Optimizing Stormwater Treatment using the MassDOT Water Quality Data Form

Presented by

Lauren Caputo, VHB

January 25, 2023

massDOT Massachusetts Department of Transportation

vhb

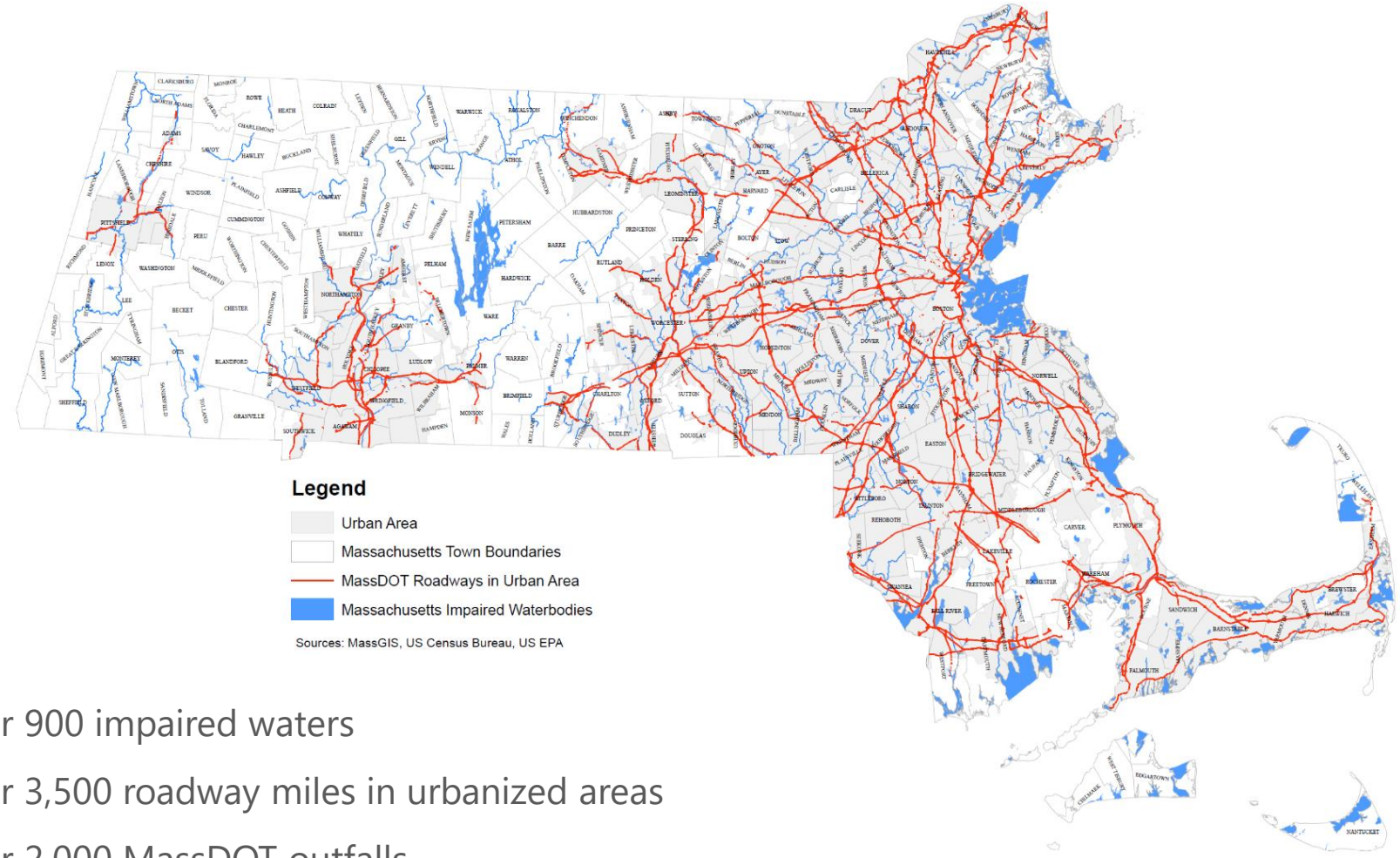
NEWEA WORKING FOR WATER QUALITY

Today's Agenda on the WQDF

- Background
- Why the update?
- Benefits
- Highlights of content

The Water Quality Data Form (WQDF) is a tool to support cost-effective stormwater treatment design for linear projects

Background – Impaired Waters Program



- Over 900 impaired waters
- Over 3,500 roadway miles in urbanized areas
- Over 2,000 MassDOT outfalls

Background – Impaired Waters Program

Two Initiatives

- Stormwater Retrofits
  - Stand-alone
- Programmed Projects
  - Piggyback on existing projects
    - Resurfacing
    - Interchange improvements
    - Bridge
    - Add-a-lane
  - WQDF drives this initiative

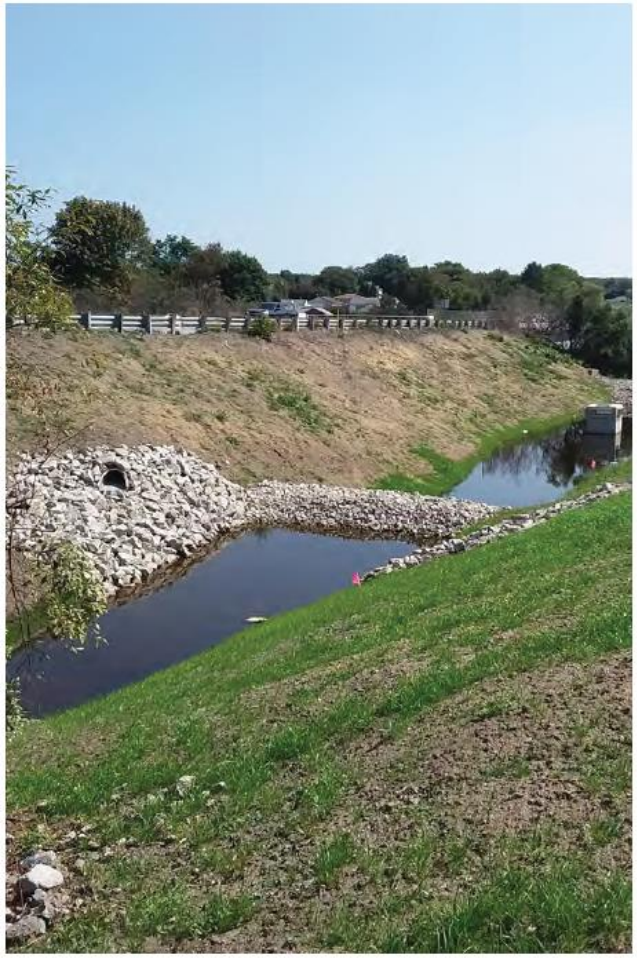
Background – the Original WQDF

Purpose:

No missed opportunities for stormwater treatment during MassDOT programmed projects!

- 25% and 75% design submission forms
- Listed receiving water and impairment status
- Told designers if SCMs* are necessary (yes/no)
- Collected SCM data and calculated treatment depth based on drainage area to SCM
- Data loaded in MassDOT stormwater assets geodatabase

**Note: Stormwater Best Management Practice (BMP) = Stormwater Control Measure (SCM)*



Infiltration basin in ponded condition © MassDOT

The New WQDF - Why the Update?

IWP Goals Now Watershed-Based

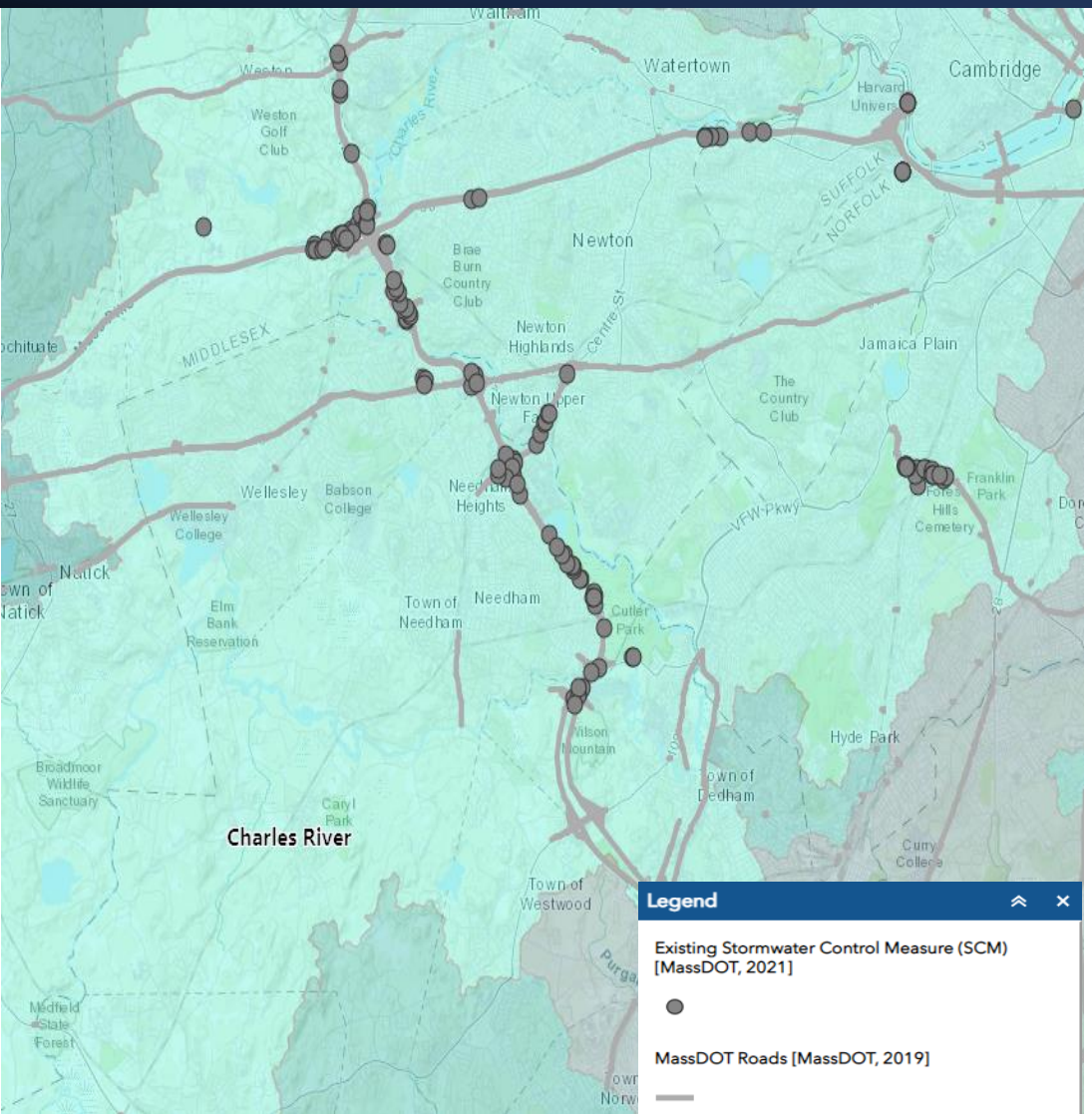
Elements of the New Form:

- One form instead of two
- Collects SCM data early in design
- Treatment requirements based on watershed (not receiving water)
- Calculates treatment based on SCM Water Quality Curves*
- Promotes Integrated Site Design

Wet basin © Horsley Witten Group

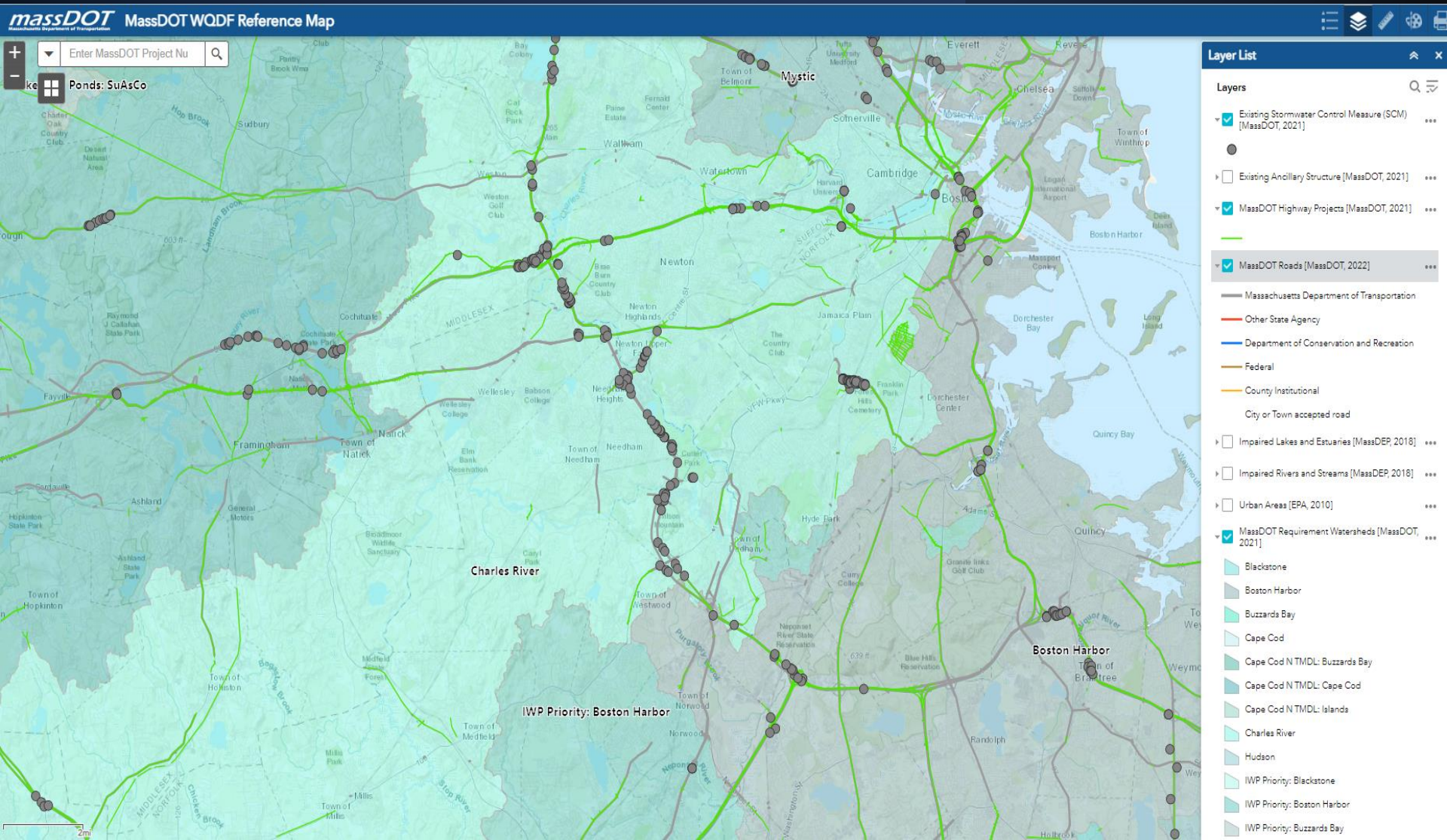
**Note: SCM Water Quality Curves are same as the EPA BMP Performance Curves in the MS4 Permit*

Benefits of the New WQDF



- Continues facilitation of stormwater treatment into programmed projects
- Simple form allows for direct guidance
- Prioritizes watersheds where MassDOT needs the most treatment
- Estimates treatment directly in form
- Easy to collect SCM data from projects
- Allows MassDOT to track stormwater treatment and plan for future projects

Highlights – Companion Web Map



Highlights – SCM Guidance Based on Project

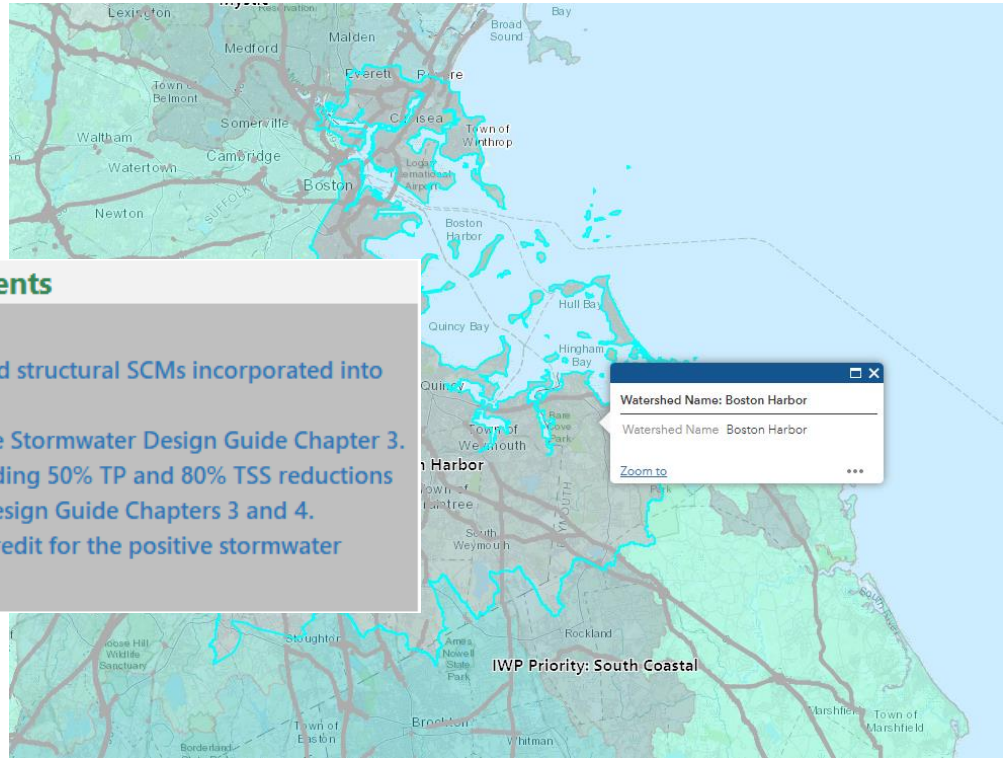
Logic in form provides guidance based on:

- Location within/outside of urbanized area
- Watershed's water quality goals
- Increase/decrease in impervious cover

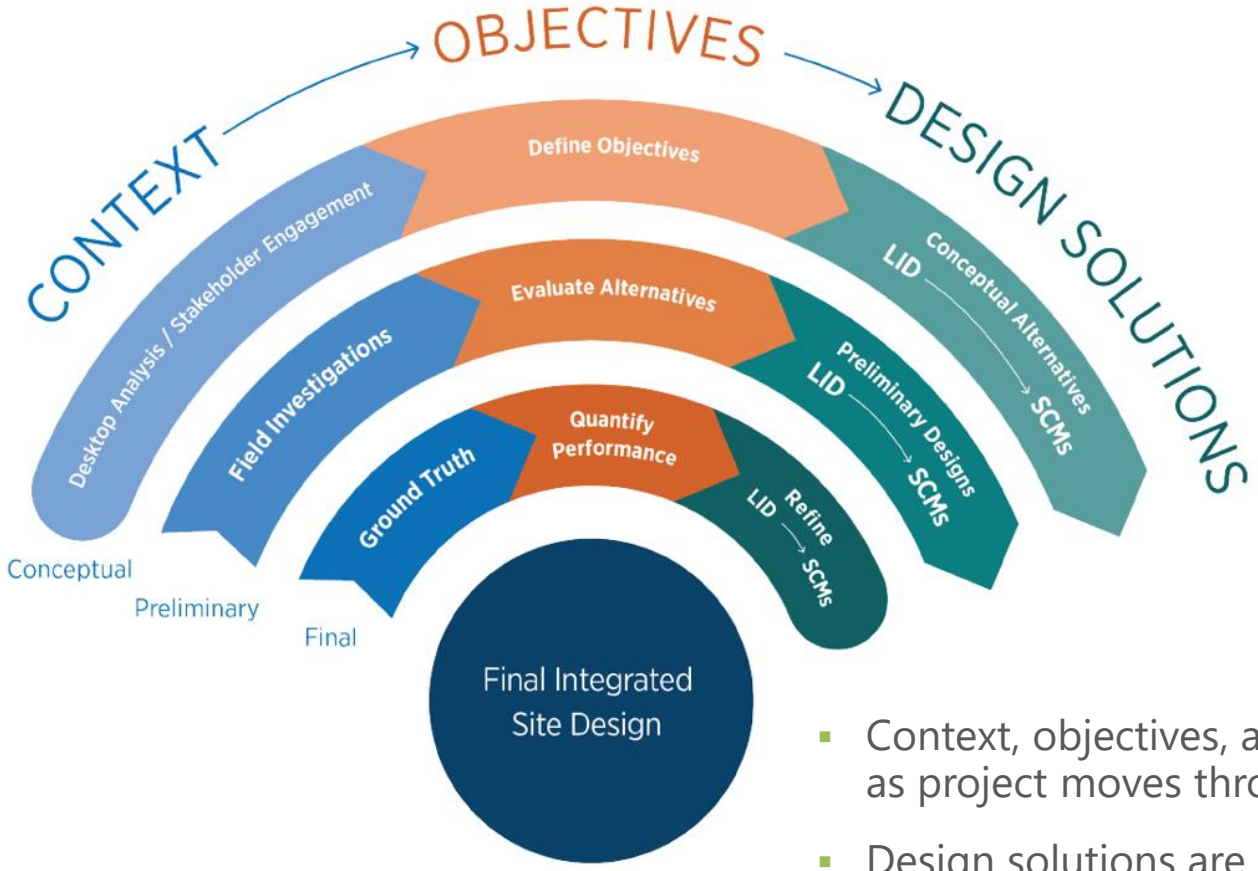
Guidance Example:

MassDOT Treatment Requirements

- Follow MassDEP regulatory standards if within MassDEP jurisdiction.
- Your project is located within a impaired waters priority watershed and structural SCMs incorporated into your project are essential for MassDOT to meet theirMS4 requirements.
- Implement MassDOT's Integrated Site Design approach outlined in the Stormwater Design Guide Chapter 3.
- Implement structural SCMs to treat all project impervious cover providing 50% TP and 80% TSS reductions to the maximum extent practical following guidance in the Stormwater Design Guide Chapters 3 and 4.
- Please be diligent in inputting your SCMs so that MassDOT can take credit for the positive stormwater improvements as part of your project.



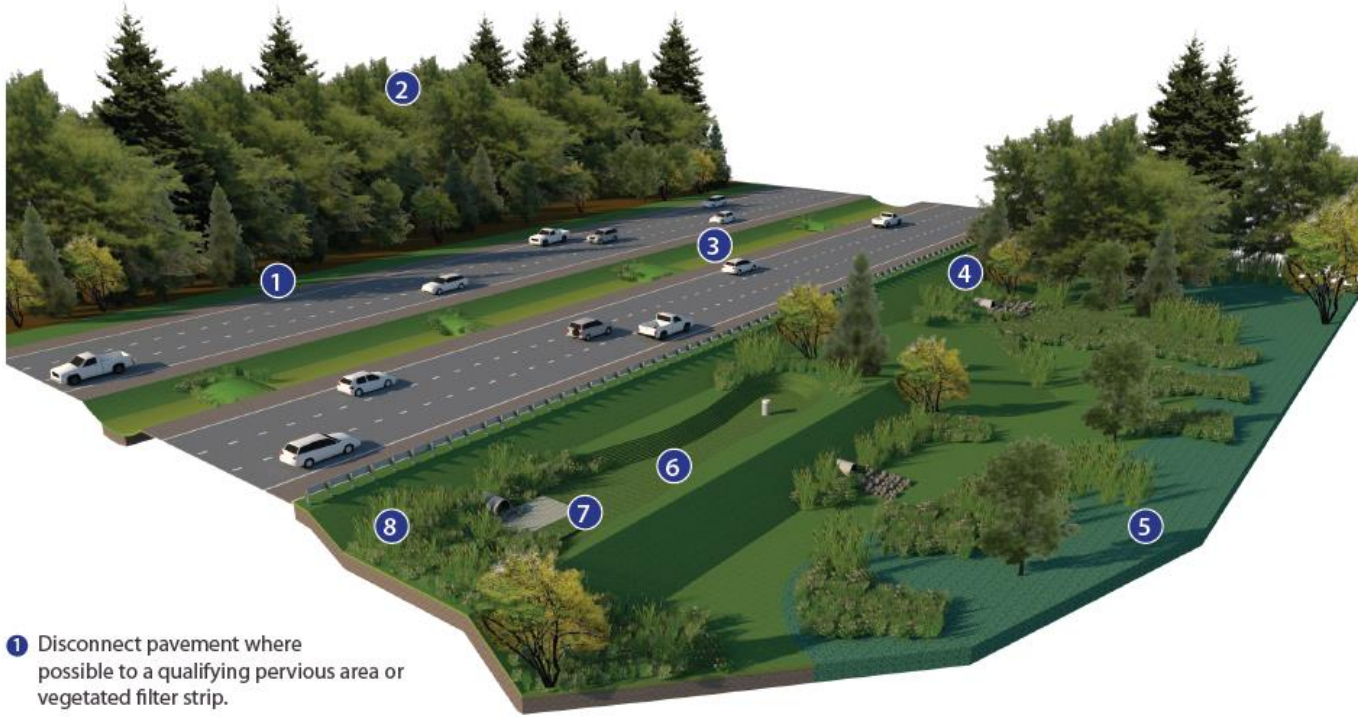
Highlights - Integrated Site Design



- Context, objectives, and design solutions are refined as project moves through design
- Design solutions are mix of LID and structural SCMs
- First, LID should be maximized throughout site, then structural SCMs are implemented

Highlights - Integrated Site Design

Examples in a Highway Setting



1. Disconnect pavement where possible to a qualifying pervious area or vegetated filter strip.
2. Preserve existing trees and vegetation.
3. Grade in vegetated linear practices with check dams to slow flow and promote infiltration.
4. Relocate outfall to vegetated upland area if not able to direct runoff to a stormwater control measure.
5. Protect wetland resource areas.
6. Locate treatment in existing open areas where possible.
7. Maximize treatment capacity with infiltration measures, such as an infiltration basin with sediment forebay.
8. Establish and maintain vegetation to stabilize roadway embankment.

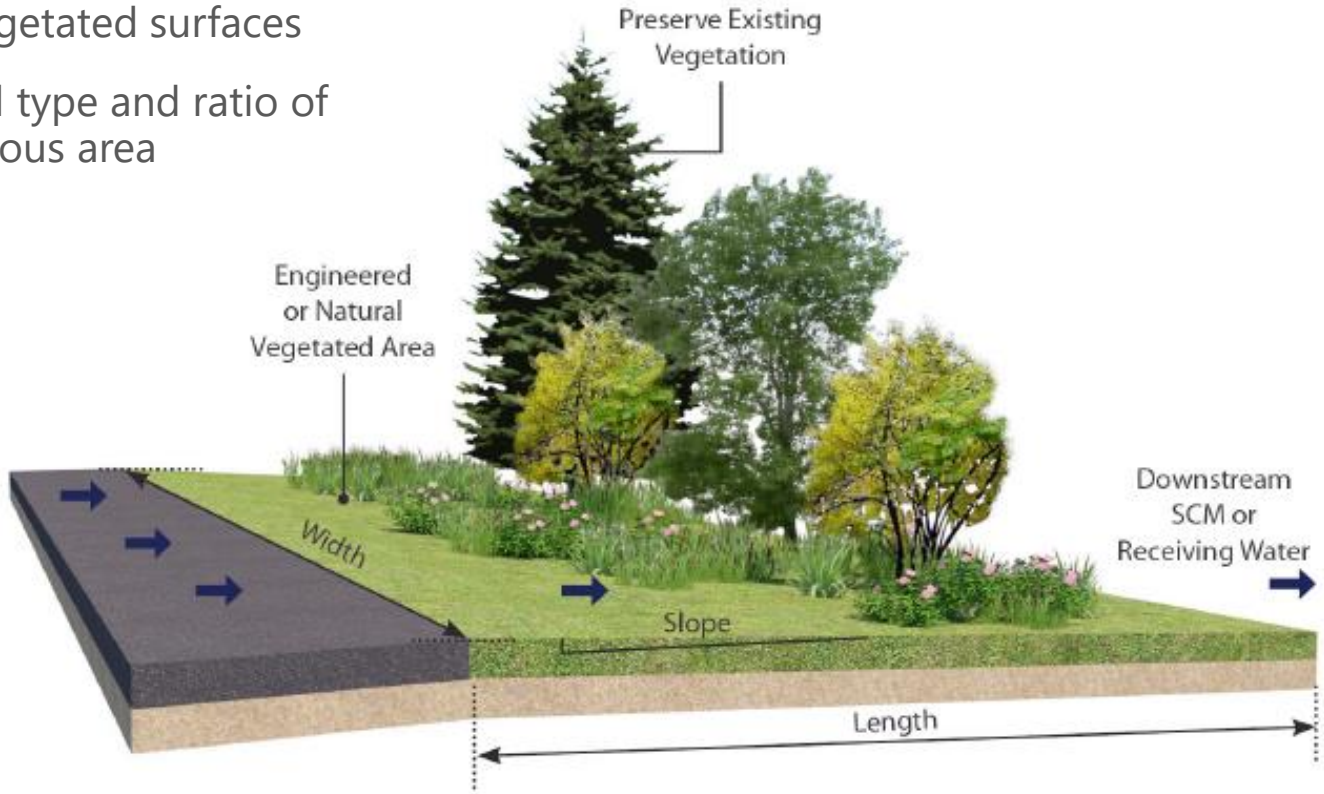
Highlights - Integrated Site Design

Examples in an Urban Setting

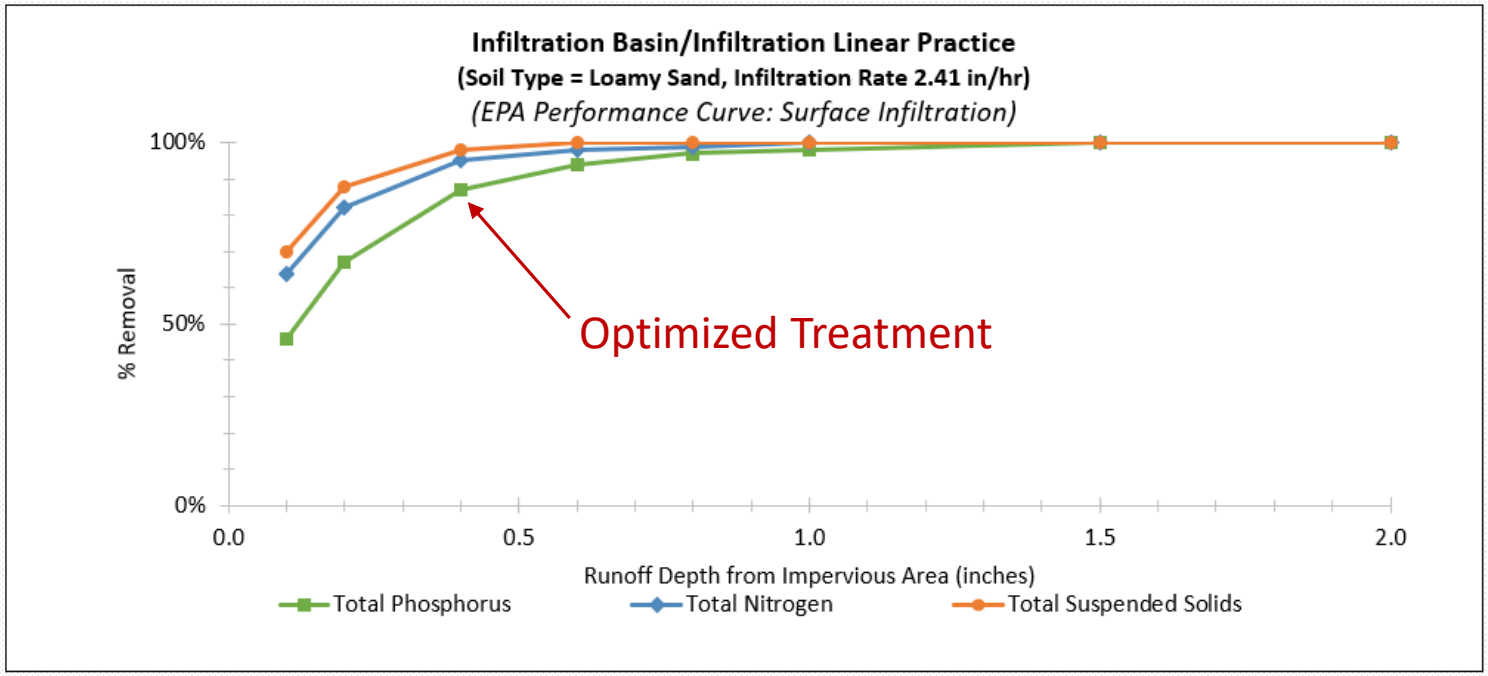
1. Preserve existing street trees.
2. Minimize impervious cover using pervious median.
3. Integrate stormwater treatment into traffic calming and pedestrian safety features, such as bioretention curb bump-outs.
4. Disconnect pavement where possible, such as grading sidewalks to drain to a qualifying pervious area or vegetated filter strip.
5. Include underdrain in porous pavement sidewalks where site conditions preclude infiltration.
6. Locate curb inlets to direct gutter flow into bioretention planter.
7. Select small-footprint SCMs like leaching basins to overcome space constraints.

Highlights – Pavement Disconnection

- Take credit for natural treatment through existing vegetated surfaces
- Credit based on soil type and ratio of impervious to pervious area



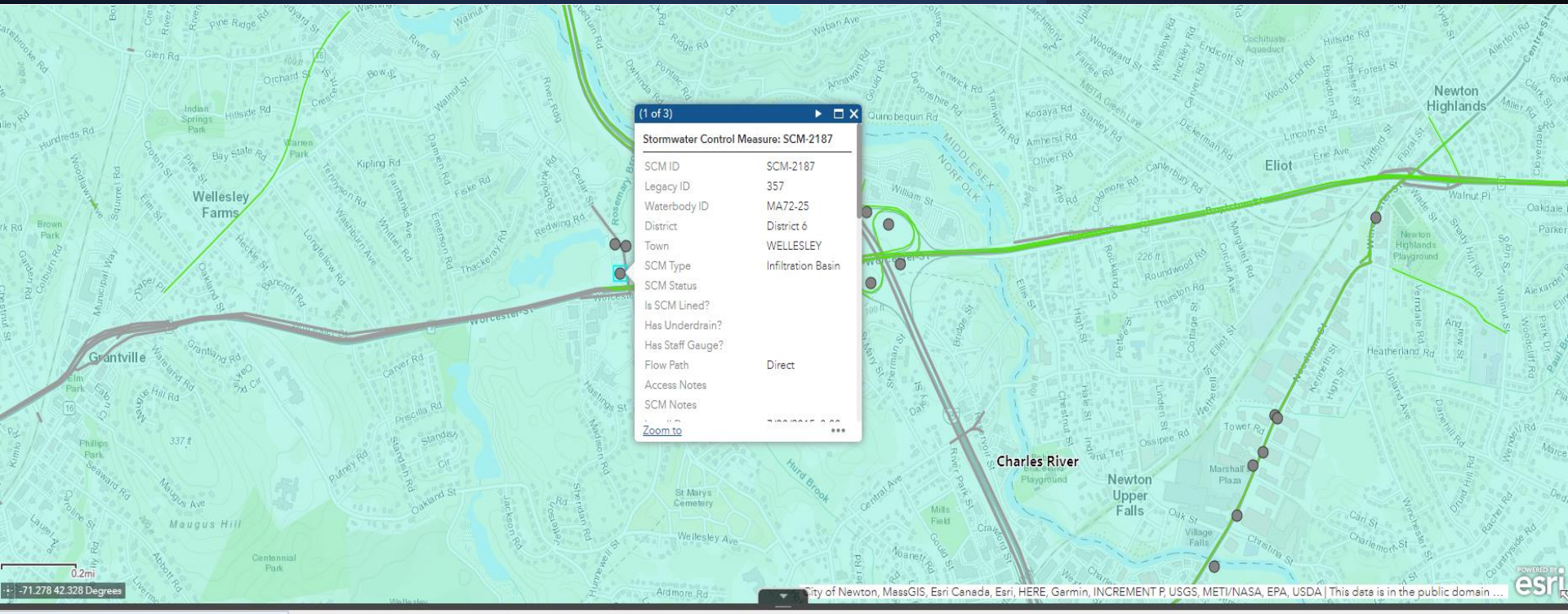
Highlights – Estimates Pollutant Removal per SCM



Infiltration Basin/Infiltration Linear Practice
(Soil Type = Loamy Sand, Infiltration Rate = 2.41 in/hr) SCM Performance Values

	Runoff Depth from Impervious Area (inches)							
	0.1	0.2	0.4	0.6	0.8	1.0	1.5	2.0
Total Phosphorus	46%	67%	87%	94%	97%	98%	100%	100%
Total Nitrogen	64%	82%	95%	98%	99%	100%	100%	100%
Total Suspended Solids	70%	88%	98%	100%	100%	100%	100%	100%

Highlights – Collects SCM Design Data

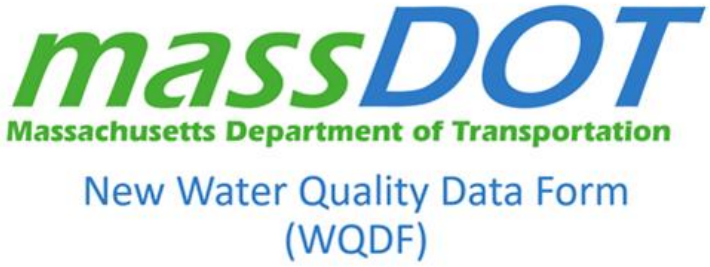


Existing Stormwater Control Measure (SCM) [MassDOT, 2021] | MassDOT Highway Projects [MassDOT, 2021] | MassDOT Requirement Watersheds [MassDOT, 2021]

Options | Filter by map extent | Zoom to | Clear selection | Refresh

SCM ID	Waterbody ID	District	Town	SCM Type	Install Date	Owned By	MAINTBY	Treatment Depth (in)	IC Watershed to SCM (Acres)	Project Name	Project Number	Source of Data	Effective IC Reduced by SCM (Acres)	P Reduced by SCM (Lbs/Year)	Submitted By	Date Submitted	MassDOT Reviewer	Revie
SCM-2187	MA72-25	District 6	WELLESLEY	Infiltration Basin	7/30/2015, 8:00 PM	MassDOT	MassDOT	0.70	0.58	Rt. 9 at Rosemary Brook	606,282.13	IWP Consultant	0.00	1.78	J. White, BSC	6/30/2015	M. Kotowski	7/14/2

Takeaways



- Facilitates stormwater treatment in MassDOT programmed projects
- Promotes Integrated Site Design
- Promotes Low Impact Development, including pavement disconnection
- Provides project-specific treatment requirements to meet Impaired Waters Program goals
- Calculates treatment based on latest available pollutant reduction data
- Allows user to optimize treatment through use of SCM Water Quality Curves
- Allows MassDOT to track treatment and plan for upcoming projects

Thank you!

Lauren Caputo | lcaputo@vhb.com

The WQDF can currently be found on MassDOT's website at:

MassDOT Environmental Services - Stormwater Management Website:
https://www.mass.gov/service-details/stormwater-management-massdot-environmental-services