1A and 1B, respectively. Land use estimates for the subwatershed include forest (58%), residential (27%), and wetlands (7%).³

MassDEP's *South Shore Coastal Watersheds 2001 Water Quality Assessment Report* for this receiving water identified the Shellfish Harvesting use as having an "impaired" status due to fecal coliform bacteria.³ The suspected sources of this impairment are on-vessel discharges, septic systems, and discharges from municipal separate storm sewer systems. The Aquatic Life and Fish Consumption uses were not assessed.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, March 2009. Final Pathogen TMDL for the South Coastal Watershed. Available at http://ofmpub.epa.gov/waters10/attains_impaired_waters.show_tmdl_document?p_tmdl_doc_blobs_id=67200

³ MassDEP, 2001. South Shore Coastal Watersheds 2001 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/94wqar1.pdf>

MassDOT's property within the urban area with the potential to directly contribute stormwater runoff to Cohasset Harbor (MA94-01) is comprised of portions of Route 3A. Refer to Figure 1 for the location of this roadway within the subwatershed to Cohasset Harbor.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁴ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁵ MassDOT assessed Cohasset Harbor (MA94-01) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁶ The condition of Cohasset Harbor is not proposed to change.

BMP 7R for Pathogen TMDL (CN 0255.0)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R⁴ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body covered by a final TMDL. Cohasset Harbor (MA94-01) is covered by the *Final Pathogen TMDL for the South Shore Coastal Watershed*.²

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to be consistent with relevant TMDLs and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7R Pathogen Methodology.⁷

The South Shore Coastal watershed has no documented point sources of bacteria pollution but numerous non-point contributions are identified in the TMDL report. The overwhelming bacteria sources identified in the TMDL report are "failing septic systems throughout the watershed, as well as general effects of overland stormwater flows as these pick up various pollutants, such as wildlife and pet wastes, garbage wastes, manures from farm operations, etc." Stormwater runoff, including agricultural runoff, was the primary wet-weather source category evaluated in the TMDL report.

⁴ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁵ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁶ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

⁷ MassDOT, December 2014. Description of MassDOT's Application of BMP 7R for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year5/Attachment4.pdf>

The *Final Pathogen TMDL for the South Coastal Watershed* states that the suspected sources of pathogens in Cohasset Harbor are marina/boating sanitary discharges and municipal separate storm sewer systems.

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the South Coastal Watershed TMDL report (Section 8.0, page 68) recommends the following specific BMPs to address elevated fecal coliform levels in the watershed:

- Correction of failing septic systems
- Controls for stormwater runoff

The TMDL report also indicates that structural BMPs may be appropriate to address runoff from impervious areas in instances where fecal coliform concentrations cannot be reduced by other means.

The following BMPs are specifically identified as being ongoing and/or planned in order to meet the bacteria TMDL for Cohasset Harbor:

- Agricultural BMPs
- Illicit discharge detection and elimination
- Implementation of stormwater management plans by MS4s
- Septic system upgrades
- WWTP BMPs to meet effluent limits
- Watershed resident education
- Additional monitoring

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7R Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements and TMDL recommendations in regard to pathogens.

As part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen-impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Although the TMDL report also identifies the benefits of structural BMPs to address runoff from impervious areas in some instances, MassDOT feels that it is not a beneficial approach to implement these BMPs in advance of other ongoing BMP efforts identified in the watershed, given the documented variability of pathogen concentrations in highway runoff, and the low probability of achieving substantial gains towards meeting the TMDL with solely implementing IC reductions and controls.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Cohasset Harbor. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit and the applicable Pathogen TMDLs. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Cohasset Harbor, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

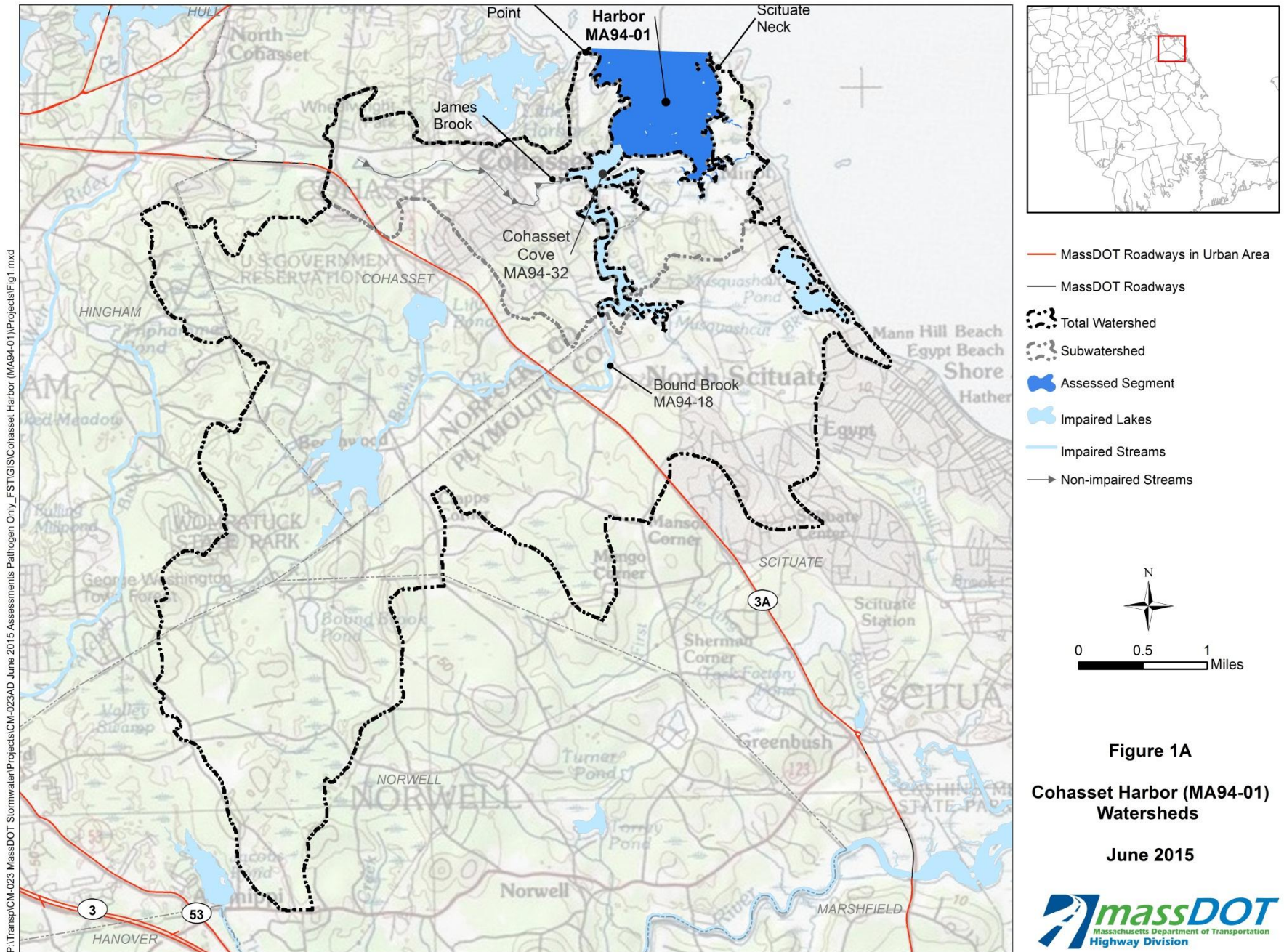


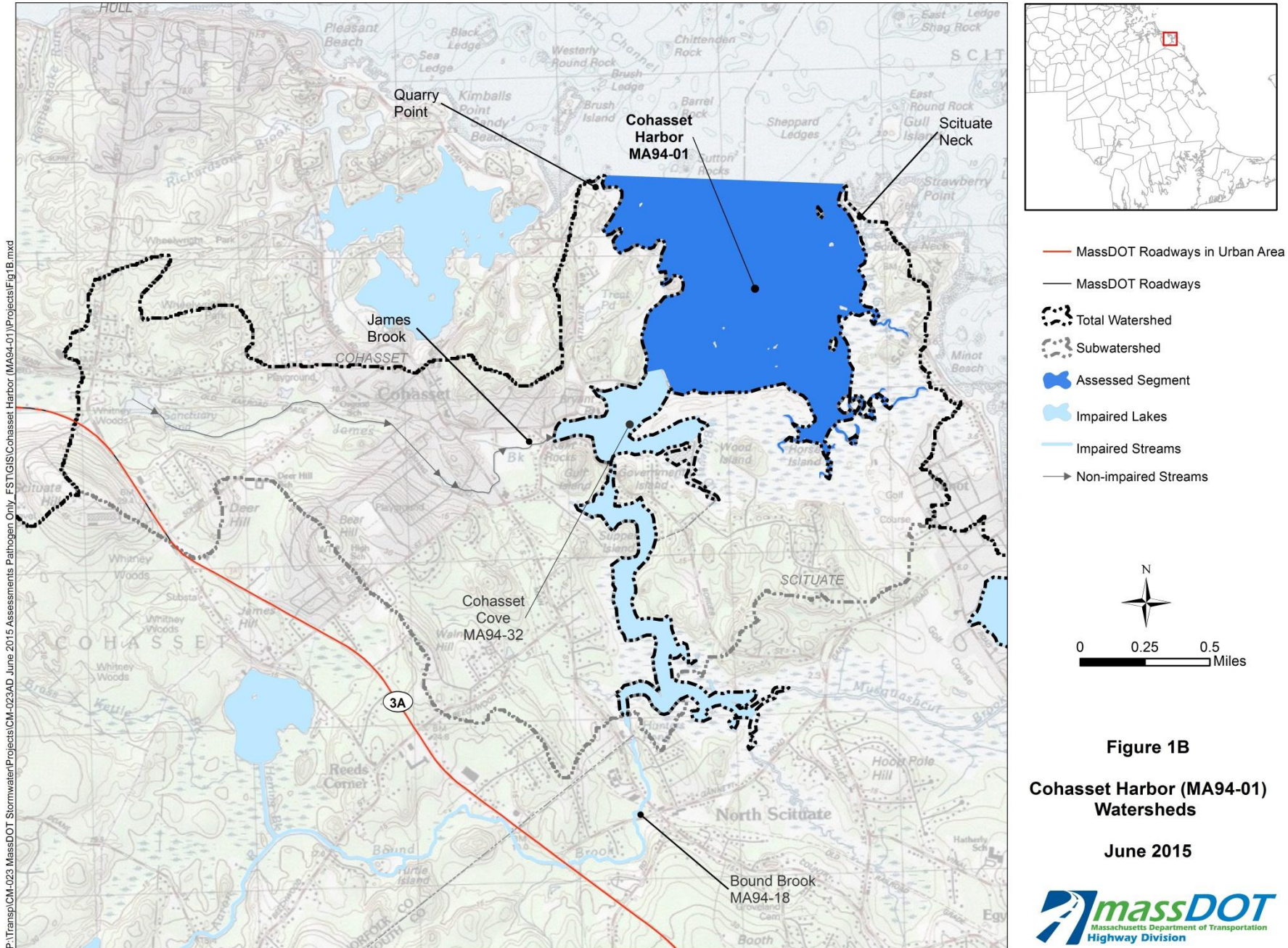
Figure 1A

Cohasset Harbor (MA94-01)
Watersheds

June 2015



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Impaired Waters Assessment for Cohasset Cove (MA94-32)

Summary

Impaired Water¹	Stormwater	
	Impairments:	<i>Fecal Coliform</i>
	Category:	<i>4A (TMDL is completed)</i>
	Final TMDLs:	<i>Final Pathogen TMDL for the South Coastal Watershed²</i>
	WQ Assessment:	<i>South Shore Coastal Watersheds 2001 Water Quality Assessment Report³</i>
Location	Towns:	<i>Cohasset, Scituate</i>
	MassDOT Roads:	<i>Route 3A</i>
Assessment Method(s)	7R (TMDL Method) <input checked="" type="checkbox"/>	7U (Non-TMDL Method) <input type="checkbox"/>

Site Description

Cohasset Cove (MA94-32) is a 57.6-acre Class A waterway (estuary) in Scituate and Cohasset, Massachusetts. Cohasset Cove is connected to Cohasset Harbor (MA94-01) to the north and The Gulf (MA94-19) to the south. The major contributors to Cohasset Cove are James Brook (a non-impaired waterbody) and Bound Brook (MA94-18). The drainage area of Cohasset Cove is approximately 16.5 square miles. The total and subwatershed to Cohasset Cove is shown on Figures 1A and 1B, respectively.

Land use estimates for the subwatershed include forest (61%), residential (26%), and wetlands (5%). The Cohasset WWTP (MA0100285) discharges a flow of 0.3 Million Gallons per Day (MGD-monthly average) of treated municipal wastewater outfall #001 to Cohasset Cove.³

MassDEP's *South Shore Coastal Watersheds 2001 Water Quality Assessment Report* for this receiving water identified the Shellfish Harvesting use with an "impaired" status due to fecal coliform bacteria.³ The suspected sources of this impairment are on-vessel discharges, septic systems, and

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, August 2014. Final Pathogen TMDL for the South Coastal Watershed. Available at http://ofmpub.epa.gov/waters10/attains_impaired_waters.show_tmdl_document?p_tmdl_doc_blobs_id=67200

³ MassDEP, 2001. South Shore Coastal Watersheds 2001 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/94wqar1.pdf>

discharges from municipal separate storm sewer systems. The Primary Contact, Secondary Contact, and Aesthetics uses were identified with a “support status”. The Aquatic Life use was not assessed.

MassDOT’s property within the urban area with the potential to directly contribute stormwater runoff to Cohasset Cove (MA94-32) is comprised of portions of Route 3A. Refer to Figure 1 for the location of this roadway within the subwatershed to Cohasset Cove.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁴ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁵ MassDOT assessed Cohasset Cove (MA94-32) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁶ The condition of Cohasset Cove is not proposed to change.

BMP 7R for Pathogen TMDL (CN 0255.0)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R⁴ of MassDOT’s Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body covered by a final TMDL. Cohasset Cove (MA94-32) is covered by the *Final Pathogen TMDL for the South Shore Coastal Watershed*.²

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to be consistent with relevant TMDLs and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT’s BMP 7R Pathogen Methodology.⁷

The South Shore Coastal watershed has no documented point sources of bacteria pollution but numerous non-point contributions are identified in the TMDL report. The overwhelming bacteria sources identified in the TMDL report are “failing septic systems throughout the watershed, as well as general effects of overland stormwater flows as these pick up various pollutants, such as wildlife and

⁴ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁵ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁶ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14/wlisp.pdf>

⁷ MassDOT, December 2014. Description of MassDOT’s Application of BMP 7R for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year5/Attachment4.pdf>

pet wastes, garbage wastes, manures from farm operations, etc.” Stormwater runoff, including agricultural runoff, was the primary wet-weather source category evaluated in the TMDL report.

The *Final Pathogen TMDL for the South Coastal Watershed* states that the suspected sources of pathogens in Cohasset Cove include the Cohasset WWTP, marinas, septic systems, and stormwater runoff.

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the South Coastal Watershed TMDL report (Section 8.0, page 68) recommends the following specific BMPs to address elevated fecal coliform levels in the watershed:

- Correction of failing septic systems
- Controls for stormwater runoff

Due to the impact of stormwater runoff on pathogen levels, the TMDL report recommends intensive application of non-structural BMPs throughout the watershed. Structural controls may be necessary if non-structural BMPs are not successful. The following BMPs are specifically identified as being ongoing and/or planned in order to meet the bacteria TMDL for the South Coastal watershed, which includes Cohasset Cove:

- Agricultural BMPs
- Illicit discharge detection and elimination
- Implementation of stormwater management plans by MS4s
- Septic system upgrades
- WWTP BMPs to meet effluent limits
- Watershed resident education
- Additional monitoring

Proposed Mitigation Plan

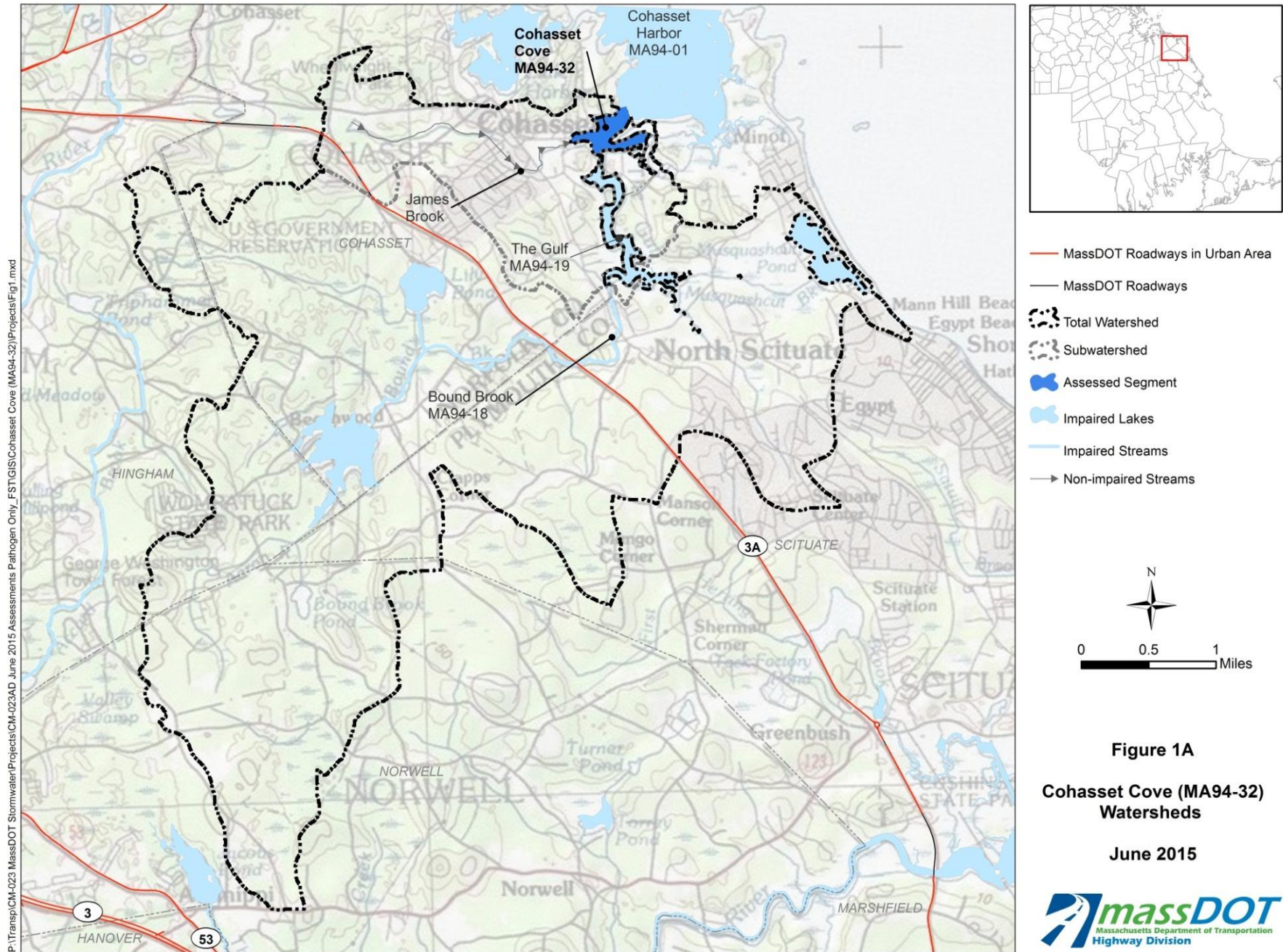
MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7R Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements and TMDL recommendations in regard to pathogens.

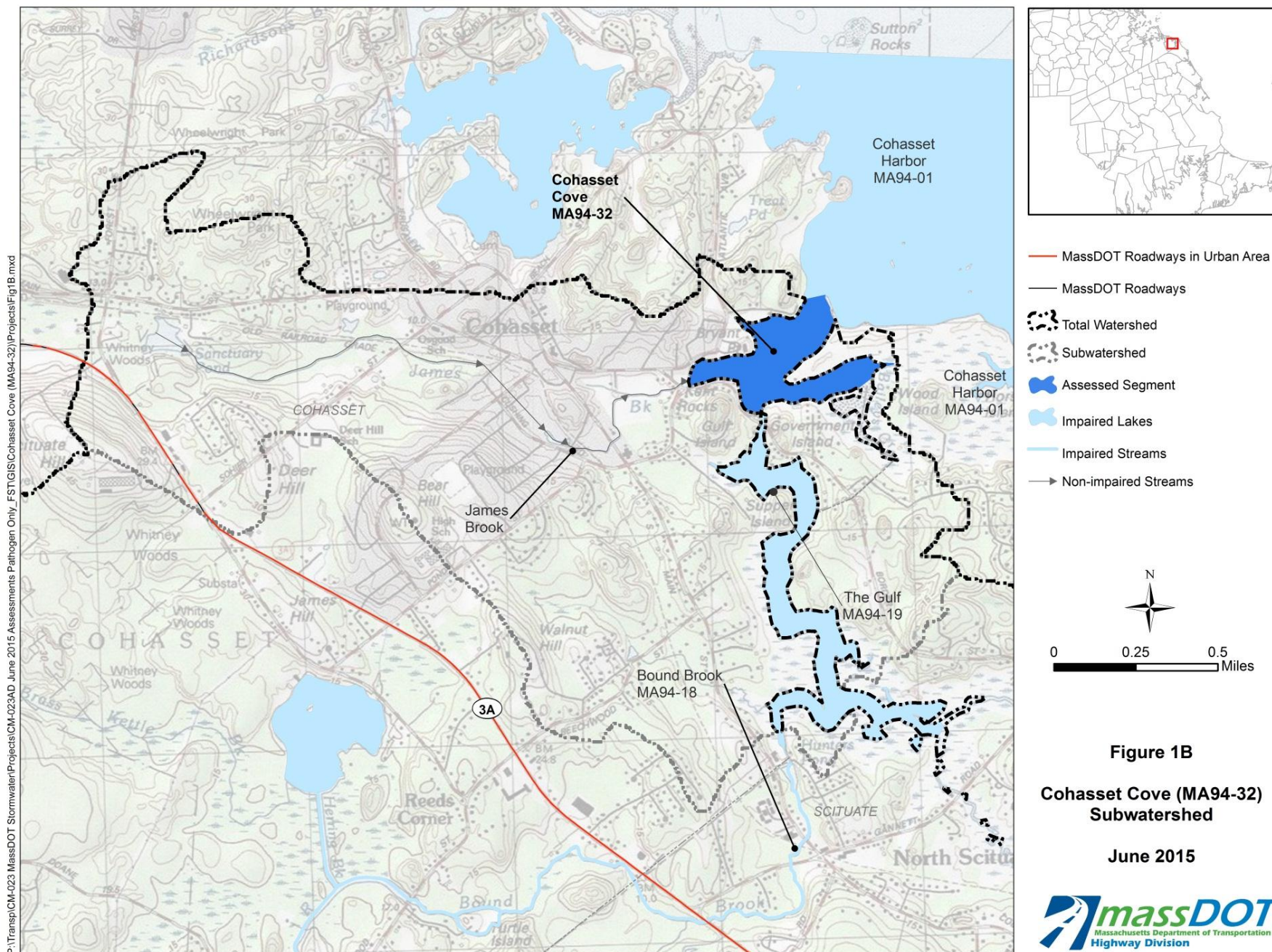
As part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen-impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Although the TMDL report also identifies the benefits of structural BMPs to address runoff from impervious areas in some instances, MassDOT feels that it is not a beneficial approach to implement these BMPs in advance of other ongoing BMP efforts identified in the watershed, given the documented variability of pathogen concentrations in highway runoff, and the low probability of achieving substantial gains towards meeting the TMDL with solely implementing IC reductions and controls.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Cohasset Cove. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit and the fecal coliform TMDLs. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Cohasset Cove, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.





Impaired Waters Assessment for Snell Creek (MA95-44)

Summary

Impaired Water ¹	Stormwater	<i>Fecal Coliform</i>
	Impairments:	
	Category:	<i>4A (TMDL is completed)</i>
	Final TMDLs:	<i>Final Pathogen TMDL for the Buzzards Bay Watershed</i> ²
	WQ Assessment:	<i>Buzzards Bay Watershed 2000 Water Quality Assessment Report</i> ³
Location	Towns:	<i>Westport</i>
	MassDOT Roads:	<i>Route 88</i>
Assessment Method(s)	7R (TMDL Method) <input checked="" type="checkbox"/>	7U (Non-TMDL Method) <input type="checkbox"/>

Site Description

Snell Creek (MA95-44) is a Class B waterway originating west of Route 88 (Drift Road) in Westport, Massachusetts. This segment includes the headwaters of Snell Creek and is the longest of the three Snell Creek segments (MA95-59, MA95-45, and MA95-44) at 1.49 miles. This segment drains approximately 0.5 square miles. Snell Creek is a Coldwater Fisheries Resource (stream inventory SARIS number 9560075). The total and subwatershed of Snell Creek are the same and are shown on Figure 1. Land use estimates for the watershed includes forest (72%), agriculture (16%), and residential (9%).³

According to the *Buzzards Bay Watershed 2000 Water Quality Assessment Report*, the Primary Contact use was assessed as “impaired” because of fecal coliform bacteria pollution.³ The source is listed as unknown, but suspected sources include municipal separate storm sewer systems, on-site septic systems, and highway/road runoff. The Secondary Contact use was assessed as “support”. Remaining uses have not been assessed.

MassDOT’s property within the urban area with the potential to directly contribute stormwater runoff to Snell Creek (MA95-44) is comprised of portions of Route 88. Refer to Figure 1 for the location the urban and non-urban portions of this roadway within the subwatershed to Snell Creek.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, March 2009. Final Pathogen TMDL for the Buzzards Bay Watershed. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/a-thru-m/buzzbay1.pdf>

³ MassDEP, November 2003. Buzzards Bay Watershed 2000 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/95wqar1.pdf>

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁴ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁵ MassDOT assessed Snell Creek (MA95-44) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁶ The condition of Snell Creek is not proposed to change.

BMP 7R for Pathogen TMDL (CN 251.1)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R⁴ of MassDOT’s Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body covered by a final TMDL. Snell Creek (MA95-44) is covered by the *Final Pathogen TMDL for the Buzzards Bay Watershed*.²

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to be consistent with relevant TMDLs and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT’s BMP 7R Pathogen Methodology.⁷

The Buzzards Bay watershed has numerous point sources and non-point sources of bacteria pollution identified in the TMDL report. The report lists three primary sources of bacteria: illicit connections, leaking sewer pipes, and sanitary sewer overflows in sewered areas; failing septic systems; and stormwater runoff. Upstream issues, including a former farm, are described as possible contributors to elevated fecal coliform concentrations in this segment.

The TMDL report states the following on Page 63:

“The Buzzards Bay National Estuaries Program has conducted a significant amount of investigation of potential bacteria sources to the Buzzards Bay System. The program produced a document, *„Atlas of Stormwater Discharges in the Buzzards Bay Watershed’*, which represents

⁴ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁵ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁶ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts’ Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14/iwlstp.pdf>

⁷ MassDOT, December 2014. Description of MassDOT’s Application of BMP 7R for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairment/Waters/Year5/Attachment4.pdf>

a premier effort to begin the work of identifying hotspot bacterial sources of pollution. This intensive effort investigated and documented over 2,600 drainage pipe and road cut discharges which have the potential to contribute bacteria pollution to nearby surface waters. That effort also prioritized each discharge into high, medium, or low for remediation, based on a ten category ranking of scores to help set priorities for remediation.”

The ranking system was based on fecal coliform concentrations, and further adjusted upwards based on proximity of sensitive areas. The Snell Creek watershed contains numerous stormwater discharge locations that are either classified as „medium” priority or „remediated.” The „remediated” locations are nearly all located in the headwaters area, and the „medium” priority sites are located the middle portion of the watershed.

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the Buzzards Bay TMDL report (Section 8.0) recommends developing a comprehensive control strategy for the diverse sources of pathogens in the watershed. The TMDL report recommends a basin-wide implementation strategy, which includes a mandatory program for implementing stormwater BMPs and eliminating illicit sources. These strategies include:

- Reducing illicit discharges (illegal sewer connections)
- Reducing failing infrastructure (leaking sewer pipes, or CSO/sanitary sewer overflows)
- Controlling storm water runoff
- Managing agricultural runoff
- Upgrading failing septic systems

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT’s BMP 7R Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements and TMDL recommendations in regard to pathogens.

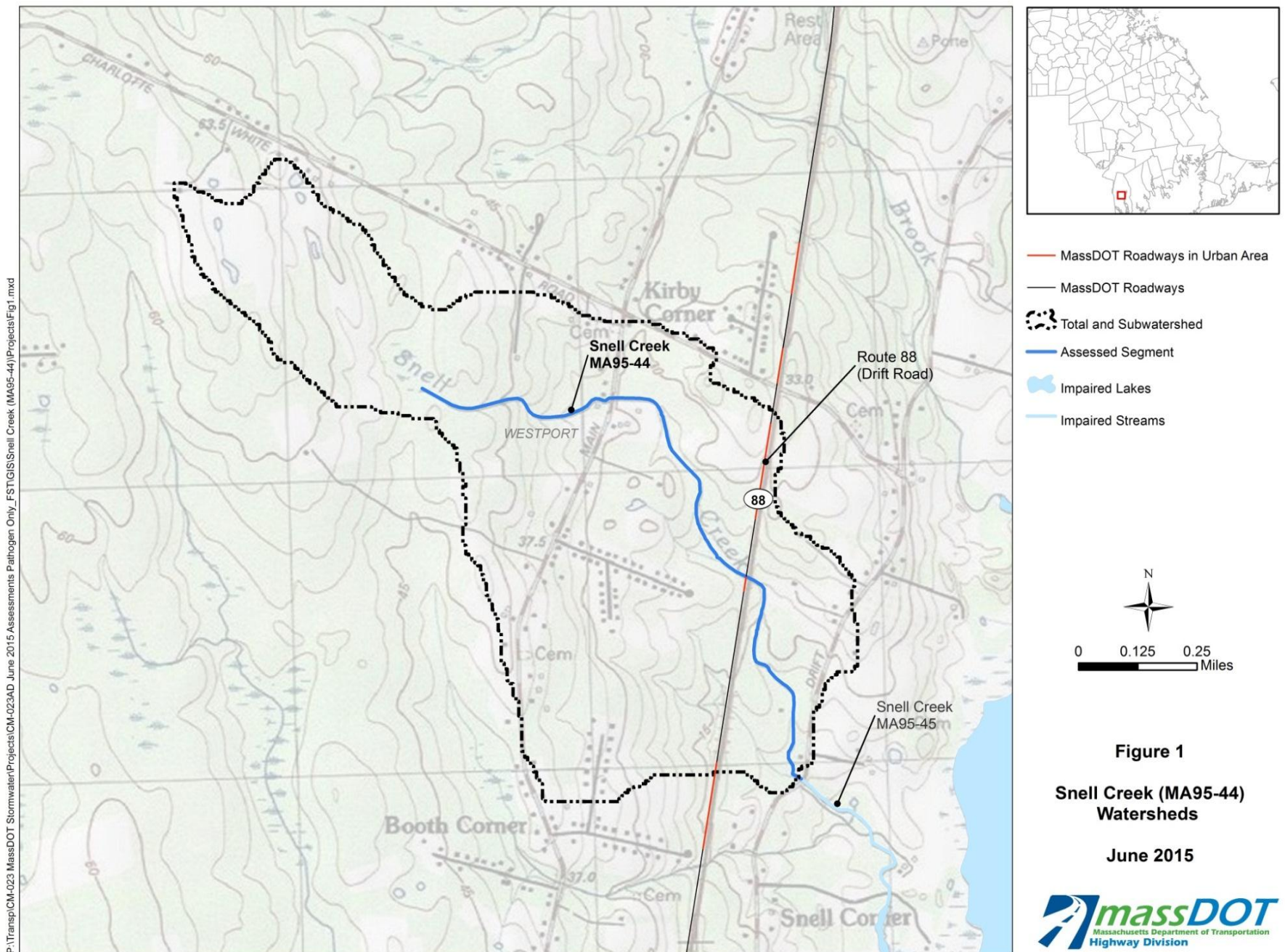
As part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen-impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Although the TMDL report also identifies the benefits of riparian restoration and structural BMPs to address runoff from impervious areas in some instances, MassDOT feels that it is not a beneficial approach to implement these BMPs in advance of other ongoing BMP efforts identified in the watershed, given the documented variability of pathogen concentrations in highway runoff, and the low probability of achieving substantial gains towards meeting the TMDL with solely implementing IC reductions and controls.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT’s stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present,

there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Snell Creek. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit and the applicable Pathogen TMDLs. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Snell Creek, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.



Impaired Waters Assessment for Snell Creek (MA95-45)

Summary

Impaired Water ¹	Stormwater	<i>Fecal Coliform</i>
	Impairments:	
	Category:	<i>4A (TMDL is completed)</i>
	Final TMDLs:	<i>Final Pathogen TMDL for the Buzzards Bay Watershed</i> ²
	WQ Assessment:	<i>Buzzards Bay Watershed 2000 Water Quality Assessment Report</i> ³
Location	Towns:	<i>Westport</i>
	MassDOT Roads:	<i>Route 88</i>
Assessment Method(s)	7R (TMDL Method) <input checked="" type="checkbox"/>	7U (Non-TMDL Method) <input type="checkbox"/>

Site Description

Snell Creek (MA95-45) is a Class B waterway located west of Route 88 (Drift Road) in Westport, Massachusetts. This segment is downstream of Snell Creek (MA95-44) and upstream of Snell Creek (MA95-59). The length of this segment is 0.67 miles and it drains an approximate area of 1.4 square miles. Snell Creek is a Coldwater Fisheries Resource (stream inventory SARIS number 9560075). The total and subwatershed of Snell Creek are the same and are shown on Figure 1. The top three land uses for the subwatershed are forest (65%), agriculture (16%), and residential (16%).³

According to the *Buzzards Bay Watershed 2000 Water Quality Assessment Report*, a 30-acre farm that was located in both the Snell Creek and East Branch Westport River watersheds was issued a Concentrated Animal Feeding Operations permit under the NPDES regulations, which stipulated best management practices for eliminating discharge to waterbodies as well as the maintenance of a vegetated buffer.³ According to the *Final Pathogen TMDL for the Buzzards Bay Watershed* report, the farm no longer operates.² There are no known regulated Water Management Act withdrawals along this segment.

The *Buzzards Bay Watershed 2000 Water Quality Assessment Report* states that the Primary and Secondary Contact uses were assessed as “impaired” because of fecal coliform bacteria pollution.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, March 2009. Final Pathogen TMDL for the Buzzards Bay Watershed. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/a-thru-m/buzzbay1.pdf>

³ MassDEP, November 2003. Buzzards Bay Watershed 2000 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/95wqar1.pdf>

The known sources for the bacteria are related to nearby dairy farming practices: animal feeding operation, grazing in riparian zone, and dairy outside milk parlor area. Suspected sources include municipal separate storm sewer systems, on-site septic systems, and highway/road runoff. Remaining uses have not been assessed.³

MassDOT's property within the urban area with the potential to directly contribute stormwater runoff to Snell Creek (MA95-45) is comprised of portions of Route 88. Refer to Figure 1 for the location of the urban and non-urban portions of this roadway within the subwatershed to Snell Creek.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁴ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁵ MassDOT assessed Snell Creek (MA95-45) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁶ The condition of Snell Creek is not proposed to change.

BMP 7R for Pathogen TMDL (CN 251.1)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R⁴ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body covered by a final TMDL. Snell Creek (MA95-45) is covered by the *Final Pathogen TMDL for the Buzzards Bay Watershed*.²

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to be consistent with relevant TMDLs and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7R Pathogen Methodology.⁷

The Buzzards Bay watershed has numerous point sources and non-point sources of bacteria pollution identified in the TMDL report. The report lists three primary sources of bacteria: illicit connections, leaking sewer pipes, and sanitary sewer overflows in sewered areas; failing septic

⁴ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

⁵ MassDOT, April 2010. BMP 7U: Water Quality Impaired Waters Assessment and Mitigation Plan. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁶ MassDEP, June 2014. Massachusetts Year 2014 Integrated List of Waters – Proposed Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/14iwlstp.pdf>

⁷ MassDOT, December 2014. Description of MassDOT's Application of BMP 7R for Pathogen Related Impairments. Available at:

<http://www.massdot.state.ma.us/Portals/8/docs/environmental/impairedWaters/Year5/Attachment4.pdf>

systems; and stormwater runoff. Upstream issues, including a former farm, are described as possible contributors to elevated fecal coliform concentrations in this segment.

The TMDL report states the following on Page 63:

“The Buzzards Bay National Estuaries Program has conducted a significant amount of investigation of potential bacteria sources to the Buzzards Bay System. The program produced a document, „Atlas of Stormwater Discharges in the Buzzards Bay Watershed”, which represents a premier effort to begin the work of identifying hotspot bacterial sources of pollution. This intensive effort investigated and documented over 2,600 drainage pipe and road cut discharges which have the potential to contribute bacteria pollution to nearby surface waters. That effort also prioritized each discharge into high, medium, or low for remediation, based on a ten category ranking of scores to help set priorities for remediation.”

The ranking system was based on fecal coliform concentrations, and further adjusted upwards based on proximity of sensitive areas. The Snell Creek watershed contains numerous stormwater discharge locations that are either classified as „medium” priority or „remediated”. The „remediated” locations are nearly all located in the headwaters area, and the „medium” priority sites are located the middle portion of the watershed.

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the Buzzards Bay TMDL report (Section 8.0) recommends developing a comprehensive control strategy for the diverse sources of pathogens in the watershed. The TMDL report recommends a basin-wide implementation strategy, which includes a mandatory program for implementing stormwater BMPs and eliminating illicit sources. These strategies include:

- Reducing illicit discharges (illegal sewer connections)
- Reducing failing infrastructure (leaking sewer pipes, or CSO/sanitary sewer overflows)
- Controlling storm water runoff
- Managing agricultural runoff
- Upgrading failing septic systems

Proposed Mitigation Plan

MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing SWMP including educational programs, illicit connection review and source control. As discussed in MassDOT’s BMP 7R Pathogen Methodology, MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements and TMDL recommendations in regard to pathogens.

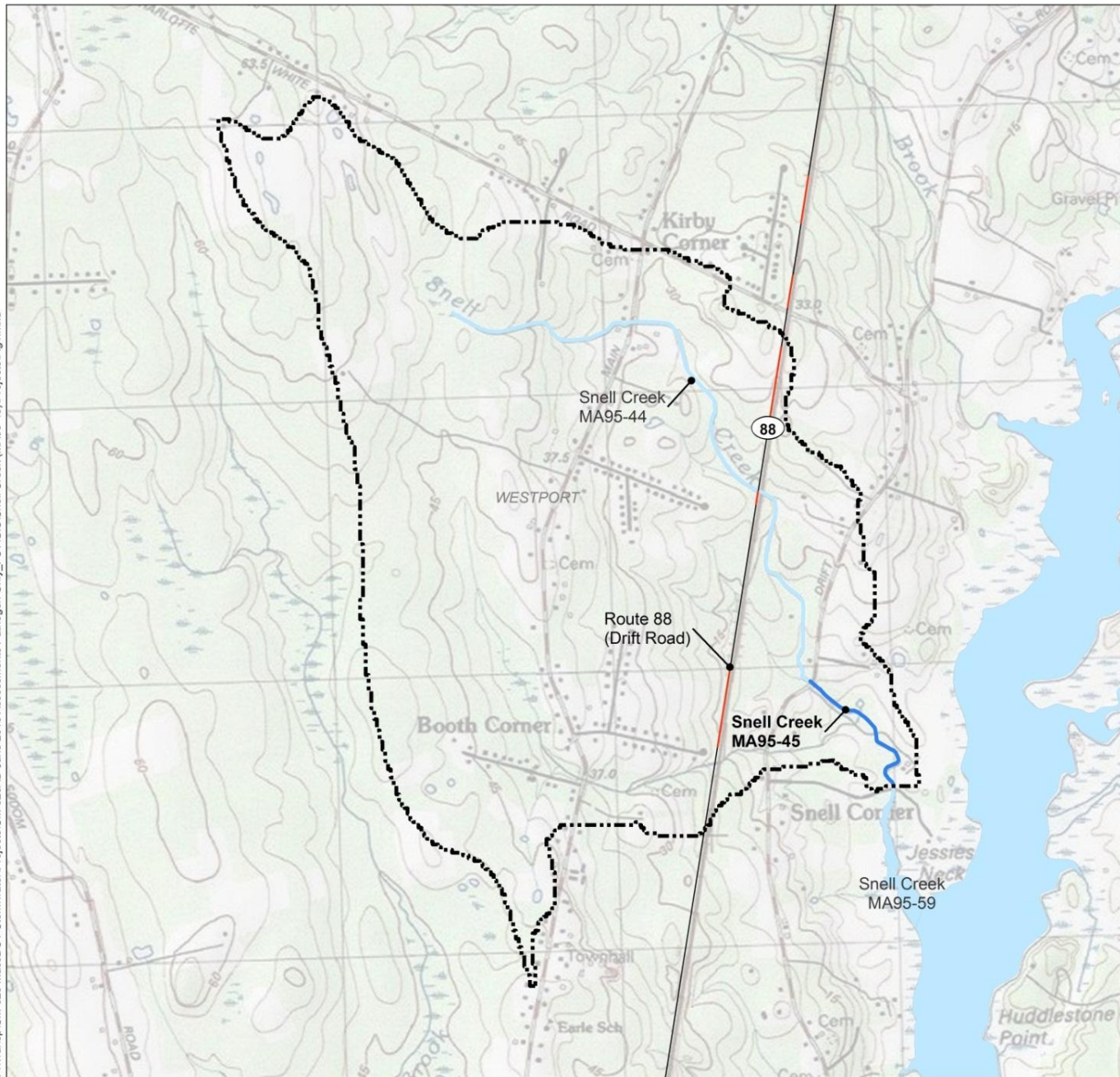
As part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen-impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

Although the TMDL report also identifies the benefits of riparian restoration and structural BMPs to address runoff from impervious areas in some instances, MassDOT feels that it is not a beneficial approach to implement these BMPs in advance of other ongoing BMP efforts identified in the

watershed, given the documented variability of pathogen concentrations in highway runoff, and the low probability of achieving substantial gains towards meeting the TMDL with solely implementing IC reductions and controls.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Snell Creek. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit and the applicable Pathogen TMDLs. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Snell Creek, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.



- MassDOT Roadways in Urban Area
- MassDOT Roadways
- Total and Subwatershed
- Assessed Segment
- Impaired Lakes
- Impaired Streams

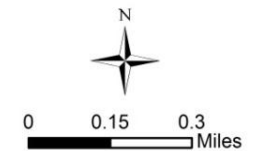


Figure 1
Snell Creek (MA95-45)
Watersheds
June 2015



Impaired Waters Assessment for Snell Creek (MA95-59)

Summary

Impaired Water¹	Stormwater	<i>Fecal Coliform</i>
	Impairments:	
	Category:	<i>4A (TMDL is completed)</i>
	Final TMDLs:	<i>Final Pathogen TMDL for the Buzzards Bay Watershed²</i>
	WQ Assessment:	<i>Buzzards Bay Watershed 2000 Water Quality Assessment Report³</i>
Location	Towns:	<i>Westport</i>
	MassDOT Roads:	<i>Route 88</i>
Assessment Method(s)	7R (TMDL Method) <input checked="" type="checkbox"/>	7U (Non-TMDL Method) <input type="checkbox"/>

Site Description

Snell Creek (MA95-59) is the southernmost segment of Snell Creek (located downstream of segments MA95-45 and MA95-44), and is an estuary described as starting at Marcus" Bridge and ending at the confluence with the East Branch Westport River (MA95-41) in Westport, Massachusetts. Snell Creek drains an approximate area of 1.7 square miles. The segment area is 6.4 acres. The total and subwatershed for Snell Creek are the same and is shown on Figure 1. The top three land uses for the watershed are forest (63%), agriculture (18%), and residential (14%).³

According to the *Buzzards Bay Watershed 2000 Water Quality Assessment Report*, the Shellfish Harvesting, Primary Contact, and Secondary Contact uses were assessed as "impaired" because of fecal coliform bacteria pollution.³ The known sources for bacteria are related to nearby dairy farming practices: animal feeding operation, grazing in riparian zone, and dairy outside milk parlor area. Suspected sources include municipal separate storm sewer systems, on-site septic systems, and highway/road runoff. Remaining uses have not been assessed. There are no known regulated Water Management Act withdrawals or NPDES discharges along this segment.

¹ MassDEP, March 2013. Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act. Massachusetts. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/12list2.pdf>

² MassDEP, March 2009. Final Pathogen TMDL for the Buzzards Bay Watershed. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/a-thru-m/buzzbay1.pdf>

³ MassDEP, November 2003. Buzzards Bay Watershed 2000 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/95wqar1.pdf>

MassDOT's property within the urban area with the potential to directly contribute stormwater runoff to Snell Creek (MA95-59) is comprised of portions of Route 88. Refer to Figure 1 for the location of the urban and non-urban portions of this roadway within the subwatershed to Snell Creek.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the waterbody for the impairments covered by the TMDL under the BMP 7R methodology.⁴ MassDOT separately assesses the waterbody for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁵ MassDOT assessed Snell Creek (MA95-59) using the methodologies described below.

This assessment has been completed based on the *Massachusetts Year 2012 Integrated List of Waters – Final Listing of the Condition of Massachusetts' Waters Pursuant to Sections 305(b), 314 and 303(d) of the Clean Water Act*.¹ MassDEP has released a proposed *Massachusetts Year 2014 Integrated List of Waters*, which has been reviewed for any proposed changes to the condition of the water bodies.⁶ The condition of Snell Creek is not proposed to change.

BMP 7R for Pathogen TMDL (CN 251.1)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R⁴ of MassDOT's Storm Water Management Plan (SWMP), which applies to impairments that have been assigned to a water body covered by a final TMDL. Snell Creek (MA95-59) is covered by the *Final Pathogen TMDL for the Buzzards Bay Watershed*.²

Pathogen concentrations in stormwater vary widely and concentrations can vary by an order of magnitude within a given storm event at a single location making it difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT generally will not conduct site specific assessments of pathogen loading for each water body impaired for pathogens but instead developed an iterative adaptive management approach to be consistent with relevant TMDLs and permit condition requirements and an approach to stormwater management. Greater detail of the assessment methodology is provided in MassDOT's BMP 7R Pathogen Methodology.⁷

The Buzzards Bay watershed has numerous point sources and non-point sources of bacteria pollution identified in the TMDL report. The report lists three primary sources of bacteria: illicit connections, leaking sewer pipes, and sanitary sewer overflows in sewered areas; failing septic systems; and stormwater runoff. Upstream issues, including a former farm, are described as possible contributors to elevated fecal coliform concentrations in this segment.

⁴ MassDOT, July 2010. BMP 7R: TMDL Watershed Review. Available at:

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⁷ MassDOT, December 2014. Description of MassDOT's Application of BMP 7R for Pathogen Related Impairments. Available at:

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The TMDL report states the following on Page 63:

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The ranking system was based on fecal coliform concentrations, and further adjusted upwards based on proximity of sensitive areas. The Snell Creek watershed contains numerous stormwater discharge locations that are either classified as „medium“ priority or „remediated.“ The „remediated“ locations are nearly all located in the headwaters area, and the „medium“ priority sites are located the middle portion of the watershed. None of the elevated discharge locations are located within this segment of Snell Creek.

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the Buzzards Bay TMDL report (Section 8.0) recommends developing a comprehensive control strategy for the diverse sources of pathogens in the watershed. The TMDL report recommends a basin-wide implementation strategy, which includes a mandatory program for implementing stormwater BMPs and eliminating illicit sources. These strategies include:

- Reducing illicit discharges (illegal sewer connections)
- Reducing failing infrastructure (leaking sewer pipes, or CSO/sanitary sewer overflows)
- Controlling storm water runoff
- Managing agricultural runoff
- Upgrading failing septic systems

Proposed Mitigation Plan

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As part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen-impaired waterbodies. The signs will inform the public of the need to remove pet waste, which can minimize contributions of pathogens to stormwater runoff. Pet waste removal bags and disposal cans will be provided.

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low probability of achieving substantial gains towards meeting the TMDL with solely implementing IC reductions and controls.

Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and thereby minimize the possibility of pathogen contributions to receiving waters. At present, there are no suspected or known illicit discharges, or unauthorized drainage tie-ins, within the subwatershed of this water body that could be contributing pathogens to the impaired water body.

MassDOT has concluded that the BMPs outlined in the SWMP are consistent with its existing permit requirements for Snell Creek. These measures achieve pathogen reductions (including fecal coliform) to the maximum extent practicable and are consistent with the intent of its existing stormwater permit and the applicable Pathogen TMDLs. As stated previously, pathogen loadings are highly variable and although there is potential for stormwater runoff from MassDOT roadways to be a contributing source it is unlikely to warrant action relative to other sources of pathogens in the watershed. MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Snell Creek, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

P:\Transp\CM-023 MassDOT Stormwater\Projects\CM-023AD June 2015 Assessments\Pathogen Only_FST\GIS\Snell Creek (MA95-59)\Projects\Fig1.mxd

