

Attachment 2:

Impaired Waters Assessments – Less Than 9% IC

Attachment 2 includes assessments of 4 water bodies which MassDOT determined the contributing watershed was less than 9% IC using BMP 7U. In accordance with the BMP 7U methodology, if the watershed is less than 9% IC then the impairment is not stormwater related and therefore MassDOT will not review the water body further under this program.

List of Impaired Water Bodies

MA11002	Cheshire Reservoir, North Basin*
MA11-03	Hoosic River*
MA81-18	Squannacook River*
MA81-21	Nissitissit River*

*Not on Appendix L-1 list.

Impaired Waters Assessment for Cheshire Reservoir North Basin (MA11002)

Summary

Impaired Water ¹	Impairments: Stormwater:	<i>Aquatic Plants (Macrophytes), Nutrient/Eutrophication Biological Indicators, Turbidity</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>Hudson River Watershed 2002 Water Quality Assessment Report</i> ³
Location	Towns:	<i>Cheshire</i>
	MassDOT Roads:	<i>Route 8</i>
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>
BMPs	Existing:	<i>None</i>

Site Description

The North Basin of the Cheshire Reservoir (MA11002) is a 284-acre lake located in Cheshire, Massachusetts. There are two permanent inlets to the North Basin, the outlet from the Middle Basin (MA11018) at the southern end and from Collins Brook on the eastern shore. The North Basin outlets at the northeast corner of the lake near Route 8 to Hoosic River (MA11-03). The total watershed is approximately 15 square miles and the subwatershed is approximately 7 square miles. Both are shown in Figure 1 and consist mainly of forest, wetland systems, medium density residential, and commercial areas.

MassDEP's *Hudson River Watershed 2002 Water Quality Assessment Report*³ for the North Basin of Cheshire Reservoir lists Secondary Contact and Aesthetics as "support" because they meet surface

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

water quality standards. Aquatic Life Use is listed as “impaired” due to non-native aquatic macrophytes. The assessment report lists the source of impairment as being “source unknown” for Aquatic Life Use. Fish Consumption and Primary Contact were listed as “not assessed” for this waterbody.

MassDOT-owned roadways within the subwatershed include portions of Route 8 (South State Road) as shown in Figure 1. Route 8 is a two-lane roadway with shoulders on either side of the road. Sections of Route 8 along Cheshire Reservoir also have curbing and guardrail. Route 8 runs in a general north-south direction and is parallel to the east bank of Cheshire Reservoir. Near the northeast corner of the reservoir is a MassDOT-owned Weigh Station situated between Cheshire Reservoir and Route 8 on Weigh Station Road. Run-off along Route 8 is captured in drop inlets and catch basins and then is directly discharged to Cheshire Reservoir in several locations. Collins Brook passes under Route 8 through a 78” culvert and then passes under the Weigh Station Road through a culvert that directly discharges to Cheshire Reservoir. Collins Brook, an unimpaired tributary to Cheshire Reservoir, receives stormwater runoff from Route 8.

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 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 Cheshire Reservoir (MA11002) using the methodologies described below.

MassDOT has identified a water body impairment in the Cheshire Reservoir watershed that is not related to stormwater runoff. This impairment is non-native aquatic plants (*M. spicatum*). 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 Cheshire Reservoir is not proposed to change.

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>

BMP 7U for Impervious Cover Related Impairments

A final TMDL is not in place to address Cheshire Reservoir's (MA11002) following impairments: aquatic plants (macrophytes), nutrient/eutrophication biological indicators, 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 7U⁷ 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 (Cheshire Reservoir) 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	9,575 acres	4,476 acres
Impervious Cover (IC) Area	374 acres	135 acres
Percent Impervious	3.9%	3.0%

MassDOT determined that the total watershed and the subwatershed are both 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 Cheshire Reservoir 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.

In addition, as part of its pet waste management program, MassDOT has determined that there is one MassDOT targeted rest stop located within the subwatershed of this water body, along Route 8 near the Cheshire Reservoir Middle Basin. This targeted rest stop is also located within the subwatershed of Hoosic River (MA11-03), which is a pathogen impaired waterbody. MassDOT will be installing signs at rest stops within the subwatersheds of pathogen impaired waterbodies. The

⁷ MassDOT, April 2011. Description of MassDOT's Application of Impervious Cover Method in BMP 7U. Available at: http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/IC_MethodApplication2011Apr6.pdf

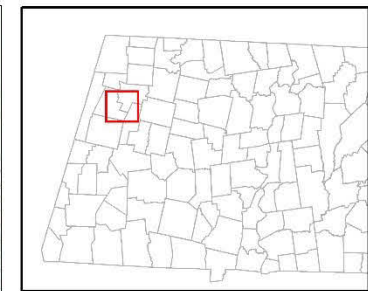
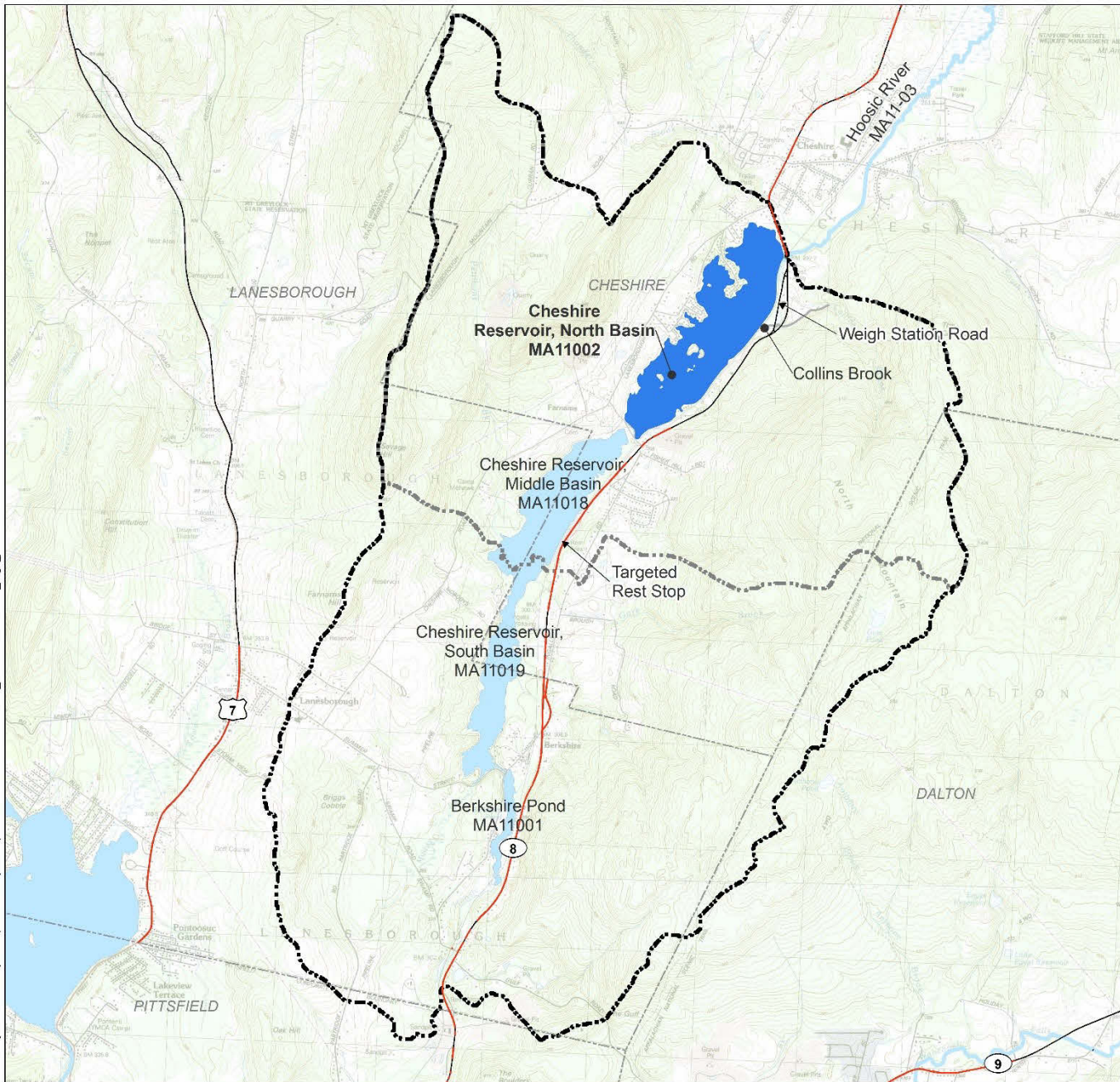
⁸ ENSR, March 2006. Stormwater TMDL Implementation Support Manual for US EPA Region 1. ENSR International & EPA Region 1, Boston, MA. Available at <http://www.epa.gov/region1/eco/tmdl/pdfs/Stormwater-TMDL-Implementation-Support-Manual.pdf>

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

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.

MassDOT will continue to ensure proper non-structural BMPs are being implemented within the watershed of Cheshire Reservoir, 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
- Non-Impaired Stream

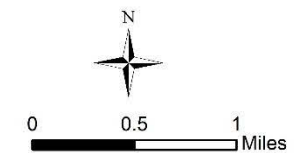


Figure 1

Cheshire Reservoir North Basin (MA11002) Watersheds

June 2015



Impaired Waters Assessment for Hoosic River (MA11-03)

Summary

Impaired Water¹	Impairments: Stormwater:	<i>Ambient Bioassays – Chronic Aquatic Toxicity, Fecal Coliform, Water Temperature</i>
	Non-Stormwater: ²	<i>Alteration in stream-side or littoral vegetative covers, Other flow regime alterations, Physical substrate habitat alterations</i>
	Category: 5 (Waters requiring a TMDL)	
	Final TMDLs: None	
	WQ Assessment: Hudson River Watershed 2002 Water Quality Assessment Report ³	
Location	Towns: Adams, Cheshire	
	MassDOT Roads: Route 8, Route 116	
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/> 7U (Non-TMDL Method) <input checked="" type="checkbox"/>	

Site Description

Hoosic River (MA11-03) is an 8.9-mile segment located in Cheshire and Adams, Massachusetts, which starts at the outlet of Cheshire Reservoir North Basin (MA11002) in Cheshire and ends at the Adams Waste Water Treatment Plant in Adams where segment MA11-04 begins. This segment of the Hoosic River 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. This segment is also classified as a Cold Water Fishery. The total watershed is approximately 64 square miles and the subwatershed is approximately 22 square miles. Both are shown in Figure 1. Land use in the subwatershed consist mostly of forest and crop land. Other land uses within the subwatershed include low and medium-density residential, commercial, and industrial areas.

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

MassDEP's *Hudson River Watershed 2002 Water Quality Assessment Report*⁶ for the 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 listed as "source unknown" but suspected sources include waterfowl, discharges from municipal separate storm sewer systems (MS4), and illicit connections/hook-ups to storm sewers. Fish consumption is listed as "not assessed" for this waterbody. Aquatic Life status is listed as "mixed". The upper 1.2-miles of this segment of the Hoosic River is listed as "impaired" due to elevated water temperatures, with the source listed as Dam or Impoundment. The middle-5.1 miles is listed as "support" because it meets surface water quality standards. The lower 2.6-miles is listed as "impaired" due to other flow regime alterations, stream bank alterations, and ambient chronic toxicity. Another suspected cause of impairment is due to evidence of nutrient/eutrophication from biological indicators. The assessment report lists sources of impairment as channelization and stream bank modifications and suspected sources as unspecified urban stormwater and agriculture.

MassDOT-owned roads within the subwatershed include portions of Route 8 and Route 116. In Cheshire, this segment of the river generally runs parallel to Route 8 and in Adams the river runs along Route 8 and crosses under Route 8 at four locations. There are several locations along Route 8 that directly contribute stormwater runoff to the Hoosic River. Once Route 8 becomes a town owned roadway, there are three MassDOT-owned bridges that cross the Hoosic River but do not directly contribute stormwater runoff to the river. The MassDOT-owned portion of Route 116 is located more than 1,000-feet from the Hoosic River. Record plans indicate roadway runoff discharges through headwalls along the edge of Route 116 before flowing overland towards the Hoosic River.

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 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 (MA11-03) 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, other flow regime alterations, and physical substrate habitat 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*

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

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 7U⁷ 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

BMP 7U for Impervious Cover Related Impairments

A final TMDL is not in place to address Hoosic River (MA11-03) following impairments: ambient bioassays – chronic aquatic toxicity, and water temperature. 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 7U⁷ which was developed using the EPA Region I's Impervious Cover (IC) Method, described in EPA's Stormwater TMDL Implementation Support Manual.⁹ 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 (Hoosic River) to determine the IC area and set a reduction target. Watersheds are based on the USGS Dataset 451¹⁰ and modified as necessary using topography. MassGIS's impervious surfaces data layer¹¹ 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	40,663 acres	14,374 acres

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, April 2011. Description of MassDOT's Application of Impervious Cover Method in BMP 7U. Available at: http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/IC_MethodApplication2011Apr6.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/impairedWaters/Year5/Attachment5.pdf>

⁹ ENSR, March 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/pdfs/Stormwater-TMDL-Implementation-Support-Manual.pdf>

¹⁰ USGS Data Series 451 Local and Cumulative Impervious Cover of Massachusetts Stream Basins Available at: <http://pubs.usgs.gov/ds/451/>

¹¹ MassGIS Impervious Surfaces datalayer taken from 2005 orthoimagery. Available at: http://www.mass.gov/mgis/impervious_surface.htm

	Total Watershed	Subwatershed
Impervious Cover (IC) Area	1,462 acres	811 acres
Percent Impervious	3.6%	5.6%

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 Hoosic 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 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 requirement in regard to pathogens.

In addition, as part of its pet waste management program, MassDOT has determined that there are three MassDOT targeted rest stops located within the total and subwatershed of this water body. Two targeted rest stops are located on Route 8 southbound in Cheshire. The third is located along Route 8 northbound in Cheshire. 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.

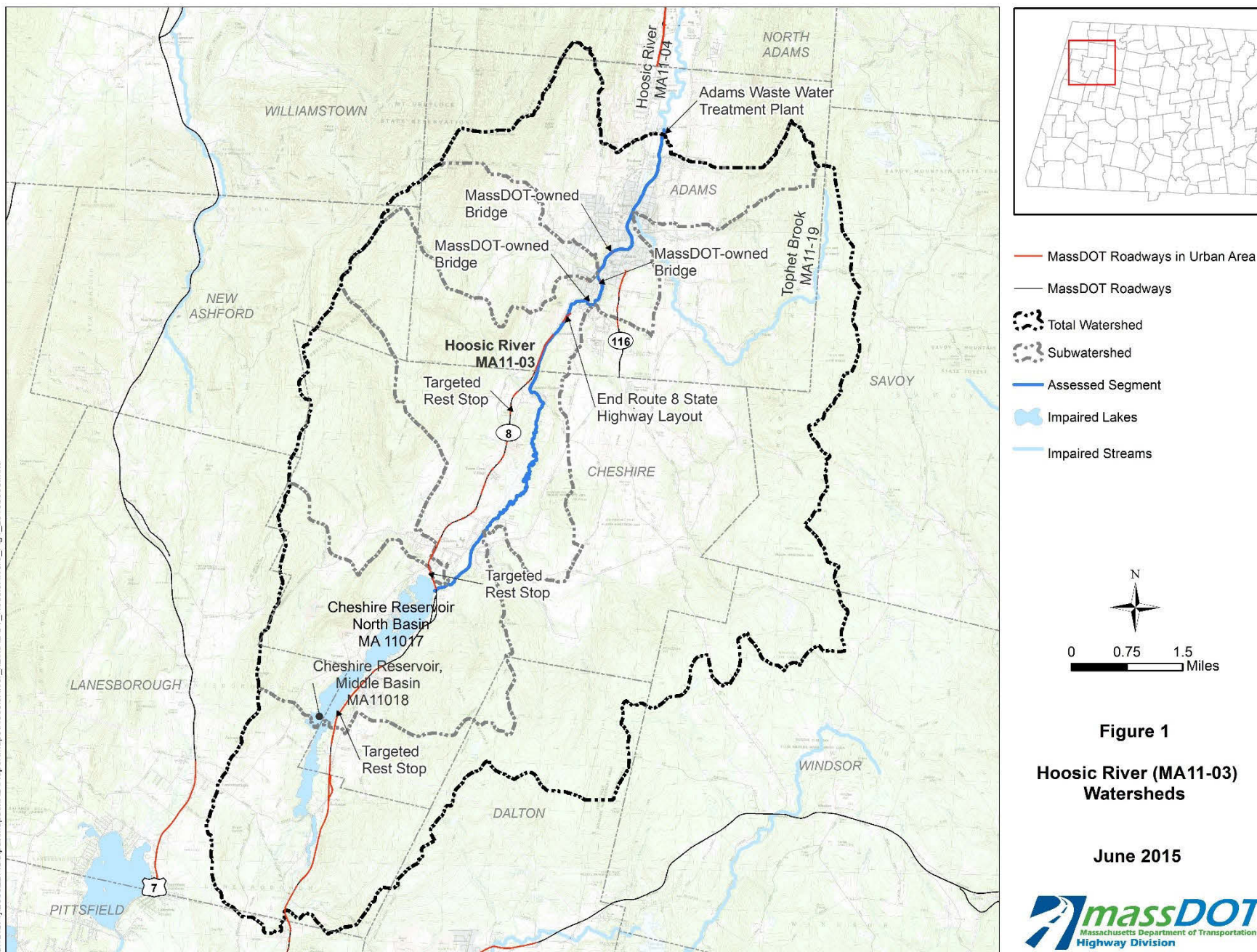
Furthermore, MassDOT has an ongoing inspection and monitoring program aimed at identifying and addressing illicit discharges to MassDOT's stormwater management system. MassDOT investigates any suspicious flows noted, and will work with owners of confirmed illicit discharges to remove these flows, and 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. 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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Impaired Waters Assessment for Squannacook River (MA81-18)

Summary

Impaired Water¹	Stormwater	<i>Escherichia coli; Lack of a cold-water</i>
	Impairments:	<i>assemblage; Low pH; Water Temperature</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>
	Final TMDLs:	<i>None</i>
	WQ Assessment:	<i>Nashua River Watershed 2003 Water Quality Assessment Report²</i>
Location	Towns:	<i>Groton, Shirley and Townsend</i>
	MassDOT Roads:	<i>Route 119</i>
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Squannacook River (MA81-18) is located in Groton, Shirley and Townsend, Massachusetts (Figure 1A). This segment originates at the confluence of Mason Brook and Willard Brook in Townsend and flows generally southeast for approximately 13 miles through former pond segment Harbor Pond (MA81054) to Hollingsworth and Vose Dam at the Groton and Shirley town line (Figure 1B).

MassDEP's *Nashua River Watershed 2003 Water Quality Assessment Report²* identified the Aquatic Life use with an "impaired" status due to lack of cold water assemblage, temperature and low pH measurements. The likely source of this impairment is the dam and impoundment. The Primary Contact use was also identified with an "impaired" status due to elevated *Escherichia coli* counts. This impairment may be temporary and local to a portion of the river segment between the Mason Road bridge and the South Street bridge in Townsend, Massachusetts. According to the report, the likely source of this impairment is wet weather discharges (non-point sources). The remaining portions of the river segment "support" the Primary Contact use. The Secondary Contact and Aesthetics uses were classified as "support" while the Fish Consumption use was "not assessed".

The total watershed and subwatershed of Squannacook River are shown on Figure 1A which are approximately 65 square miles and 23 square miles respectively and are located in Ashby, Groton, Lunenburg, Pepperell, Shirley and Townsend, Massachusetts as well as multiple New Hampshire towns. Figure 1B shows the only MassDOT-owned roadway in the Squannacook River

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 Watersheds 2003 Water Quality Assessment Report. Available at: <http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/81wqar08.pdf>

subwatershed which is Route 119. The subwatershed to Squannacook River is comprised of croplands and pastures, wetlands and low density residential areas with the majority of the subwatershed consisting of forested 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 Squannacook River (MA81-18) 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.⁵ The condition of Squannacook 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

BMP 7U for Impervious Cover Related Impairments

A final TMDL is not in place to address Squannacook River's (MA81-18) following impairments: lack of cold-water assemblage, low pH and water temperature. 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 7U⁷ which was developed using the EPA Region I's Impervious Cover (IC) Method, described in EPA's Stormwater

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/impairment/Waters/Year5/Attachment5.pdf>

⁷ MassDOT, April 2011. Description of MassDOT's Application of Impervious Cover Method in BMP 7U. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/IC_MethodApplication2011Apr6.pdf

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 (Squannacook 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 Figures 1A and 1B.

Table 1 Impaired Segment Watershed

	Total Watershed	Subwatershed
Watershed Area	41,909 acres	14,896 acres
Impervious Cover (IC) Area	1,889 acres	827 acres
Percent Impervious	4.5%	5.6%

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 Squannacook 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 *Escherichia coli* impairment, 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

⁸ ENSR, March 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/pdfs/Stormwater-TMDL-Implementation-Support-Manual.pdf>

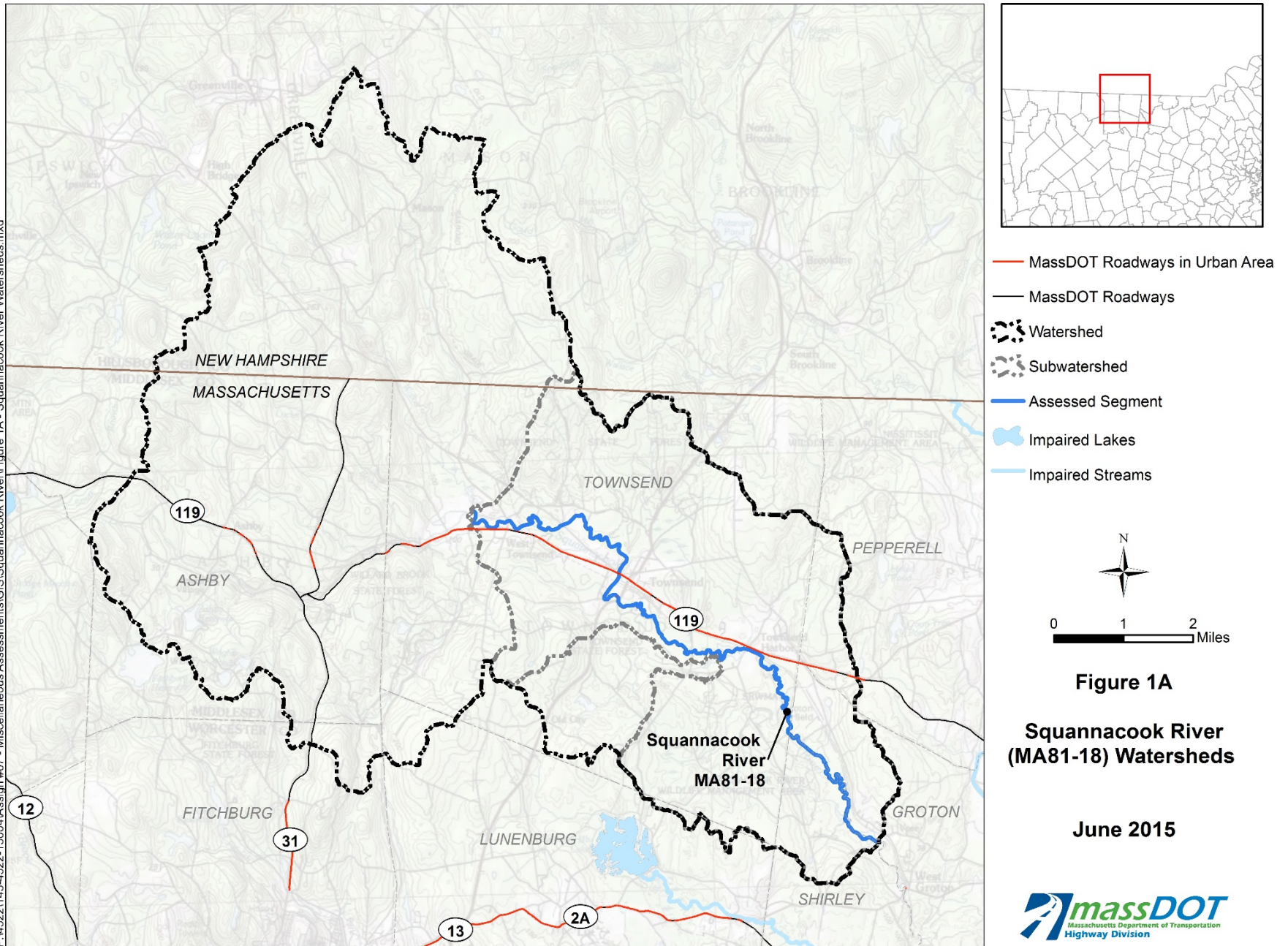
⁹ USGS Data Series 451 Local and Cumulative Impervious Cover of Massachusetts Stream Basins Available at: <http://pubs.usgs.gov/ds/451/>

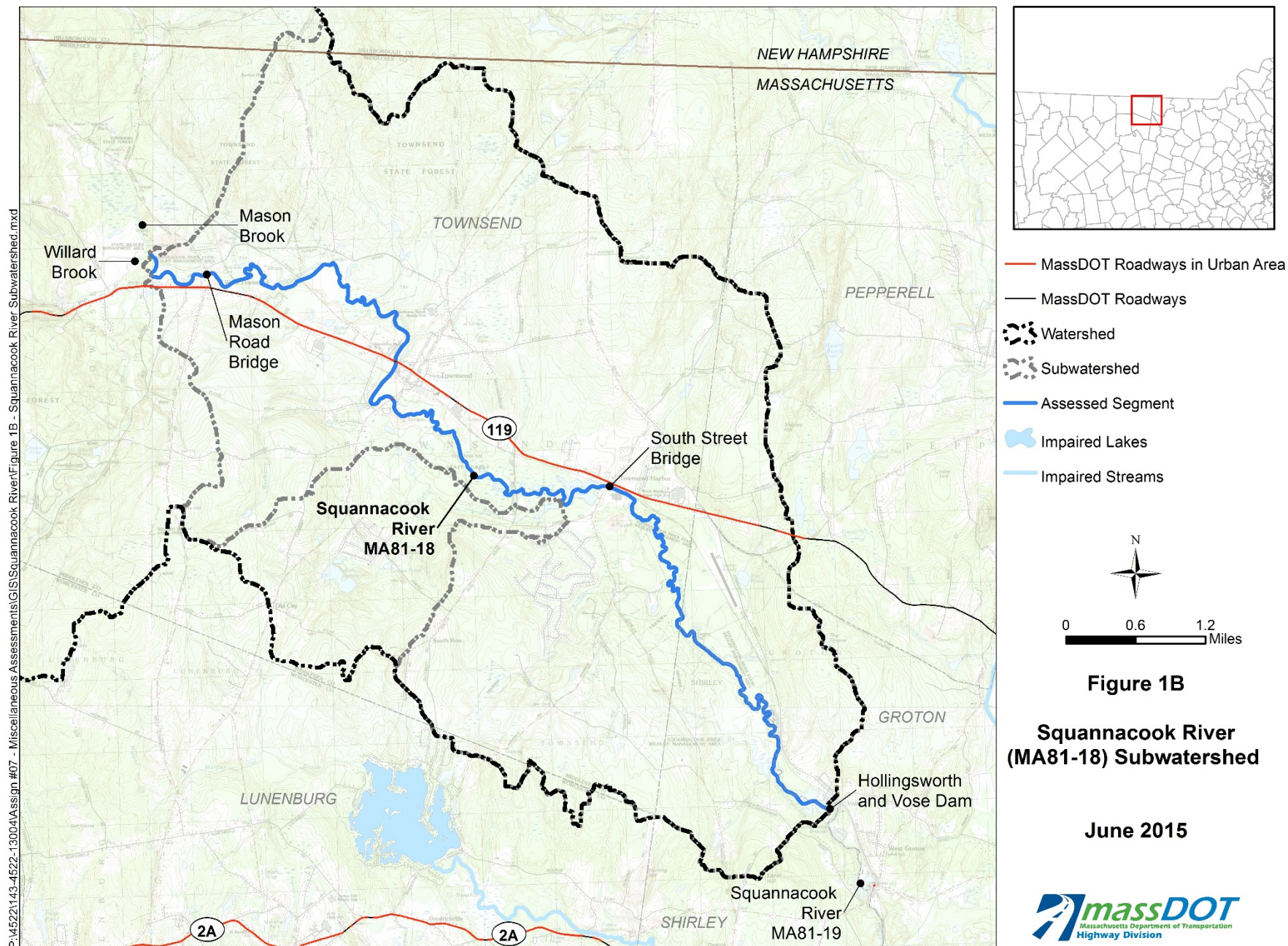
¹⁰ MassGIS Impervious Surfaces datalayer taken from 2005 orthoimagery. Available at: http://www.mass.gov/mgis/impervious_surface.htm

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 Squannacook 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 Squannacook 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.





Impaired Waters Assessment for Nissitissit River (MA81-21)

Summary

Impaired Water¹	Stormwater Impairments:	<i>Lack of a cold-water assemblage</i>
	Category:	<i>5 (Waters requiring a TMDL)</i>
	Final TMDLs:	<i>None</i>
	WQ Assessment:	<i>Nashua River Watershed 2003 Water Quality Assessment Report²</i>
Location	Towns:	<i>Pepperell</i>
	MassDOT Roads:	<i>Route 111 (Hollis Street Bridge)</i>
Assessment Method(s)	7R (TMDL Method) <input type="checkbox"/>	7U (Non-TMDL Method) <input checked="" type="checkbox"/>

Site Description

Nissitissit River (MA81-21) originates at the New Hampshire state line and flows generally southeast for 4.6 miles before its confluence with the Nashua River (MA81-07) in Pepperell, Massachusetts (Figure 1A).

MassDEP's *Nashua River Watershed 2003 Water Quality Assessment Report²* identified the Aquatic Life use as "impaired" due to a lack of cold water assemblage. The source of this impairment is unknown. The Primary Contact, Secondary Contact and Aesthetics uses were all classified as "support" while the Fish Consumption use was "not assessed".

The total watershed and subwatershed of Nissitissit River are shown on Figure 1A which are approximately 61 square miles and 9.6 square miles respectively and are located in Pepperell and Townsend, Massachusetts as well as multiple New Hampshire towns. Figure 1B shows the only MassDOT-owned roadway in the Nissitissit River subwatershed which is the Hollis Street Bridge (Route 111) over Nissitissit River. The subwatershed to Nissitissit River is comprised of residential areas, pastures and crop land, and wetlands with the majority of the subwatershed consisting of forested area.

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>

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 Nissitissit River (MA81-21) 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 Nissitissit River is not proposed to change.

BMP 7U for Impervious Cover Related Impairments

A final TMDL is not in place to address Nissitissit River (MA81-21) following impairments: lack of a coldwater assemblage. 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 7U⁶ 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 (Nissitissit 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 impervious surfaces data layer⁹ was used to determine the IC of the watersheds. The total watershed and the subwatershed are shown in Figures 1A and 1B.

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, April 2011. Description of MassDOT’s Application of Impervious Cover Method in BMP 7U. Available at:

http://www.massdot.state.ma.us/Portals/8/docs/environmental/npdes/IC_MethodApplication2011Apr6.pdf

⁷ ENSR, March 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/pdfs/Stormwater-TMDL-Implementation-Support-Manual.pdf>

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

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

Table 1 Impaired Segment Watershed

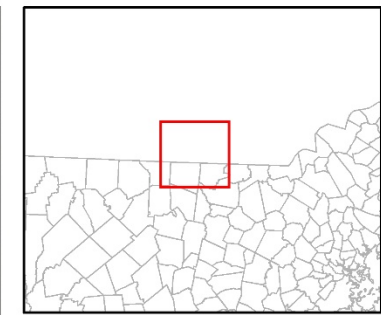
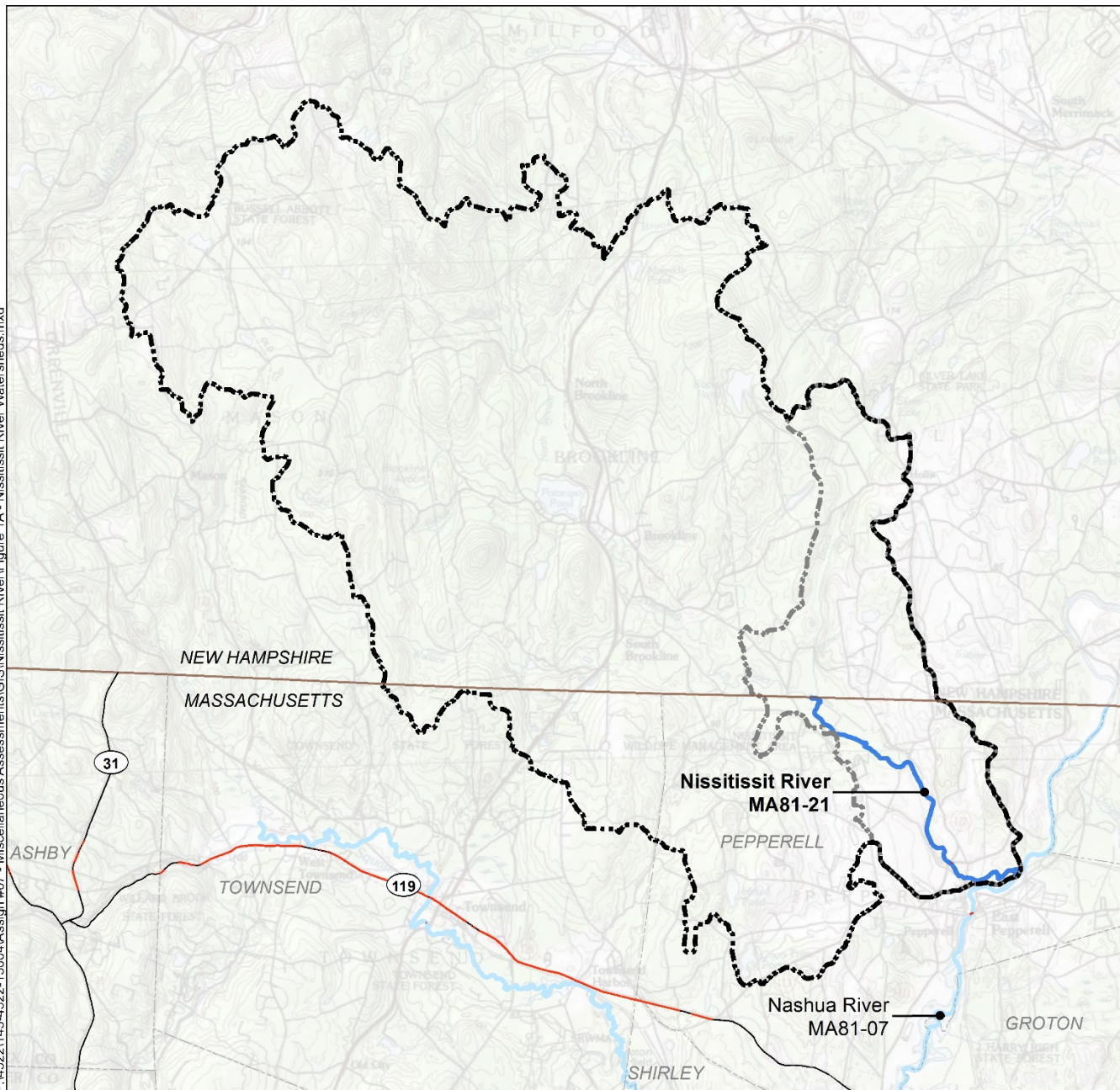
	Total Watershed	Subwatershed
Watershed Area	38,868 acres	6,153 acres
Impervious Cover (IC) Area	1,962 acres	457 acres
Percent Impervious	5.1%	7.4%

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 Nissitissit 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 Nissitissit 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 toward meeting effective IC reductions.



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

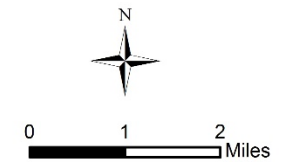


Figure 1A
Nissitissit River
(MA81-21)
Watersheds
June 2015



