

Attachment 2:

Impaired Waters Assessments – Less Than 9% IC

List of Impaired Water Bodies

MA21-17	Southwest Branch Housatonic River
MA35-08	Otter River
MA51-11	West River
MA53-04	Palmer River
MA62-03	Taunton River
MA93-29	Cat Brook

Impaired Waters Assessment for Southwest Branch Housatonic River (MA21-17)

Summary

Impaired Water ¹	Stormwater Impairments:	<i>Sedimentation/Siltation, Fecal Coliform</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>
	Final TMDLs:	<i>None</i>
	WQ Assessment:	<i>Housatonic River Watershed 2002 Water Quality Assessment Report</i> ²
Location	Towns:	<i>Pittsfield</i>
	MassDOT Roads:	<i>Route 20, Gale Avenue Bridge</i>
Assessment Method(s)		
	7R (TMDL Method) ☐	7U (Non-TMDL Method) ☒

Site Description

Southwest Branch Housatonic River (MA21-17) is located in northeast Massachusetts in the Town of Pittsfield. The segment is 5.8 miles long and begins at the outlet of Richmond Pond (MA21088) in Pittsfield and ends at its confluence with West Branch Housatonic River (MA21-18) in Pittsfield. The MassDOT-owned roads within the watershed are Route 20 and the Gale Avenue Bridge.

The land use in the total watershed consists of mostly forest, followed by agriculture and open land with scattered residential areas. The total watershed and subwatershed are located within the towns of Hancock, Pittsfield, Lenox, and Richmond (see Figure 1). The upstream end of the subwatershed bisects Richmond Pond (MA21088) in order to be consistent with the USGS Dataset 451, which is the data source used as the basis of the watershed delineations.³ The Pittsfield Municipal Airport lies within the segment's subwatershed. The Bousquet Ski Area is also within the segment's subwatershed and withdraws water from the River for their snowmaking operations. According to the *Housatonic River Watershed 2002 Water Quality Assessment Report*,² Southwest Branch Housatonic River (MA21-17) is "impaired" for Primary Contact use due to elevated fecal

¹ MassDEP, 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, 2007. Housatonic River Watersheds 2002 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/21wqar07.pdf>

³ USGS Data Series 451 Local and Cumulative Impervious Cover of Massachusetts Stream Basins Available at: <http://pubs.usgs.gov/ds/451/>

coliform with suspected sources of pet waste and leaking sewer pipe. The report does not list any sources for sedimentation/siltation pollutants.

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 Southwest Branch Housatonic River (MA21-17) 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 List⁶ which has been reviewed for any proposed changes to the condition of the water bodies. The condition of Southwest Branch Housatonic 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 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

BMP 7U for Impervious Cover Related Impairments

A Final TMDL is not in place to address Southwest Branch Housatonic River's (MA21-17) following impairments: sedimentation/siltation. Therefore, MassDOT assessed the stormwater-related impairments not addressed by a TMDL using the approach outlined in the Description of MassDOT's Application of Impervious Cover Method in BMP 7U⁵ which was developed using the EPA Region I's Impervious Cover (IC) Method, described in EPA's Stormwater TMDL Implementation Support Manual.⁸ Consistent with the findings of EPA and others, MassDOT

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

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

⁶ MassDOT, 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.

⁸ ENSR, 2006. Stormwater TMDL Implementation Support Manual for US EPA Region 1. ENSR International & EPA Region 1, Boston, MA. Available at

<http://www.epa.gov/region1/eco/tmdl/regionalpgrfs.html>

concluded that when a watershed had less than 9% IC, stormwater was not the likely cause of the impairment.

MassDOT calculated the following values for the total contributing watershed and the subwatershed of the impaired water (Southwest Branch Housatonic River) to determine the IC area and set a reduction target. Watersheds are based on the USGS Dataset 451 and modified as necessary using topography.⁹ MassGIS's impervious surfaces data layer was used to determine the IC of the watersheds.¹⁰ The total watershed and the subwatershed are shown in Figure 1.

Table 1 Impaired Segment Watershed

	Total Watershed	Subwatershed
Watershed Area	15,076 acres	5,952 acres
Impervious Cover (IC) Area	756 acres	462 acres
Percent Impervious	5.0%	7.8%

MassDOT determined that the total watershed and the subwatershed are both less than 9% impervious, indicating that stormwater is a likely not a contributor to the impairments.

Proposed Mitigation Plan

MassDOT has concluded, using the IC Method, that there is no required reduction in impervious area for Southwest Branch Housatonic River because the percent of impervious cover within the subwatershed is equal to or less than the 9% maximum IC target. This indicates that stormwater from this watershed is not likely the cause of the impairments not covered by a TMDL. Therefore, further assessment of this waterbody for impairments not covered by a TMDL is not warranted under the Impaired Waters Program.

With respect to the fecal coliform impairment, MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing Stormwater Management Plan (SWMP) including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7U Pathogen Methodology,⁷ 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 subwatershed of 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-

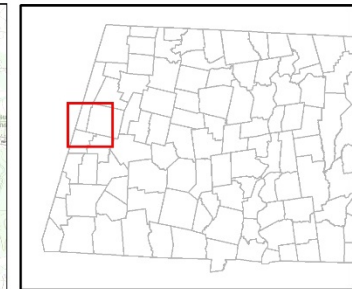
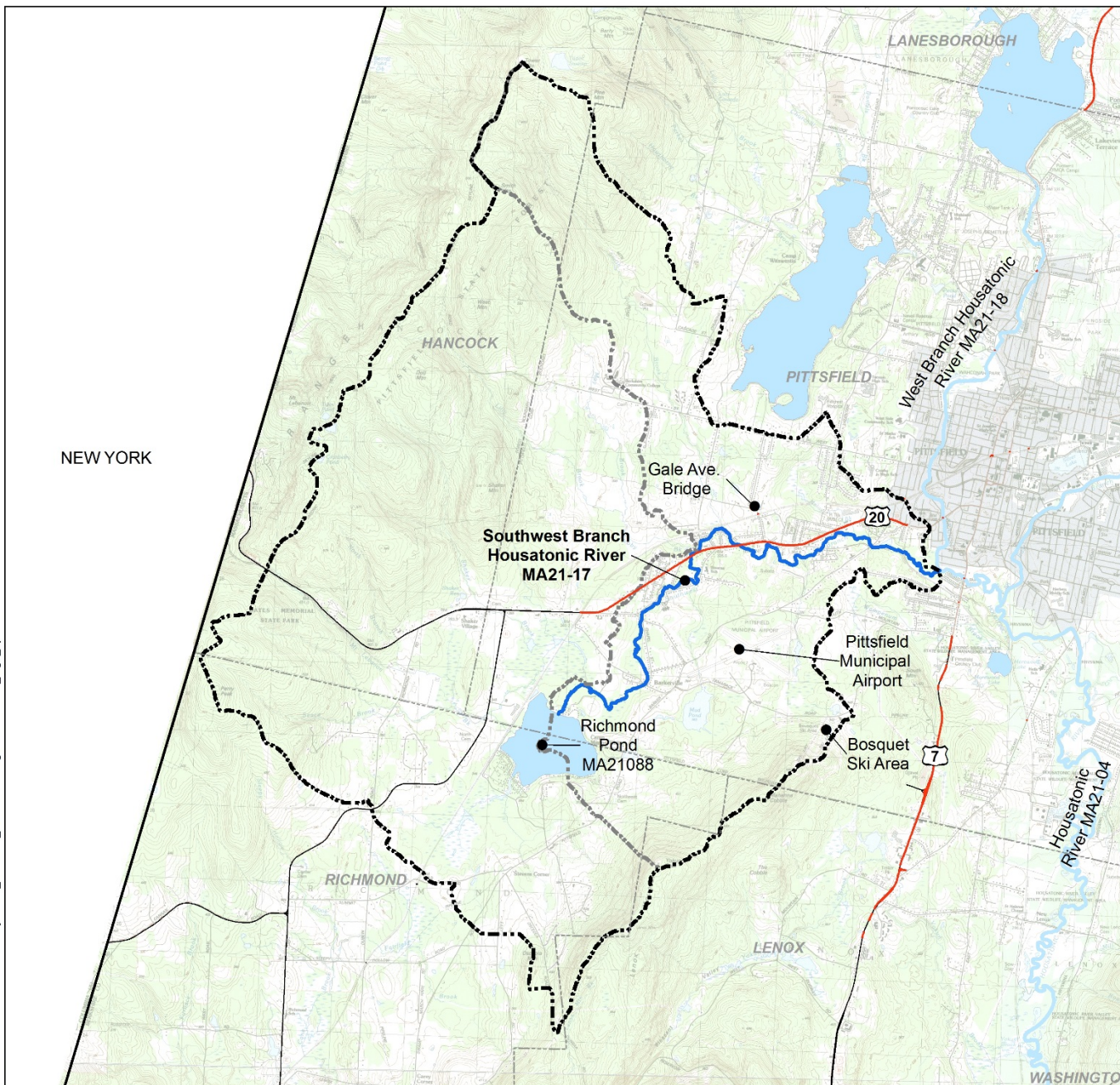
⁹ USGS Data Series 451 Local and Cumulative Impervious Cover of Massachusetts Stream Basins Available at: <http://pubs.usgs.gov/ds/451/>

¹⁰ MassGIS Impervious Surfaces datalayer taken from 2005 orthoimagery. Available at: http://www.mass.gov/mgis/impervious_surface.htm

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 Southwest Branch Housatonic 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 Southwest Branch Housatonic River, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education. Further work by MassDOT on programmed projects, which often include broader scale road layout changes, may provide additional opportunities for construction of new treatment BMPs. This is consistent with an iterative adaptive management approach to address impairments. MassDOT will include an update in NPDES permit annual reports to EPA regarding proposed BMP design either through retrofit or programmed projects, plans for construction of BMPs, and reduction achieved by finalized BMP designs.



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

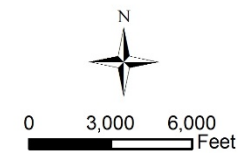


Figure 1
Southwest Branch
Housatonic River (MA21-17)
Watersheds

December 2014



Impaired Waters Assessment for Otter River (MA35-08)

Summary

Impaired Water ¹	Impairments:	Stormwater:	Aquatic Macroinvertebrate Bioassessments, Fecal Coliform, Fishes Bioassessments, Nutrient/Eutrophication, Biological Indicators, Taste and Odor, Turbidity
		Non-Stormwater: ²	Total Dissolved Solids, PCB in Fish Tissue
	Category:	5 (Waters requiring a TMDL)	
	Final TMDLs:	None	
	WQ Assessment:	Millers River Watershed 2000 Water Quality Assessment Report ³	
Location	Towns:	Winchendon, Templeton	
	MassDOT Roads:	Route 202, Route 68	
Assessment Method(s)	7R (TMDL Method) ☐	7U (Non-TMDL Method) ☒	

Site Description

Otter River (MA35-08) is covered under the *Millers River Watershed 2000 Water Quality Assessment Report*.³ The watershed contributing to the segment is comprised of 67% forest, 13% residential, and 5% open land. The segment flows for 5.5 miles from its headwaters at the Seaman Paper Dam in Templeton to its confluence with Millers River in Winchendon. The total watershed is located within the towns of Winchendon, Templeton, Hubbardston, Westminster, Gardner, and Ashburnham. The subwatershed is located within the towns of Templeton and Winchendon. The MassDOT-owned roads within Otter River's subwatershed include Route 202 and Route 68. Route 202 travels through downtown Templeton and Route 68 travels through mostly residential area.

¹ MassDEP, 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, 2004. Millers River Watersheds 2000 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/07v5/35wqar.pdf>

This segment of Otter River receives effluent from the Templeton Wastewater Treatment Plant and is adjacent to the Templeton Sludge Landfill. A monitoring plan is in place in accordance with the requirements of MassDEP for the landfill. The Seaman Paper Co. is authorized to discharge treated industrial waste into the waterbody. There are Water Management Act (WMA) water withdrawals permits for the American Tissue Mills, the Seaman Paper Co., and the Templeton Water Department for this segment of Otter River.

According to the Water Quality Assessment Report, Otter River is “impaired” for all designated uses, which include Aquatic Life, Fish Consumption, Primary Contact, Secondary Contact, and Aesthetics. The turbidity and odor impairments to the segment have suspected sources of sand/gravel/rock mining, discharges from municipal separate storm sewer systems, and highway, road, bridge runoff from new construction. The impairments to Aquatic Life (PCB contamination, combination benthic/fishes bioassessment, and habitat indicator bioassessments) are cited as being due, at least in part, to contaminated sediment and releases from waste sites or dumps. The source of turbidity and odor is unknown.

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 Otter River (MA35-08) using the methodologies described below.

MassDOT has identified a subset of water body impairments in the Otter River watershed which are not related to stormwater runoff. Specific impairments unrelated to stormwater for the Otter River include total dissolved solids and PCB in fish tissue. In accordance with MassDOT's Impaired Waters Assessment for Impaired Waters with Impairments Unrelated to Stormwater² in the December 8, 2012 EPA submittal, the non-stormwater related impairments are not specifically addressed as part of the Impaired Waters Program.

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 List⁶ which has been reviewed for any proposed changes to the condition of the water bodies. The condition of Otter 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.

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

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

⁶ MassDOT, 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>

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

BMP 7U for Impervious Cover Related Impairments

A Final TMDL is not in place to address Otter River's (MA35-08) following impairments: aquatic macroinvertebrate bioassessments, fishes bioassessments, nutrient/eutrophication biological indicators, taste and odor, and turbidity. Therefore, MassDOT assessed the stormwater-related impairments not addressed by a TMDL using the approach outlined in the Description of MassDOT's Application of Impervious Cover Method in BMP 7U⁵ which was developed using the EPA Region I's Impervious Cover (IC) Method, described in EPA's Stormwater TMDL Implementation Support Manual.⁸ Consistent with the findings of EPA and others, MassDOT concluded that when a watershed had less than 9% IC, stormwater was not the likely cause of the impairment.

MassDOT calculated the following values for the total contributing watershed and the subwatershed of the impaired water (Otter River) to determine the IC area and set a reduction target. Watersheds are based on the USGS Dataset 451⁹ and modified as necessary using topography. MassGIS's impervious surfaces data layer¹⁰ was used to determine the IC of the watersheds. The total watershed and the subwatershed are shown in Figure 1.

Table 1 Impaired Segment Watershed

	Total Watershed	Subwatershed
Watershed Area	39,424 acres	3,382 acres
Impervious Cover (IC) Area	3,319 acres	296 acres
Percent Impervious	8.4%	8.8%

MassDOT determined that the total watershed and the subwatershed are both less than 9% impervious, indicating that stormwater is a likely not a contributor to the impairments.

Proposed Mitigation Plan

MassDOT has concluded, using the IC Method, that there is no required reduction in impervious area for Otter River because the percent of impervious cover within the subwatershed is equal to or less than the 9% maximum IC target. This indicates that stormwater from this watershed is not likely the cause of the impairments not covered by a TMDL. Therefore, further assessment of this

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

⁸ ENSR, 2006. Stormwater TMDL Implementation Support Manual for US EPA Region 1. ENSR International & EPA Region 1, Boston, MA. Available at <http://www.epa.gov/region1/eco/tmdl/regionalpgrfs.html>

⁹ USGS Data Series 451 Local and Cumulative Impervious Cover of Massachusetts Stream Basins Available at: <http://pubs.usgs.gov/ds/451/>

¹⁰ MassGIS Impervious Surfaces datalayer taken from 2005 orthoimagery. Available at: http://www.mass.gov/mgis/impervious_surface.htm

waterbody for impairments not covered by a TMDL is not warranted under the Impaired Waters Program.

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

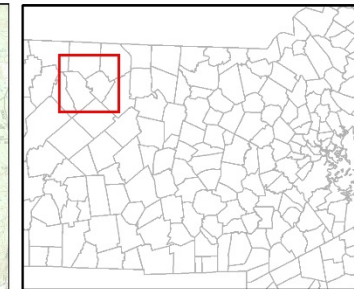
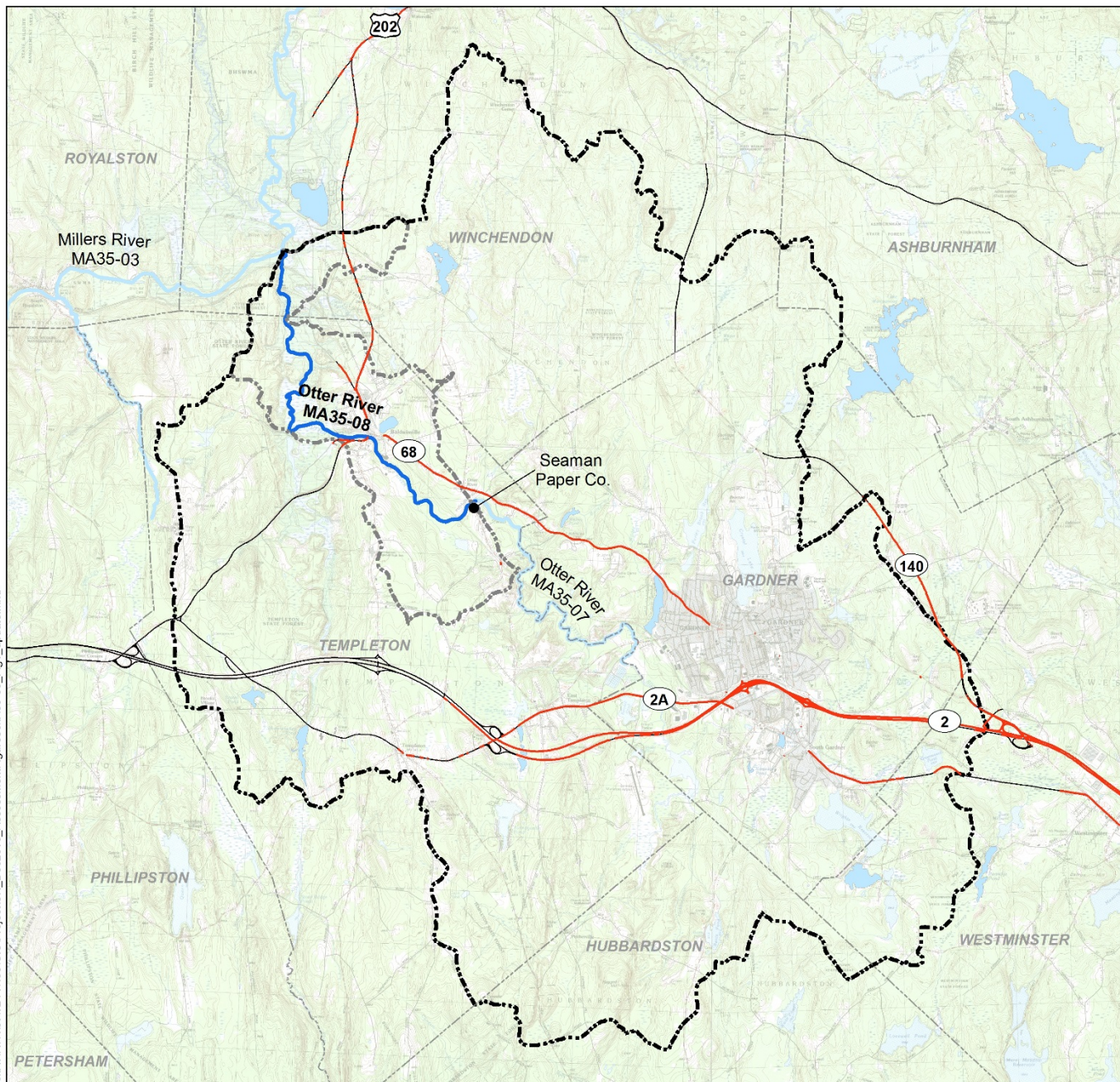
In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. MassDOT will be installing signs at rest stops within the subwatershed of impaired waterbodies. The signs will inform the public 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 Otter 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 Otter River, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education. Further work by MassDOT on programmed projects, which often include broader scale road layout changes, may provide additional opportunities for construction of new treatment BMPs. This is consistent with an iterative adaptive management approach to address impairments. MassDOT will include an update in NPDES permit annual reports to EPA regarding proposed BMP design either through retrofit or programmed projects, plans for construction of BMPs, and reduction achieved by finalized BMP designs.

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

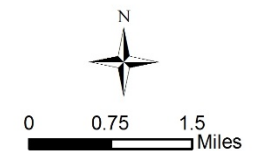


Figure 1
Otter River (MA35-08)
Watersheds

December 2014



Impaired Waters Assessment for West River (MA51-11)

Summary

Impaired Water ¹	Impairments:	Stormwater: <i>Low pH</i>
		Non-Stormwater: ² <i>Non-Native Aquatic Plants</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>
	Final TMDLs:	<i>None</i>
	WQ Assessment:	<i>Blackstone River Watershed 2003-2007 Water Quality Assessment Report</i> ³
Location	Towns:	<i>Upton, Grafton</i>
	MassDOT Roads:	<i>Route 140, Interstate 90</i>
Assessment Method(s)		
	7R (TMDL Method) ☐	7U (Non-TMDL Method) ☒

Site Description

West River (MA51-11) is located within the Blackstone River Watershed. The land use for the contributing total watershed to this segment is mostly comprised of forest with scattered residential areas. The subwatershed and total watershed are located within the towns of Westborough, Upton, Grafton, and Northbridge. West River begins in Grafton as the primary outlet to Silver Lake (MA51151). The segment flows for 3.8 miles through Lake Wildwood, which was formerly segment MA51181 but is now considered a run of the river impoundment. West River (MA51-11) terminates at the wastewater treatment plant discharge in Upton. MassDOT owns portions of Route 140, which runs through the subwatershed parallel and to the east of the segment. Another MassDOT owned road, I-90, runs through the upper portion of the subwatershed and total watershed.

West River is covered in the *Blackstone River Watershed 2003-2007 Water Quality Assessment Report*.³ The river is “impaired” for Aquatic Life in the vicinity of Lake Wildwood due to a non-native aquatic macrophyte infestation but listed as “support” for the rest of the segment. Primary Contact,

¹ MassDEP, 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, 2010. Blackstone River Watersheds 2003-2007 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/3baapp/51wqr10.pdf>

Secondary Contact, and Aesthetics are all listed as “support;” however, an “alert” status is identified for all three uses based on the occasional observation of oily sheens and odors. Fish Consumption is “not assessed.” The report does not list any sources for the low pH impairment.

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 West River (MA51-11) using the methodologies described below.

MassDOT identified a water body impairment in the West River watershed which is not related to stormwater runoff. The specific impairment unrelated to stormwater for West River is non-native aquatic plants. In accordance with MassDOT's Impaired Waters Assessment for Impaired Waters with Impairments Unrelated to Stormwater² in the December 8, 2012 EPA submittal, the non-stormwater related impairments are not specifically addressed as part of the Impaired Waters Program.

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 List⁶ which has been reviewed for any proposed changes to the condition of the water bodies. The condition of West River (MA51-11) is not proposed to change.

BMP 7U for Impervious Cover Related Impairments

A Final TMDL is not in place to address West River's (MA51-11) following impairments: low pH. Therefore, MassDOT assessed the stormwater-related impairments not addressed by a TMDL using the approach outlined in the Description of MassDOT's Application of Impervious Cover Method in BMP 7U⁵ which was developed using the EPA Region I's Impervious Cover (IC) Method, described in EPA's Stormwater TMDL Implementation Support Manual.⁷ Consistent with the findings of EPA and others, MassDOT concluded that when a watershed had less than 9% IC, stormwater was not the likely cause of the impairment.

MassDOT calculated the following values for the total contributing watershed and the subwatershed of the impaired water (West River) to determine the IC area and set a reduction target. Watersheds are based on the USGS Dataset 451⁸ and modified as necessary using topography. MassGIS's

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

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

⁶ MassDOT, 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 ENSR, 2006. Stormwater TMDL Implementation Support Manual for US EPA Region 1. ENSR International & EPA Region 1, Boston, MA. Available at <http://www.epa.gov/region1/eco/tmdl/regionalpgrfs.html>

⁸ USGS Data Series 451 Local and Cumulative Impervious Cover of Massachusetts Stream Basins Available at: <http://pubs.usgs.gov/ds/451/>

impervious surfaces data layer⁹ was used to determine the IC of the watersheds. The total watershed and the subwatershed are shown in Figure 1.

Table 1 Impaired Segment Watershed

	Total Watershed	Subwatershed
Watershed Area	9,220 acres	6,257 acres
Impervious Cover (IC) Area	583 acres	475 acres
Percent Impervious	6.3%	7.6%

MassDOT determined that the total watershed and the subwatershed are both less than 9% impervious, indicating that stormwater is a likely not a contributor to the impairments.

Proposed Mitigation Plan

MassDOT has concluded, using the IC Method, that there is no required reduction in impervious area for West River because the percent of impervious cover within the subwatershed is equal to or less than the 9% maximum IC target. This indicates that stormwater from this watershed is not likely the cause of the impairments not covered by a TMDL. Therefore, further assessment of this waterbody for impairments not covered by a TMDL is not warranted under the Impaired Waters Program.

MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of West River, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education. Further work by MassDOT on programmed projects, which often include broader scale road layout changes, may provide additional opportunities for construction of new treatment BMPs. This is consistent with an iterative adaptive management approach to address impairments. MassDOT will include an update in NPDES permit annual reports to EPA regarding proposed BMP design either through retrofit or programmed projects, plans for construction of BMPs, and reduction achieved by finalized BMP designs.

⁹ MassGIS Impervious Surfaces datalayer taken from 2005 orthoimagery. Available at: http://www.mass.gov/mgis/impervious_surface.htm

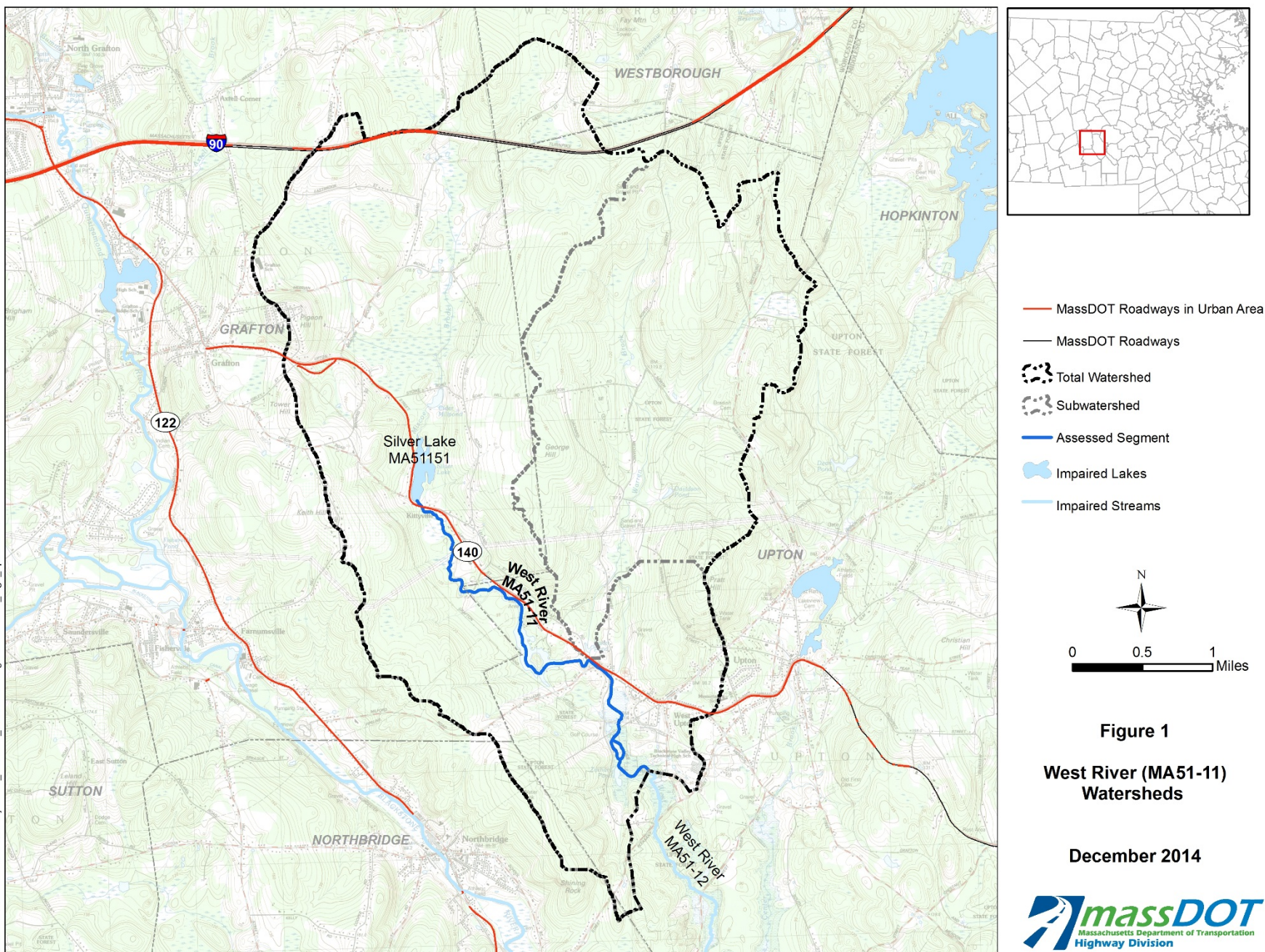


Figure 1

West River (MA51-11)
Watersheds

December 2014



Impaired Waters Assessment for Palmer River (MA53-04)

Summary

Impaired Waters¹	Impairments:	Stormwater:	<i>Fecal Coliform and Nutrient/Eutrophication Biological Indicators</i>
		Non-Stormwater: ²	<i>Low-Flow Alterations</i>
	Category:	5 (Waters requiring a TMDL)	
	Final TMDLs:	<i>Bacteria TMDL for the Palmer River Basin (CN 182.0)³</i>	
Location	WQ Assessment:	<i>Narragansett and Mount Hope Bay Watersheds 2004-2008 Water Quality Assessment Report⁴</i>	
	Towns:	<i>Rehoboth</i>	
	MassDOT Roads:	<i>Route 44</i>	
Assessment Method(s)		7R (TMDL Method) ☒	7U (Non-TMDL Method) ☒

Site Description

Palmer River, segment MA53-04 flows approximately 5.6 miles southwest, then southeast from the confluence of the East and West Branches of the Palmer River to the Shad Factory Pond dam in Rehoboth, Massachusetts (Figure 1). Route 44, a MassDOT-owned roadway, is located within the total and subwatershed of Palmer River and crosses directly over segment MA53-04. A field visit indicated that flow from Route 44, from a high point in the vicinity of the intersection of Broad Street and Route 44, drains to wetlands prior to the river; therefore, the only direct discharges occur where Route 44 crosses Palmer River.

MassDEP's Water Quality Assessment Report⁴ for this receiving water indicates that the Narragansett Bay Estuary Program identifies that low flows have been a concern for the Palmer

¹ MassDEP, 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, April 2004. Bacterial TMDL for the Palmer River Basin Final Report MA53 03 2004-2 CN 182.0. Available at: <http://www.mass.gov/eea/docs/depl/water/resources/n-thru-y/palmer.pdf>

⁴ MassDEP, March 2009. Narragansett and Mount Hope Bay Watersheds 2004-2008 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/depl/water/resources/3baapp/6153wq08.pdf>

River from the confluence of the East and West Branches of the Palmer River to Route 6 in Rehoboth. The water body is a cold water fishery that supports one of the few small stream American shad (*Alosa sapidissima*) fisheries in the Commonwealth and the only one south of Cape Cod. However, the aquatic life use was not assessed due to limited data. All other uses were also not assessed.

Existing BMPs

MassDOT did not identify any existing BMPs in place to treat roadway runoff from the directly discharging area before reaching the impaired water segment.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the water body for the impairments covered by the TMDL under the BMP 7R methodology.⁵ MassDOT separately assesses the water body for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁶ MassDOT assessed Palmer River (MA53-04) using the methodologies described below.

MassDOT has identified a subset of water body impairments in the Palmer River watershed which are not related to stormwater runoff. Specific impairments unrelated to stormwater for the Palmer River (MA53-04) include low-flow 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.⁷

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.⁸ MassDEP has released a Proposed Massachusetts Year 2014 Integrated List⁹ which has been reviewed for any proposed changes to the condition of the water bodies. The condition of Palmer River (MA53-04) 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 7R of MassDOT's Storm Water Management Plan (SWMP),¹⁰ which applies to impairments

⁵ MassDOT. December 2014. Description of MassDOT's Application of BMP 7R for Pathogen Related Impairments.

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

⁷ 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

⁸ MassDEP, 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>

⁹ 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>

¹⁰ MassDOT. December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments.

that have been assigned to a water body covered by a final TMDL. Palmer River (MA53-04) is covered by the Bacteria TMDL for the Palmer River Basin.¹¹

Pathogen concentrations in stormwater vary widely temporally and spatially; concentrations can vary by an order of magnitude within a given storm event at a single location.¹² Therefore, it is difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT's South East Expressway study measured bacterial concentration in stormwater runoff¹³ and data indicate that highway's pathogen loading may be lower than urban areas. Considering that the potential sources of pathogens (e.g. illicit discharges, sewer utilities, pet waste, and wildlife) are likely to be less prevalent in the highway environment than along urban roads, this finding is not surprising.

According to the TMDL, sources of indicator bacteria in the Palmer River watershed were found to be many and varied. Most of the bacteria sources in the Palmer River watershed are believed to be related to agricultural runoff, and other potential dry weather sources such as poorly performing septic systems, and wildlife directly contributing fecal matter to receiving waters. Recommended TMDL implementation measures include the correction of failing septic systems, improved cattle fencing and feeding operations, and stream bank, riparian wetland and floodplain restoration in the riparian zone where residential development and roadways are predominant land uses.

The Palmer River watershed has no documented point sources of bacteria pollution but numerous non-point contributions are identified in the TMDL report. The overwhelming 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.

The TMDL report states the following on Page 19:¹²

"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."

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 Report¹² (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

¹¹ MassDEP, April 2004. Bacteria TMDL for Palmer River Basin. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/palmer.pdf>

¹² MassDEP, April 2004. Bacteria TMDL for Palmer River Basin. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/palmer.pdf>

¹³ Smith. (2002). Effectiveness of Three Best Management Practices for Highway Runoff Quality along the Southeast Expressway. USGS Water Resources Investigations Report 02-4059. Boston, Massachusetts.

- 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

BMP 7U for Impervious Cover Related Impairments

A Final TMDL is not in place to address Palmer River's (MA53-04) following impairments: nutrient/eutrophication biological indicators. Therefore, MassDOT assessed the stormwater-related impairments not addressed by a TMDL using the approach outlined in the Description of MassDOT's Application of Impervious Cover Method in BMP 7U¹⁴ which was developed using the EPA Region I's Impervious Cover (IC) Method, described in EPA's Stormwater TMDL Implementation Support Manual.¹⁵ Consistent with the findings of EPA and others, MassDOT concluded that when a watershed had less than 9% IC, stormwater was not the likely cause of the impairment.

MassDOT calculated the following values for the total contributing watershed and the subwatershed of the impaired water (Palmer River) to determine the IC area and set a reduction target. Watersheds are based on the USGS Dataset 451 and modified as necessary using topography.¹⁶ MassGIS's impervious surfaces data layer was used to determine the IC of the watersheds.¹⁷ The total watershed and the subwatershed are shown in Figure 1.

Table 1 Impaired Segment Watershed

	Total Watershed	Subwatershed
Watershed Area	20,075 acres	6,464 acres
Impervious Cover (IC) Area	1,259 acres	525 acres
Percent Impervious	6.3%	8.1%

¹⁴ MassDOT, 6 April, 2011. Description of MassDOT's Application of Impervious Cover Method in BMP 7U (MassDOT Application of IC Method).
http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

¹⁵ ENSR 2006. Stormwater TMDL Implementation Support Manual for US EPA Region 1. ENSR International & EPA Region 1, Boston, MA. Available at
<http://www.epa.gov/region1/eco/tmdl/regionalpggrfs.html>

¹⁶ USGS Data Series 451 Local and Cumulative Impervious Cover of Massachusetts Stream Basins Available at: <http://pubs.usgs.gov/ds/451/>

¹⁷ MassGIS Impervious Surfaces datalayer taken from 2005 orthoimagery. Available at: http://www.mass.gov/mgis/impervious_surface.htm

MassDOT calculated the subwatershed is less than 9% impervious indicating that stormwater is likely not a contributor to the impairments.

Proposed Mitigation Plan

MassDOT has concluded, using the IC Method, that there is no required reduction in impervious area for Palmer River (MA53-04) because the percent of impervious cover within the subwatershed is equal to or less than the 9% maximum IC target. This indicates that stormwater from this watershed is not likely the cause of the impairments not covered by a TMDL. Therefore, further assessment of this water body for impairments not covered by a TMDL is not warranted under the Impaired Waters Program.

In accordance with the BMPs identified in the TMDL report as planned measures to reach compliance with the Palmer River bacteria TMDL 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 subwatershed of 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.

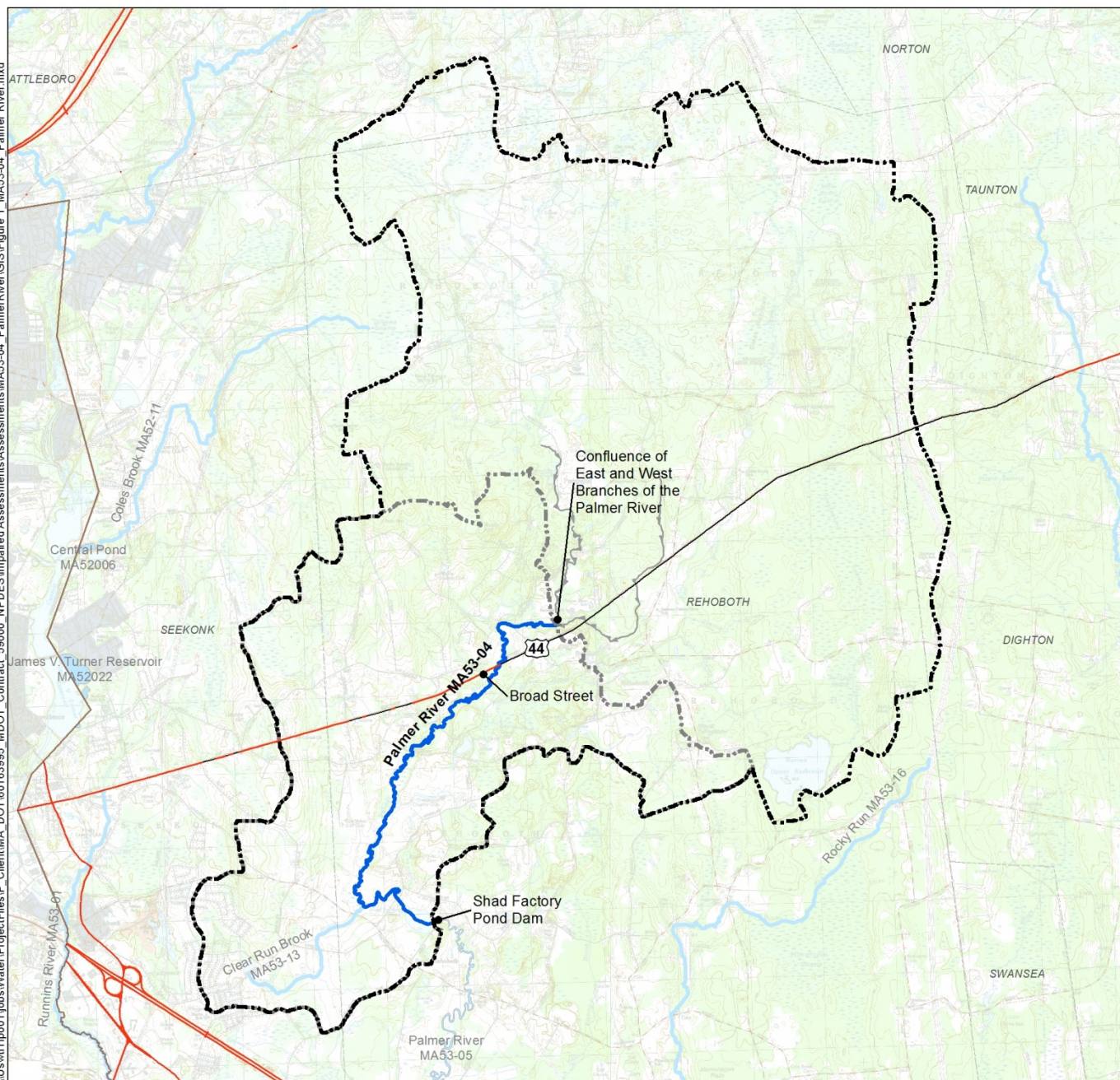
Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and 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 the Palmer 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 the Palmer River, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education.

MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Palmer River (MA53-04), including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education. Further work by MassDOT on programmed projects, which often include broader scale road layout changes, may provide additional opportunities for construction of new treatment BMPs. This is consistent with an iterative adaptive management approach to address impairments. MassDOT will include an update in NPDES permit annual reports to EPA regarding proposed BMP design either through retrofit or

programmed projects, plans for construction of BMPs, reduction achieved by finalized BMP designs and progress made towards meeting target reductions.

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

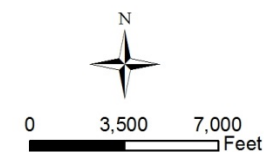


Figure 1
Palmer River (MA53-04)
Watersheds

December 2014



Impaired Waters Assessment for Taunton River (MA62-03)

Summary

Impaired Water ¹	Stormwater Impairments:	<i>Fecal Coliform; Dissolved Oxygen</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>
	Final TMDLs:	<i>Final Pathogen TMDL for the Taunton River Watershed (CN256.0)</i> ²
	WQ Assessment:	<i>Taunton River Watershed 2001 Water Quality Assessment Report</i> ³
Location	Towns:	<i>Somerset, Dighton and Berkley</i>
	MassDOT Roads:	<i>Route 138</i>
Assessment Method(s)		
	7R (TMDL Method) ☒	7U (Non-TMDL Method) ☒

Site Description

Taunton River (MA62-03) is formed by the confluence of the Matfield and Town Rivers in Bridgewater, Massachusetts, and flows an approximately 40-mile course to Mount Hope Bay. The total and subwatershed for this segment is shown in Figure 1A. The main stem of the Taunton River flows through the towns of Bridgewater, Raynham, Taunton, Dighton, Berkley, Fall River, Freetown and Somerset (Figure 1A). The main stem of the Taunton River is separated into four segments for the purposes of the final Massachusetts Year 2012 Integrated List of Waters.¹ Figure 1B shows the subwatershed of the segment that is the subject of this assessment. Segment MA62-03 of the Taunton River, extends from the Berkley Bridge in Dighton/Berkley to the confluence with the Assonet River at a line from Sandy Point, Somerset northeasterly to the southwestern tip of Assonet Neck in Berkley (Figure 1B).

The MassDOT-owned roadways within urban area that are located within the subwatershed include Route 138. It should be noted that only a portion of the MassDOT-owned road inside the watershed boundary is within an MS4-regulated urban area. Part of the MassDOT road is outside of the designated urban area; therefore, discharge from this roadway is not identified as contributing to the impaired segment.

¹ MassDEP, 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 June 2011. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/taunton1.pdf>

³ MassDEP, December 2005. Taunton River Watershed 2001 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/agencies/massdep/water/watersheds/taunton-river-watershed-2001.html>

The MassDEP Water Quality Assessment Report³ indicates that the three most predominant land uses in the subwatershed consist of forest, residential and open space. The forest land use comprises half of the entire subwatershed. The water quality assessment identifies the shellfish harvesting use as impaired due to fecal coliform bacteria suspected from discharges from municipal separate storm sewer systems, combined sewer overflows, septic systems and marina/boating pump-out releases. All other uses were not assessed.

Existing BMPs

MassDOT did not identify any existing BMPs in place to treat roadway runoff from the directly discharging area before reaching the impaired water segment.

Assessment

In cases where a TMDL has been approved, MassDOT assesses the water body for the impairments covered by the TMDL under the BMP 7R methodology.⁴ MassDOT separately assesses the water body for any stormwater-related impairments that are not covered by the TMDL under the BMP 7U methodology.⁵ MassDOT assessed Taunton River (MA62-03) 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.⁶ MassDEP has released a Proposed Massachusetts Year 2014 Integrated List⁷ which has been reviewed for any proposed changes to the condition of the water bodies. The condition of Taunton River (MA62-03) is not proposed to change.

BMP 7R for Pathogen TMDL (CN 256.0)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R of MassDOT's Storm Water Management Plan (SWMP),⁸ which applies to impairments that have been assigned to a water body covered by a final TMDL. Taunton River (MA62-03) is covered by the *Pathogen TMDL for the Taunton River Watershed*.⁹

⁴ Massachusetts Department of Transportation (MassDOT), July 22, 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, 6 April, 2011. Description of MassDOT's Application of Impervious Cover Method in BMP 7U (MassDOT Application of IC Method). http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁶ 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>

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/07v5/14wlistp.pdf>

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

⁹ MassDEP, June 2011. Final Pathogen TMDL for the Taunton River Watershed June 2011. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/taunton1.pdf>

Pathogen concentrations in stormwater vary widely temporally and spatially; concentrations can vary by an order of magnitude within a given storm event at a single location.¹⁰ Therefore, it is difficult to predict pathogen concentrations in stormwater with accuracy. MassDOT's South East Expressway study measured bacterial concentration in stormwater runoff¹¹ and data indicate that highway's pathogen loading may be lower than urban areas. Considering that the potential sources of pathogens (e.g. illicit discharges, sewer utilities, pet waste, and wildlife) are likely to be less prevalent in the highway environment than along urban roads, this finding is not surprising.

According to the Final TMDL, numerous point and non-point sources of fecal contamination have been identified in the Taunton River Watershed. Dry weather sources include leaking sewer pipes, illicit connections of sanitary sewers to storm drains, failing septic systems, recreation activities, wildlife including birds, and inadequately treated boat wastes. Wet weather sources include wildlife and domesticated animals, stormwater runoff including municipal separate storm sewer systems (MS4s), combined sewer overflows (CSOs), and sanitary sewer overflows (SSOs). Most of the bacterial sources are believed to be stormwater related. Recommended TMDL implementation measures include bacterial source tracking and implementation of structural and non-structural BMPs.

The TMDL states on page 17 that 100% of the total estuary area assessed were classified as impaired. Several of the Taunton River Segments (both on and off the main stem) are prioritized and will require additional bacterial source tracking work and implementation of structural and non-structural (BMP's). In total, there are 20 pathogen impaired segments (12 river and 8 estuary), that contain indicator bacteria concentrations in excess of the Massachusetts water quality standards. The majority of the priority areas are located near downtown Taunton, MA where there are relatively dense residential developments and nearby major roads and highways including Route 44 and Route 24. Taunton River, segment MA62-03 is listed as a high priority.

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 report¹² (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:

- Elimination of illicit sewer connections
- Regulate stormwater runoff and develop stormwater management plans (SWMP) for municipal separate storm sewer systems (MS4s)

¹⁰ MassDEP, 2009. Final Pathogen TMDL for the Cape Cod Watershed. Available at: <http://www.mass.gov/dep/water/resources/capecod1.pdf>

¹¹ Smith. (2002). Effectiveness of Three Best Management Practices for Highway Runoff Quality along the Southeast Expressway. USGS Water Resources Investigations Report 02-4059. Boston, Massachusetts.

¹² MassDEP, 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>

- Documentation of storm drain outfall locations
- Septic tank controls
- Continue to regulate WWTP discharges
- Watershed resident education
- Additional monitoring

BMP 7U for Impervious Cover Related Impairments

A Final TMDL is not in place to address Taunton River's (MA62-03) following impairments: dissolved oxygen. Therefore, MassDOT assessed the stormwater-related impairments not addressed by a TMDL using the approach outlined in the Description of MassDOT's Application of Impervious Cover Method in BMP 7U¹³ which was developed using the EPA Region I's Impervious Cover (IC) Method, described in EPA's Stormwater TMDL Implementation Support Manual.¹⁴ Consistent with the findings of EPA and others, MassDOT concluded that when a watershed had less than 9% IC, stormwater was not the likely cause of the impairment.

MassDOT calculated the following values for the total contributing watershed and the subwatershed of the impaired water Taunton River (MA62-03) to determine the IC area and set a reduction target. Watersheds are based on the USGS Dataset 451 and modified as necessary using topography.¹⁵ MassGIS's impervious surfaces data layer was used to determine the IC of the watersheds.¹⁶ The total watershed and the subwatershed are shown in Figures 1A and 1B.

Table 1 Impaired Segment Watershed

	Total Watershed	Subwatershed
Watershed Area	308,284 acres	5,343 acres
Impervious Cover (IC) Area	23,992 acres	412 acres
Percent Impervious	7.8%	7.7%

MassDOT calculated the subwatershed is less than 9% impervious indicating that stormwater is a likely not a contributor to the impairments.

Proposed Mitigation Plan

MassDOT has concluded, using the IC Method, that there is no required reduction in impervious area for the Taunton River because the percent of impervious cover within the subwatershed is equal to or less than the 9% maximum IC target. This indicates that stormwater from this watershed is not likely the cause of the impairments not covered by a TMDL. Therefore, further assessment of

¹³ MassDOT, 6 April, 2011. Description of MassDOT's Application of Impervious Cover Method in BMP 7U (MassDOT Application of IC Method).
http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

¹⁴ ENSR 2006. Stormwater TMDL Implementation Support Manual for US EPA Region 1. ENSR International & EPA Region 1, Boston, MA. Available at
<http://www.epa.gov/region1/eco/tmdl/regionalpgfrs.html>

¹⁵ USGS Data Series 451 Local and Cumulative Impervious Cover of Massachusetts Stream Basins Available at: <http://pubs.usgs.gov/ds/451/>

¹⁶ MassGIS Impervious Surfaces datalayer taken from 2005 orthoimagery. Available at: http://www.mass.gov/mgis/impervious_surface.htm

this water body for impairments not covered by a TMDL is not warranted under the Impaired Waters Program.

With respect to the fecal coliform impairment, MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing Stormwater Management Plan (SWMP) including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7R Pathogen Methodology,¹⁷ MassDOT believes that existing efforts are consistent with the current and draft MS4 permit requirements and TMDL recommendations in regard to pathogens.

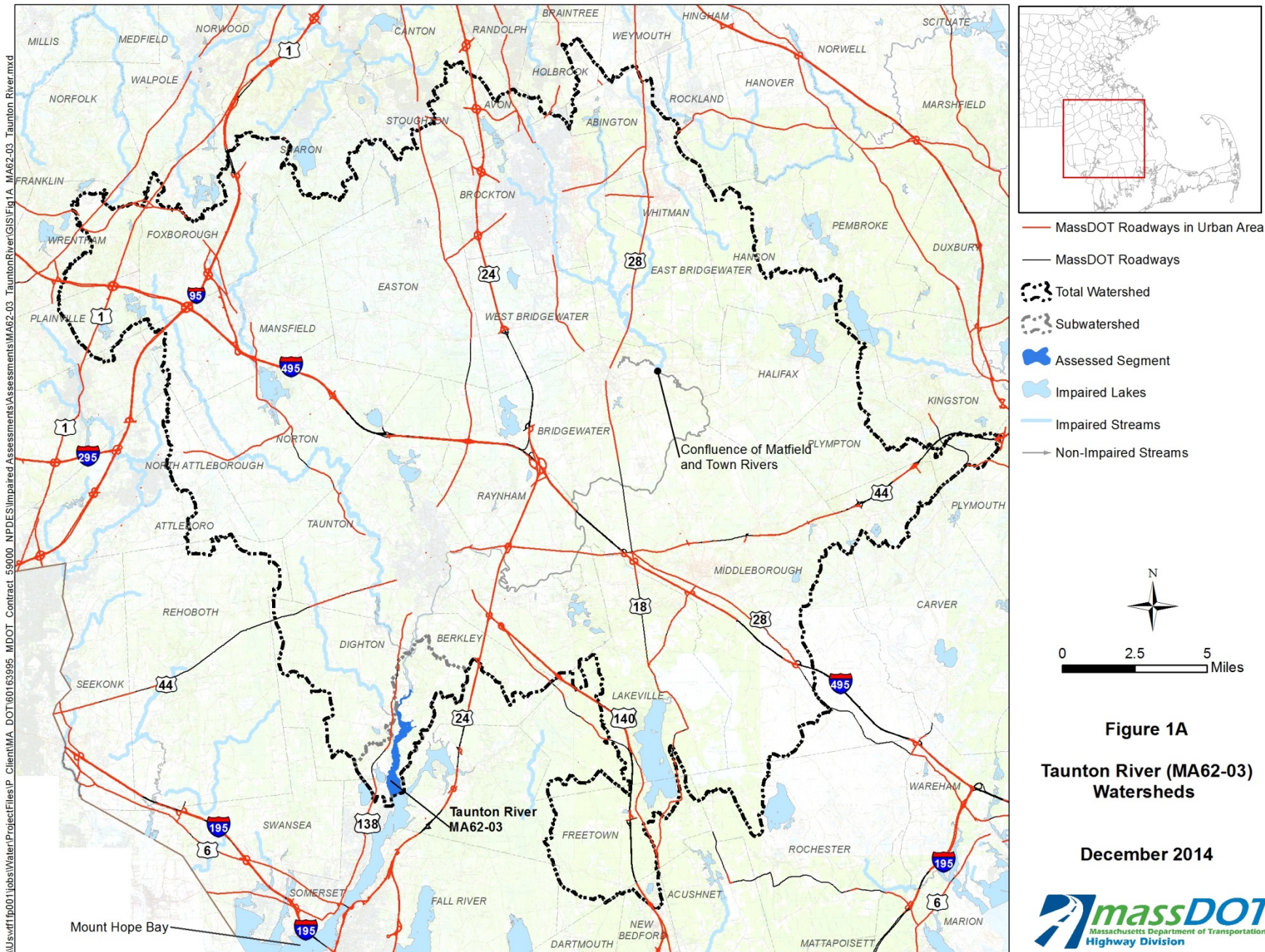
In accordance with the BMPs identified in the TMDL report as planned measures to reach compliance with the Taunton River pathogen TMDL report, MassDOT has documented the locations of its stormwater outfalls. In addition, as part of its pet waste management program, MassDOT has determined that no MassDOT targeted rest stops are located within the subwatershed of this water body. At rest stops that have been identified as being within subwatersheds of water bodies impaired for pathogens, MassDOT will be installing signs informing the public of the need to remove pet waste in order to minimize contributions of pathogens to the impaired water body, and pet waste removal bags and disposal cans will be provided.

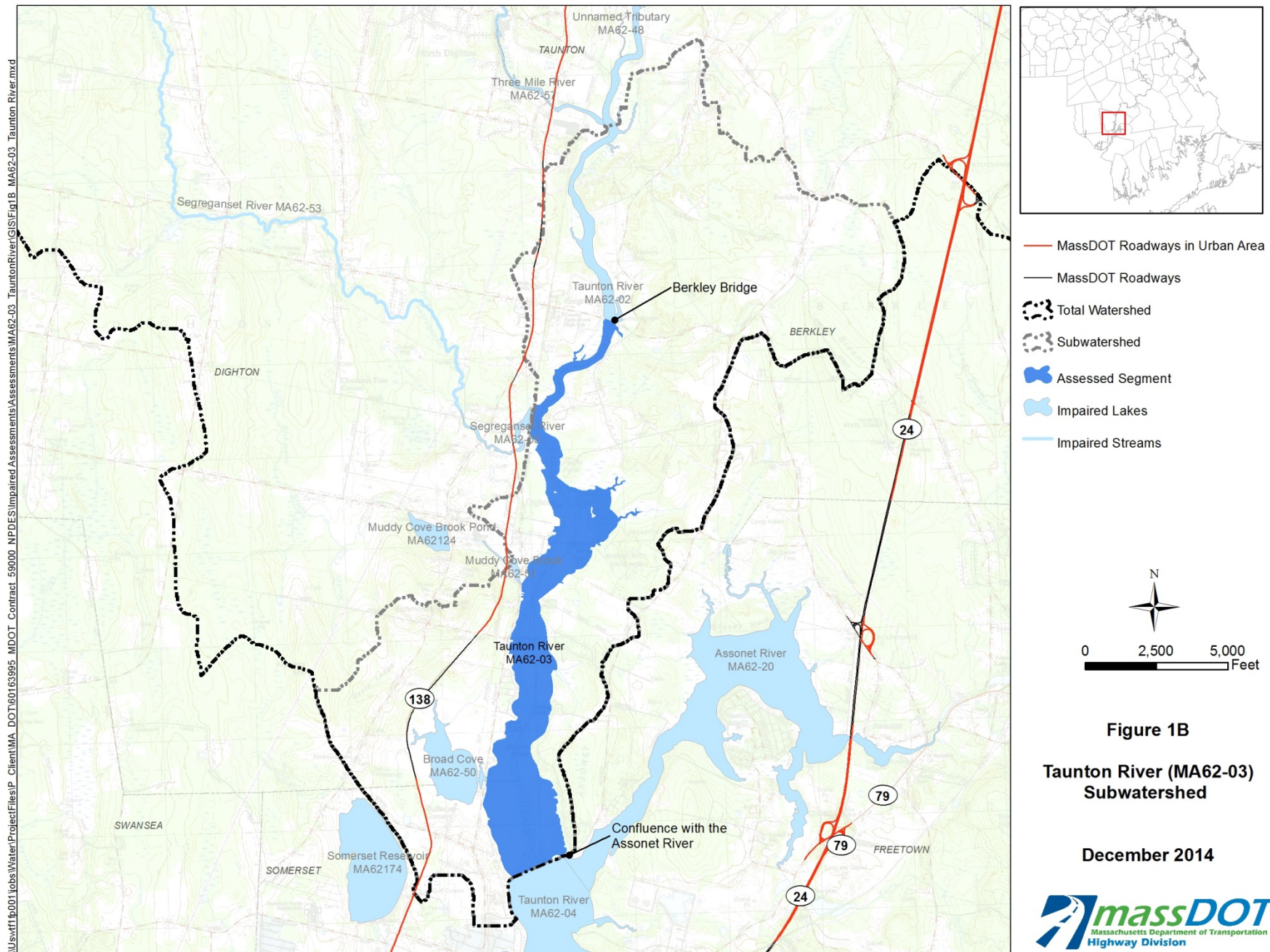
Although the TMDL report also identifies the benefits of structural BMPs to address runoff from impervious areas in some instances, MassDOT feels that it is not a beneficial approach to implement these BMPs in advance of other ongoing BMP efforts identified in the watershed, given the documented variability 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 Taunton River (MA62-03). 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 Taunton River, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education. Further work by MassDOT on programmed projects, which often include broader scale road layout changes, may provide additional opportunities for construction of new treatment BMPs. This is consistent with an iterative adaptive management approach to address impairments. MassDOT will include an update in NPDES permit annual reports to EPA regarding proposed BMP design either through retrofit or programmed projects, plans for construction of BMPs, reduction achieved by finalized BMP designs and progress made towards meeting target reductions.

¹⁷ MassDOT. December 2014. Description of MassDOT's Application of BMP 7R for Pathogen Related Impairments.





Impaired Waters Assessment for Cat Brook (MA93-29)

Summary

Impaired Waters ¹	Stormwater Impairments:	<i>Fecal Coliform, Low pH</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>
	Final TMDLs:	<i>Final Pathogen TMDL for the North Coastal Watershed March 2012</i> ²
	WQ Assessment:	<i>North Shore Coastal Watersheds 2002 Water Quality Assessment Report</i> ³
	Towns:	<i>Manchester-by-the-Sea</i>
Location	MassDOT Roads:	<i>Route 127, Route 128</i>
Assessment Methods(s)	7R (TMDL Method) ☒ 7U (Non-TMDL) ☒	

Site Description

Cat Brook (MA93-29) is a 1.7-mile segment located in Manchester-by-the-Sea, Massachusetts. Cat Brook flows from headwaters east of Route 128 in Manchester to confluence with Manchester Harbor at Route 127. Causeway and Sawmill Brook are the two named tributaries of Cat Brook. Cat Brook is sometimes referred to as Sawmill Brook downstream of their confluence. The total watershed and subwatershed are the same and consist of medium density residential and commercial area, recreational space, and forest. MassDEP's Water Quality Assessment Report⁴ lists Secondary Contact and Aesthetics uses as "support" because they meet surface water quality standards. Primary Contact use is listed as "impaired" due to elevated fecal coliform bacteria. The source of the impairment is unknown but the suspected source is discharges from separate storm sewer systems. Aquatic Life and Fish Consumption uses are listed as "not assessed" for this waterbody.

¹ MassDEP, 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 MassDEP, 2012. *Final Pathogen TMDL for the North Coastal Watershed March 2012*. Available at <http://www.mass.gov/eea/docs/depl/water/resources/n-thru-y/ncoastl1.pdf>

³ MassDEP, 2007. *North Shore Coastal Watersheds 2002 Water Quality Assessment Report*. Available at <http://www.mass.gov/eea/docs/depl/water/resources/71wqar09/93wqar06.pdf>

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

The watershed area for Cat Brook is approximately 3,218-acres (See Figure 1). MassDOT-owned roadways within Cat Brook watershed are Route 127 and Route 128. The MassDOT-owned portions of Route 127 in the area of Cat Brook can generally be described as a two-lane roadway with curbing and sidewalks on either side of the roadway. Route 128 is a four-lane divided highway with two lanes and shoulders in both directions. Also located within the watershed is the MassDOT-owned Exit 15 on-ramps and off-ramps for Route 128.

Runoff captured in catch basins along MassDOT-owned portion of Route 127 directly discharges to Cat Brook outside MassDOT layout. The outfalls are located within the Manchester Town-owned portion of Route 127 Layout. Route 128, east of the Exit 15 interchange, is cross sloped away from Cat Brook, and runoff is directed to existing swales located in the median and outer shoulder of the southbound travel lanes. No catch basins or outfalls are located with the MassDOT-owned Layout along Route 128 that discharge directly to Cat Brook.

Also included in the Cat Brook watershed is the unimpaired stream Sawmill Brook. Sawmill Brook passes under Route 128 at the Exit 15 interchange. There are catch basins located along Route 128 at Exit 15 that likely outfall directly to Sawmill Brook.

Existing BMPs

MassDOT did not identify any existing BMPs in place to treat roadway runoff from the directly discharging area before reaching the impaired water segment during a site visit on August 26, 2014.

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 Cat Brook (MA93-29) 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.⁷ MassDEP has released a Proposed Massachusetts Year 2014 Integrated List⁸ which has been reviewed for any proposed changes to the condition of the water bodies. The condition of Cat Brook is proposed to change to Category 4A (TMDL is completed) on the Massachusetts Year 2014 Integrated List, however, the impairments remain the same.

⁵ Massachusetts Department of Transportation (MassDOT), July 22, 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, 6 April, 2011. Description of MassDOT's Application of Impervious Cover Method in BMP 7U (MassDOT Application of IC Method). http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

⁷ MassDEP, 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>

⁸ MassDOT, 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>

BMP 7R for Pathogen TMDL (CN 155.0)

MassDOT assessed the indicator bacteria (fecal coliform) impairment using the approach described in BMP 7R of MassDOT's Storm Water Management Plan (SWMP)⁹ which applies to impairments that have been assigned to a water body covered by a Final TMDL. Cat Brook (MA93-29) is covered by the *Final Pathogen TMDL for the North Coastal Watershed*.¹⁰

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.¹¹

According to Section 5.0 on Page 67 of the Final TMDL, "sources of indicator bacteria in the North Coastal watershed are many and varied". Indicator bacteria is found in the North Coastal watershed during dry and wet weather conditions. Suspected and known dry weather sources in the watershed include:

- leaking sewer pipes;
- stormwater drainage systems (illicit connections of sanitary sewers to storm drains);
- failing septic systems;
- recreational activities;
- wildlife including birds; and
- discharges of inadequately treated boat waste.

Some suspected and known wet weather sources include:

- wildlife and domesticated animals (including pets);
- stormwater runoff including municipal separate storm sewer systems (MS4);
- combined sewer overflows (CSOs); and
- sanitary sewer overflows (SSOs).

In addition to the generic recommendations provided in the draft NPDES MS4 permits for Massachusetts and discussed in the MassDOT Pathogen Methodology, the TMDL states that implementation to achieve the TMDL goals should be an iterative process by first prioritizing areas based on available data while considering their impact to down gradient resources. Recommended TMDL implementation measures include identification and elimination of prohibited sources such as leaky or illicitly connected sanitary sewer flows, and best management practices to mitigate storm water runoff volume.

BMP 7U for Impervious Cover Related Impairments

A Final TMDL is not in place to address Cat Brook's (MA93-29) following impairments: low pH. Therefore, MassDOT assessed the stormwater-related impairments not addressed by a TMDL

⁹ Massachusetts Department of Transportation (MassDOT), July 22, 2010. BMP 7R: TMDL Watershed Review. Available at: http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7R_TMDL_WatershedReview.pdf

¹⁰ MassDEP, 2012. *Final Pathogen TMDL for the North Coastal Watershed* March 2012. Available at <http://www.mass.gov/eea/docs/dep/water/resources/n-thru-y/ncoast11.pdf>

¹¹ MassDOT, December 2014. Description of MassDOT's Application of BMP 7R for Pathogen Related Impairments.

using the approach outlined in the Description of MassDOT's Application of Impervious Cover Method in BMP 7U¹² which was developed using the EPA Region I's Impervious Cover (IC) Method, described in EPA's Stormwater TMDL Implementation Support Manual.¹³ Consistent with the findings of EPA and others, MassDOT concluded that when a watershed had less than 9% IC, stormwater was not the likely cause of the impairment.

MassDOT calculated the following values for the total contributing watershed of the impaired water (Cat Brook) to determine the IC area and set a reduction target. Watersheds are based on the USGS Dataset 451 and modified as necessary using topography.¹⁴ MassGIS's impervious surfaces data layer was used to determine the IC of the watersheds.¹⁵

Table 1 Impaired Segment Watershed

	Total Watershed
Watershed Area	3,218 acres
Impervious Cover (IC) Area	283 acres
Percent Impervious	8.8%

MassDOT calculated the subwatershed to be less than 9% impervious indicating that stormwater is likely not a contributor to the impairments.

Proposed Mitigation Plan

MassDOT has concluded, using the IC Method, that there is no required reduction in impervious area for Cat Brook because the percent of impervious cover within the subwatershed is equal to or less than the 9% maximum IC target. This indicates that stormwater from this watershed is not likely the cause of the impairments not covered by a TMDL. Therefore, further assessment of this waterbody for impairments not covered by a TMDL is not warranted under the Impaired Waters Program.

With respect to the fecal coliform impairment, MassDOT implements a variety of non-structural BMP programs across their system in accordance with their existing Stormwater Management Plan (SWMP) including educational programs, illicit connection review and source control. As discussed in MassDOT's BMP 7R Pathogen Methodology,¹⁶ 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 North Coastal pathogen TMDL report, MassDOT has documented the

¹² MassDOT, 6 April, 2011. Description of MassDOT's Application of Impervious Cover Method in BMP 7U (MassDOT Application of IC Method).
http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/BMP_7U_ImpairedWaterbodiesAssessment.pdf

¹³ ENSR 2006. Stormwater TMDL Implementation Support Manual for US EPA Region 1. ENSR International & EPA Region 1, Boston, MA. Available at
<http://www.epa.gov/region1/eco/tmdl/regionalpgrfs.html>

¹⁴ USGS Data Series 451 Local and Cumulative Impervious Cover of Massachusetts Stream Basins Available at: <http://pubs.usgs.gov/ds/451/>

¹⁵ MassGIS Impervious Surfaces datalayer taken from 2005 orthoimagery. Available at: http://www.mass.gov/mgis/impervious_surface.htm

¹⁶ MassDOT, December 2014. Description of MassDOT's Application of BMP 7U for Pathogen Related Impairments.

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. At rest stops that have been identified as being within subwatersheds of water bodies impaired for pathogens, MassDOT will be installing signs at rest stops within the subwatershed of 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 stormwater 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 Cat 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 Cat Brook, including regular roadway and drainage system maintenance, erosion and sedimentation control, and outreach and education. Further work by MassDOT on programmed projects, which often include broader scale road layout changes, may provide additional opportunities for construction of new treatment BMPs. This is consistent with an iterative adaptive management approach to address impairments. MassDOT will include an update in NPDES permit annual reports to EPA regarding proposed BMP design either through retrofit or programmed projects, plans for construction of BMPs, reduction achieved by finalized BMP designs and progress made towards meeting target pathogen load reductions.

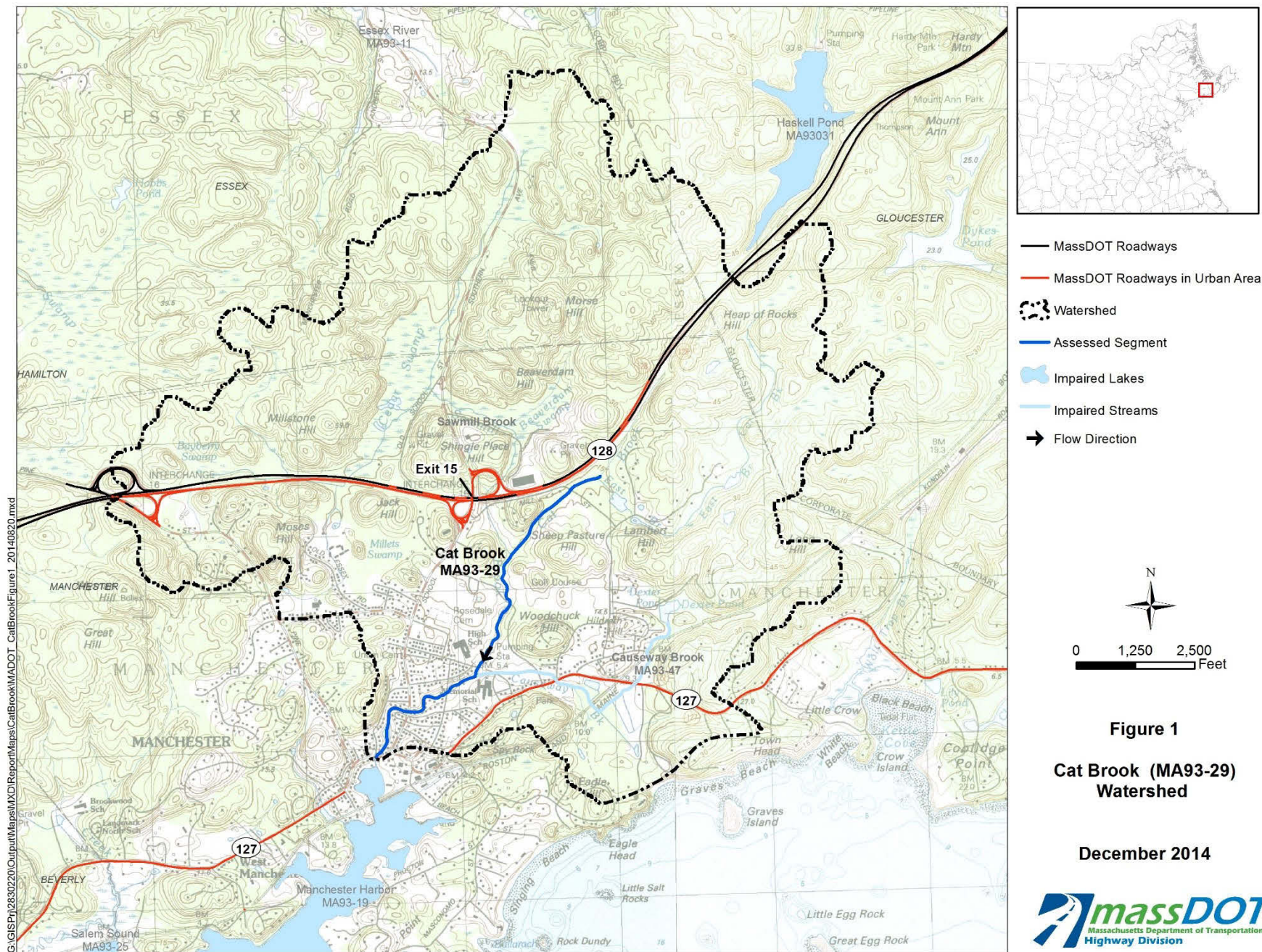


Figure 1
Cat Brook (MA93-29)
Watershed

December 2014

