Greening Springfield:

Springfield's Green Infrastructure Technical Guide

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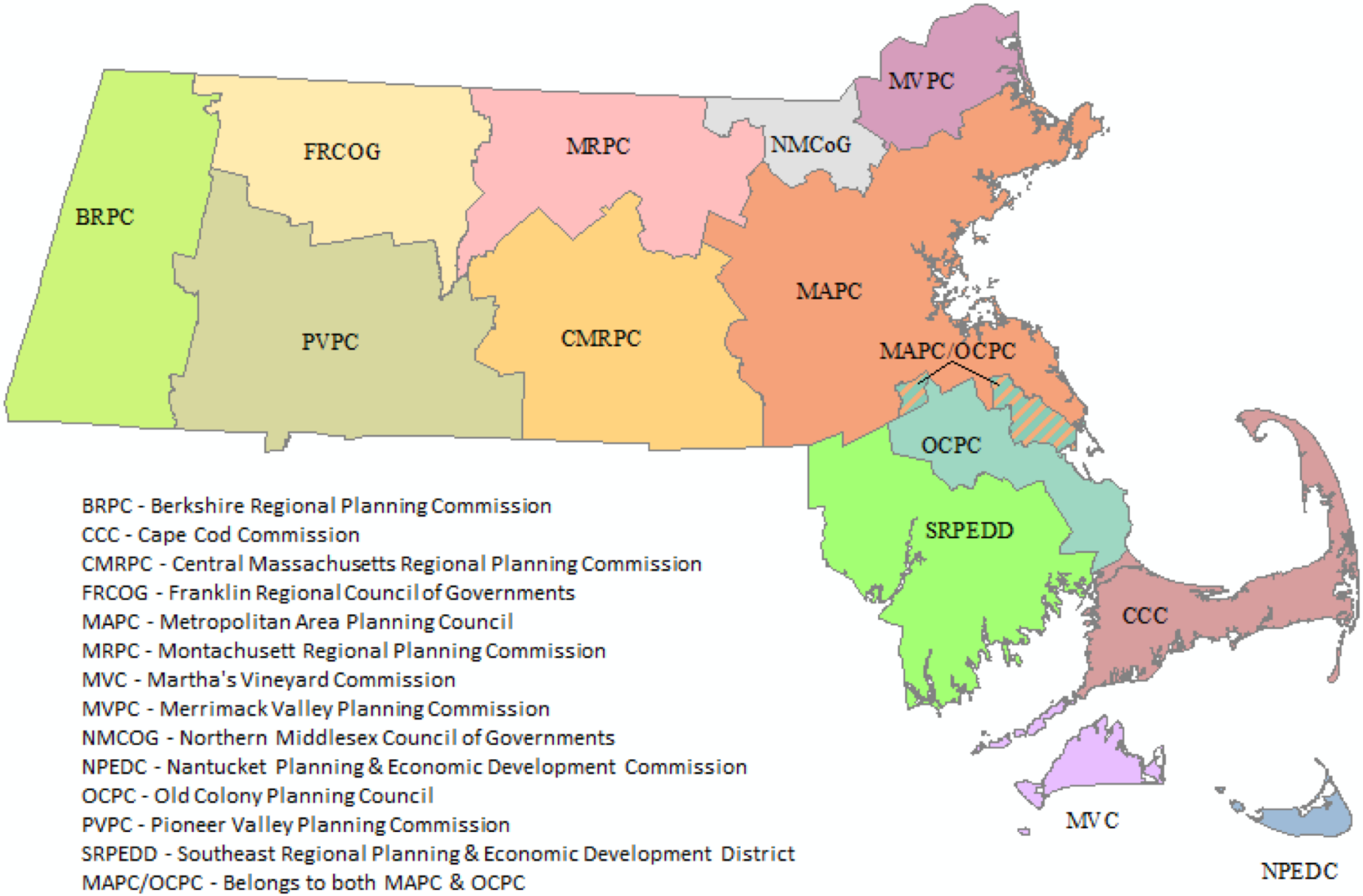
Regional Drivers for Green Infrastructure

Pioneer Valley Region

- A diverse mix of forested “hilltowns”, fertile agricultural valley communities, and highly urbanized post-industrial cities sited along the Connecticut River
- 604,304 residents
  - Largest city: Springfield (153,705)
  - Smallest town: Tolland (485)

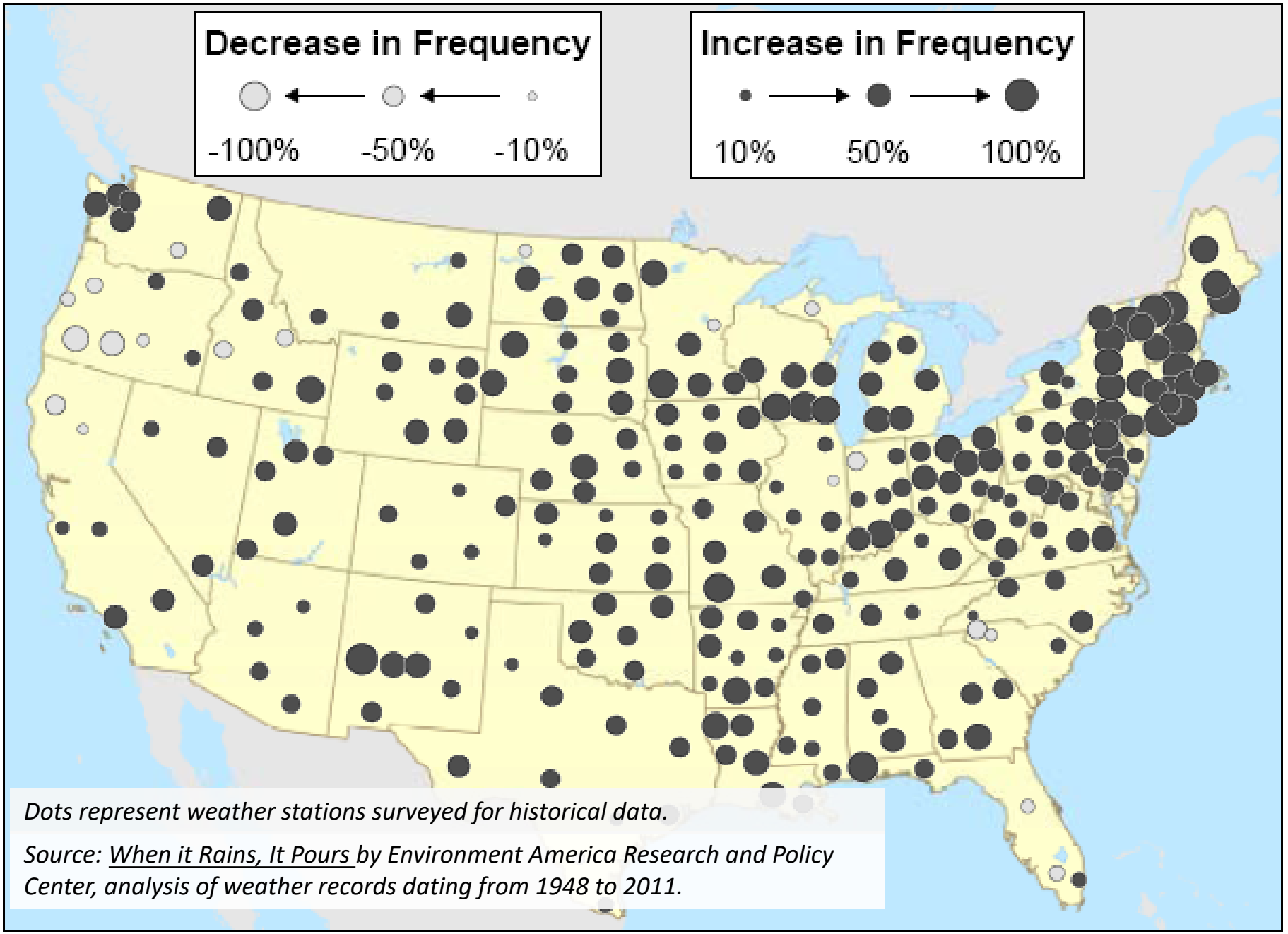
Top Photo: Yankee Magazine;
Bottom: PeterPereira.com

Regional Planning Agencies



BRPC - Berkshire Regional Planning Commission
CCC - Cape Cod Commission
CMRPC - Central Massachusetts Regional Planning Commission
FRCOG - Franklin Regional Council of Governments
MAPC - Metropolitan Area Planning Council
MRPC - Montachusett Regional Planning Commission
MVC - Martha's Vineyard Commission
MVPC - Merrimack Valley Planning Commission
NMCOG - Northern Middlesex Council of Governments
NPEDC - Nantucket Planning & Economic Development Commission
OCPC - Old Colony Planning Council
PVPC - Pioneer Valley Planning Commission
SRPEDD - Southeast Regional Planning & Economic Development District
MAPC/OCPC - Belongs to both MAPC & OCPC

Regional Concern: Increase in Storm Size & Frequency

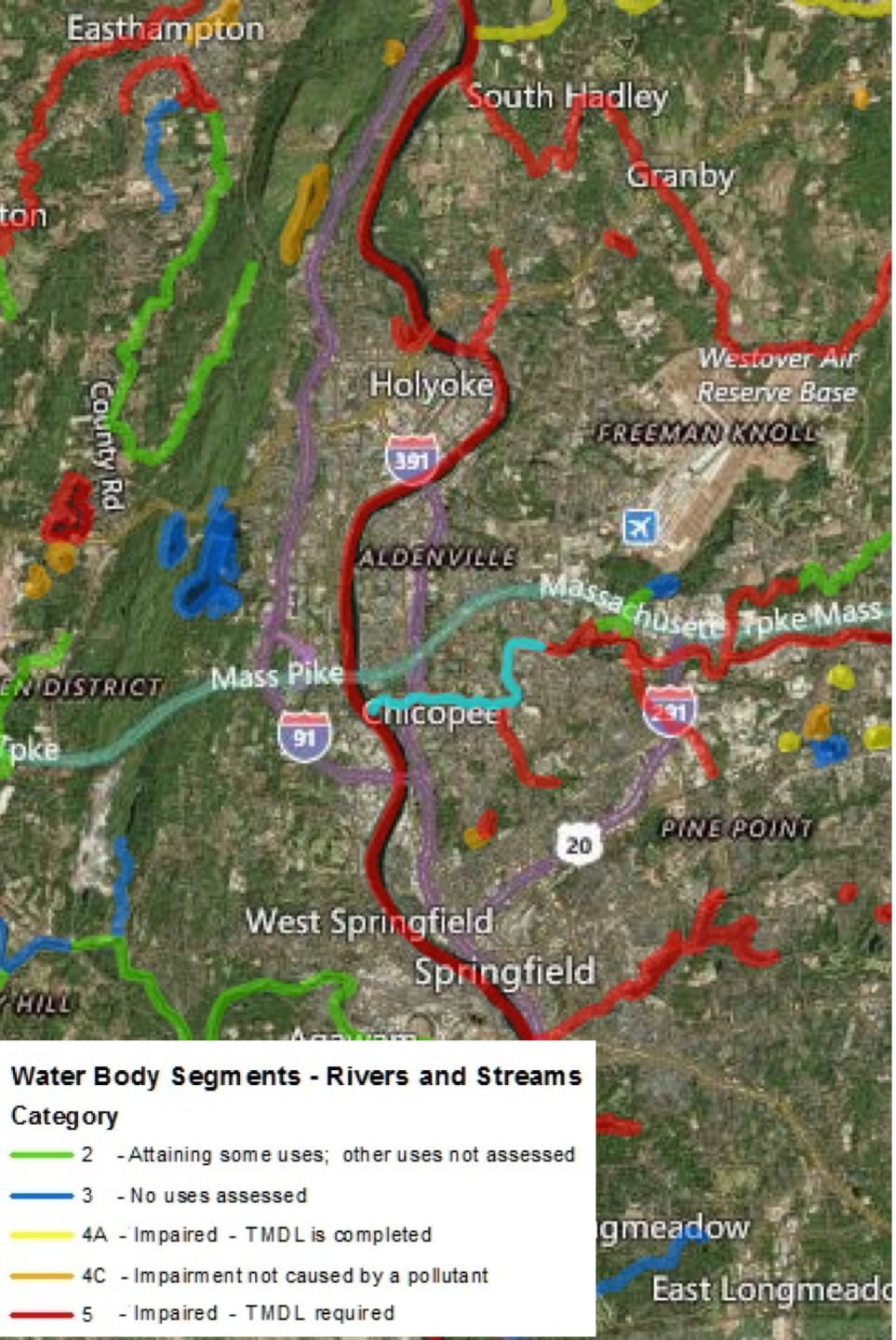


Dots represent weather stations surveyed for historical data.

Source: When it Rains, It Pours by Environment America Research and Policy Center, analysis of weather records dating from 1948 to 2011.

Regional Concern: Localized Flooding

Bottom right: Congress Street, Springfield 2018. All other images posted to MassLive during May 23 , 2014 storm event. Top left: Mosier Street, Holyoke. Top right: King Street, Northampton. Bottom left: Prospect Street, Chicopee.

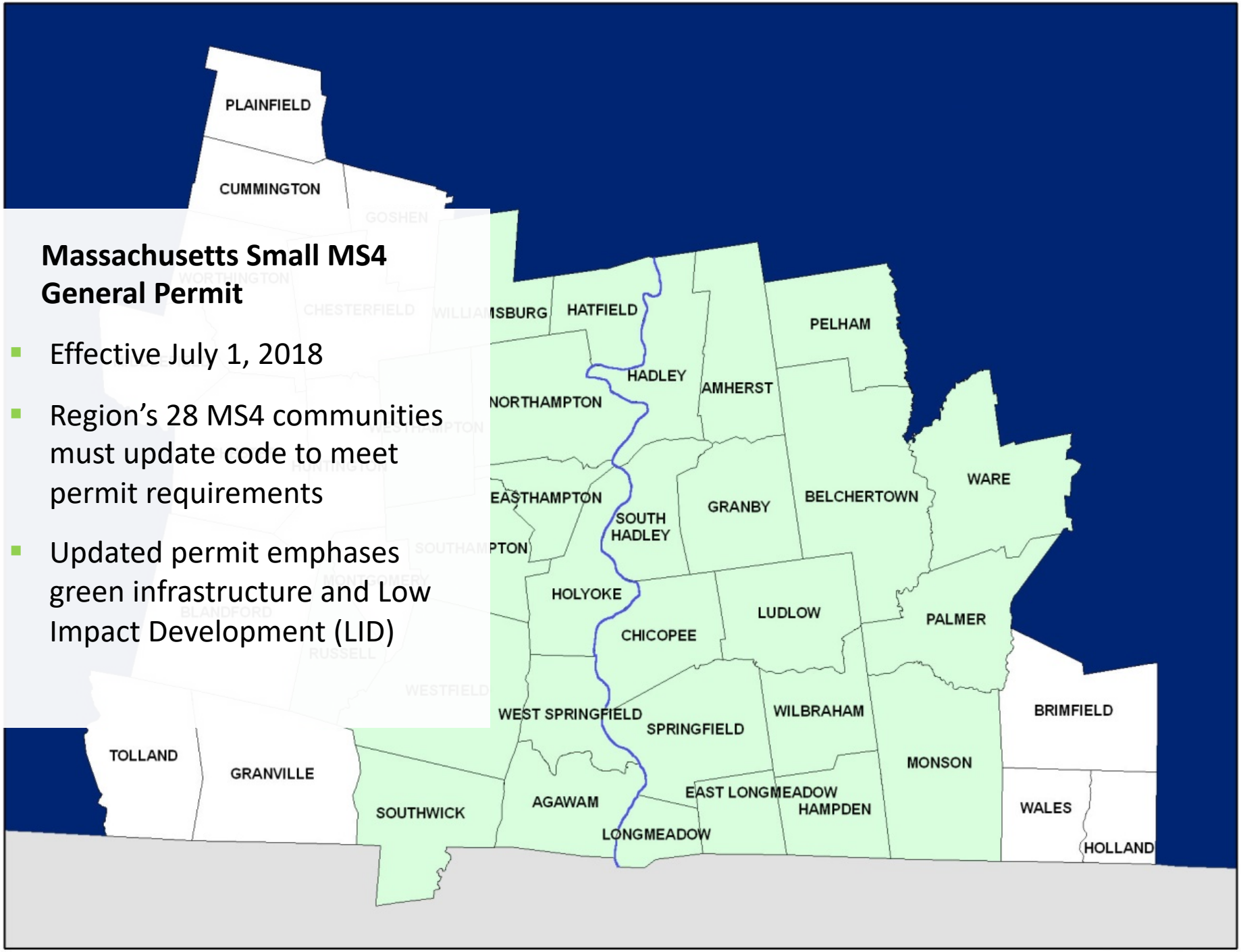


Regional Concern: Water Quality

- Connecticut River and Chicopee River cannot support primary contact recreation due to *E. coli* impairments from wet weather discharges
- Holyoke, Chicopee, and Springfield are all under administrative orders from EPA to remediate CSOs

Massachusetts Small MS4 General Permit

- Effective July 1, 2018
- Region's 28 MS4 communities must update code to meet permit requirements
- Updated permit emphases green infrastructure and Low Impact Development (LID)



Strong, Healthy, and Just
Springfield's Climate Action & Resilience Plan

- Objective: reduce GHG by 80% by 2050; increase community resilience with a focus on climate justice
- Top cross-cutting strategy of the plan: Develop a context-sensitive GI design manual
  - guides design by location
  - establishes criteria to ensure consideration of GI strategies from the onset of planning and design

Co-Benefits of Green Infrastructure

- "...for every full vegetated acre of green infrastructure, there will be total annual benefits of $8,522 in reducing energy demand, $166 in reduced CO2 emissions, $1,044 in improved air quality, and $4,725 in increased property value (Center for Clean Air Policy, 2011, p. iv).

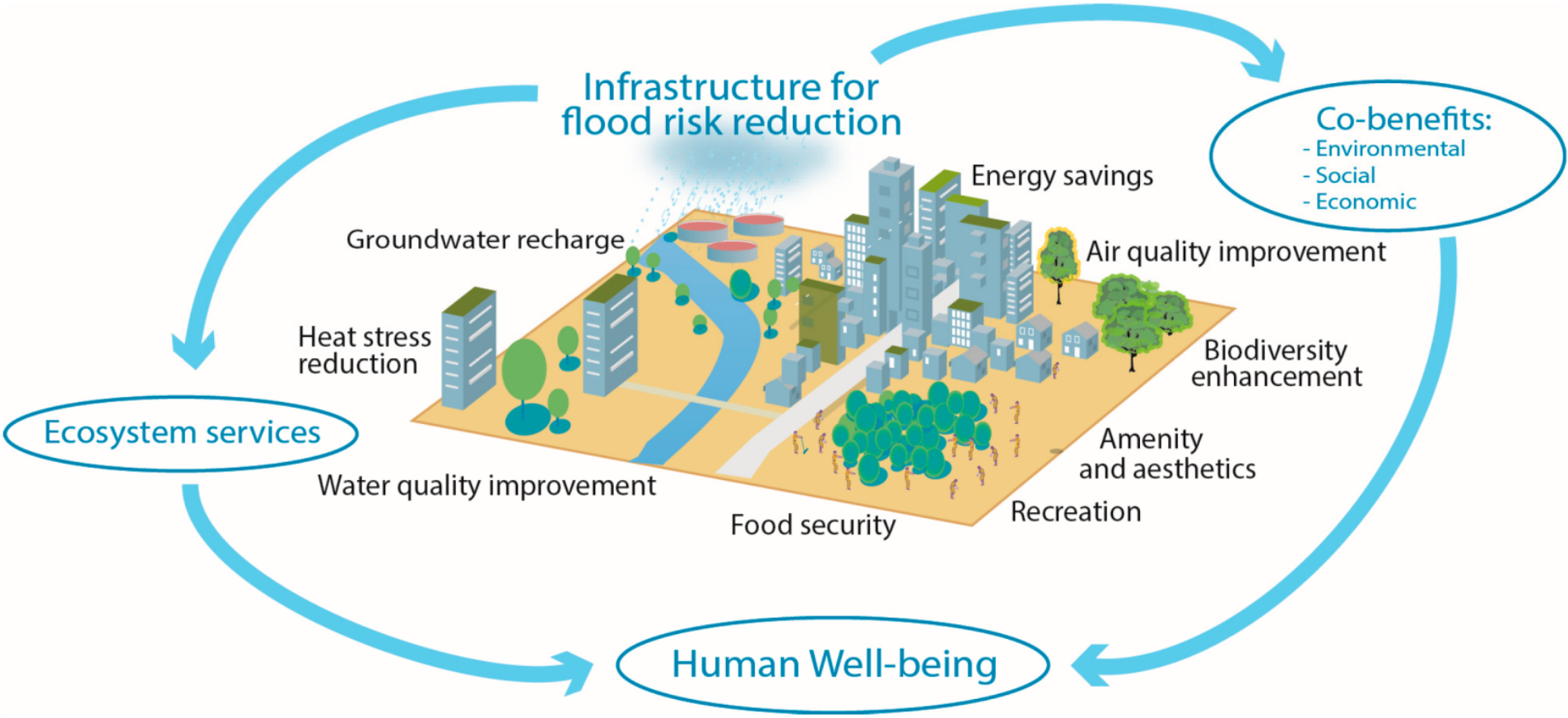
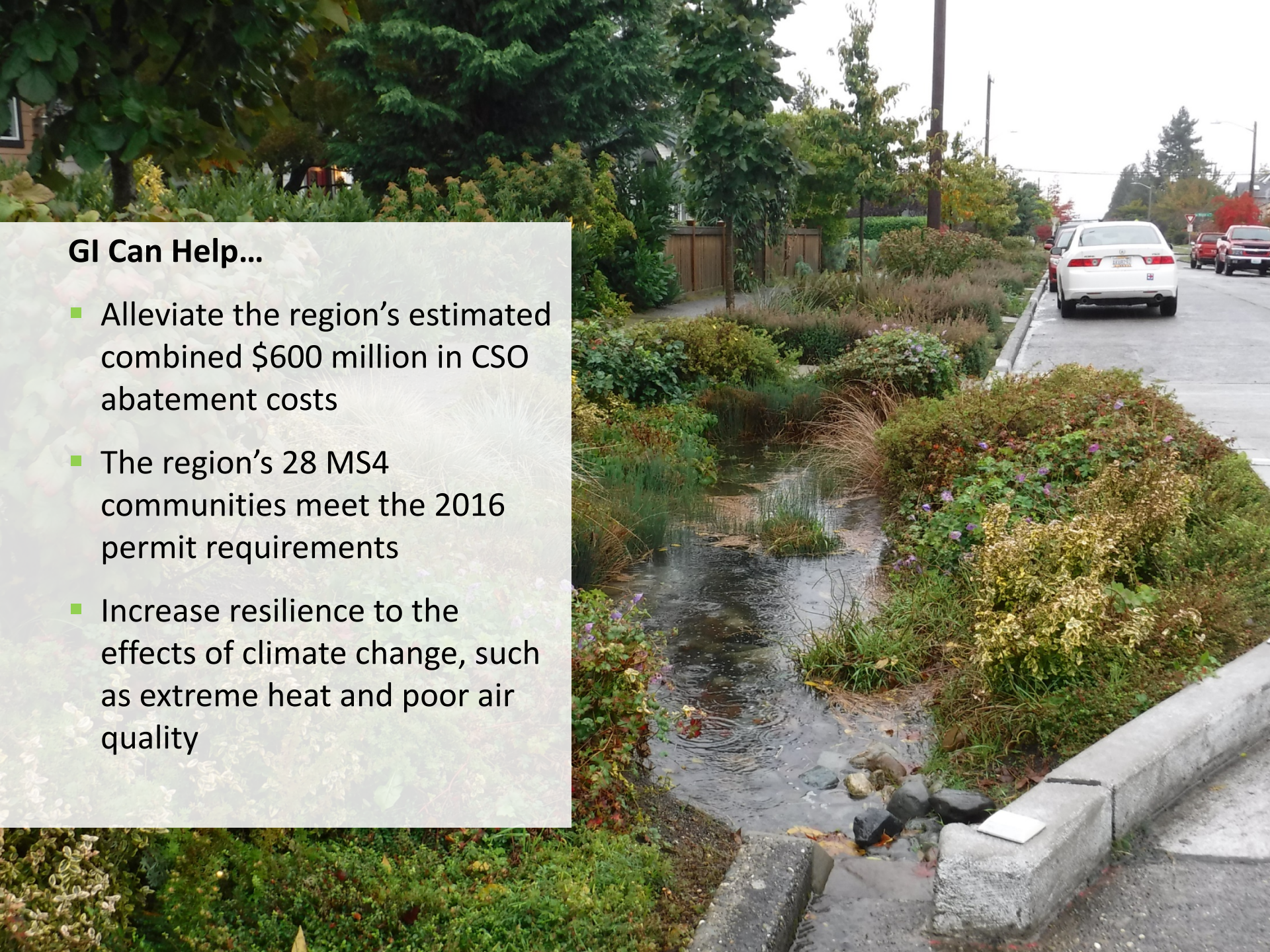


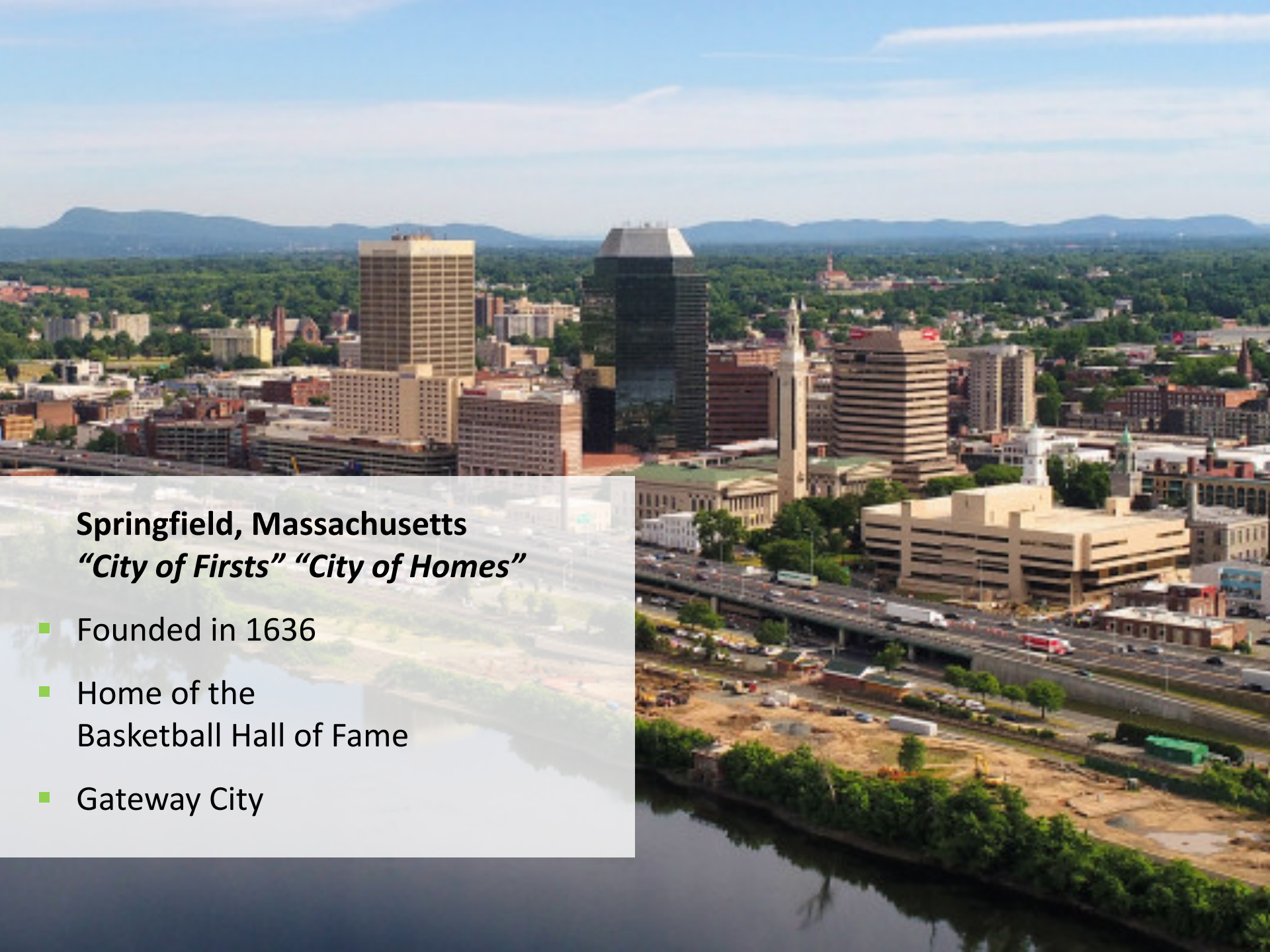
Image: Alves, A.; Patiño Gómez, J.; Vojinovic, Z.; Sánchez, A.; Weesakul, S. Combining Co-Benefits and Stakeholders Perceptions into Green Infrastructure Selection for Flood Risk Reduction. *Environments* 2018, *5*, 29.



GI Can Help…

- Alleviate the region's estimated combined $600 million in CSO abatement costs
- The region's 28 MS4 communities meet the 2016 permit requirements
- Increase resilience to the effects of climate change, such as extreme heat and poor air quality

Springfield Context and DPW Perspective



Springfield, Massachusetts
"City of Firsts" "City of Homes"

- Founded in 1636
- Home of the Basketball Hall of Fame
- Gateway City

Union Station

CRRC

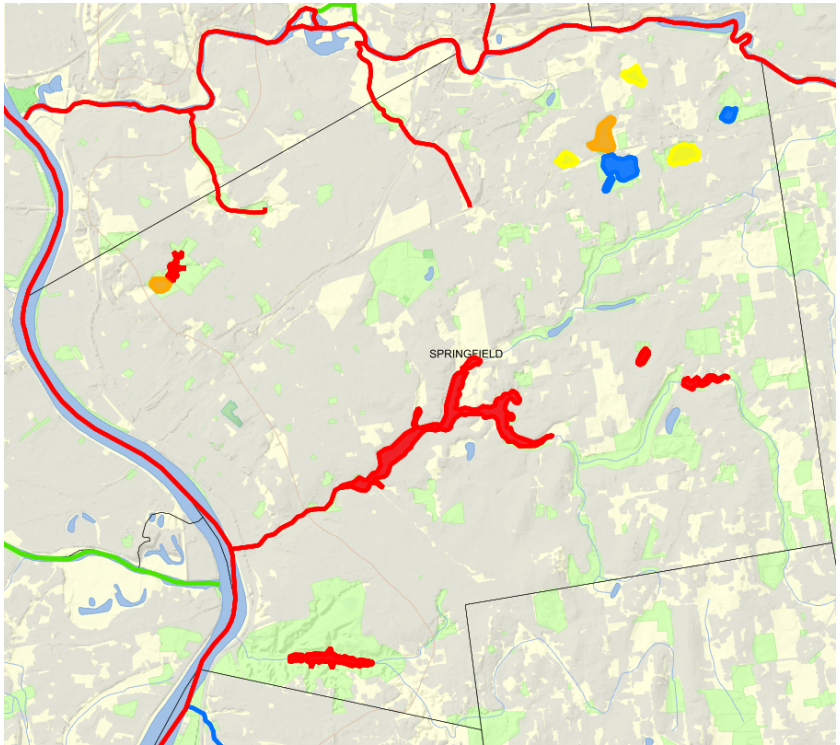
Revitalizing Springfield


MGM Springfield

Pope Francis

Springfield's Water Resources

- Stormwater system:
  - Combined sewer & MS4
- Waterbodies impaired for phosphorus & bacteria
- Phosphorus TMDL for lakes & ponds



DPW Perspective:
Why Promote Green Infrastructure?

Recent Efforts to Promote Green Infrastructure in Springfield

- Demonstration rain gardens
- Currently designing a green street at the 'X' intersection
- Updating Springfield stormwater regulations

Renaissance School

Camp Wilder Park

Why develop the Springfield Green Infrastructure Guide?

- Provide a vetted set of green infrastructure solutions for municipal right-of-way projects
- Provide a baseline for projects that can be used to improve stormwater quality and reduce peak flows
- Simplify the review process
- Give project proponents a range of options for meeting stormwater management requirements

Considerations

- Green infrastructure needs to be context sensitive, practicable, and manageable
- Understand our abilities to manage the requirements, staffing, work load, private sector pushback
- Inspection and Maintenance are important components that need to be included as well. Need to understand who will be doing it and how it will be done.

Green Infrastructure Technical Guide

Developing the Green Infrastructure Guide

Springfield's Green Infrastructure Working Group

Engineering—Planning—Natural Resources—Parks

Forestry—Water & Sewer Commission

1) Who is the guide for?
2) How will they use it?
3) What practices do we want to encourage?
4) What technical guidance should we provide?

Public Roads

Public Facilities

Applications

Private Projects

Trees

Permeable Pavement

Practices

Infiltration

Bioretention

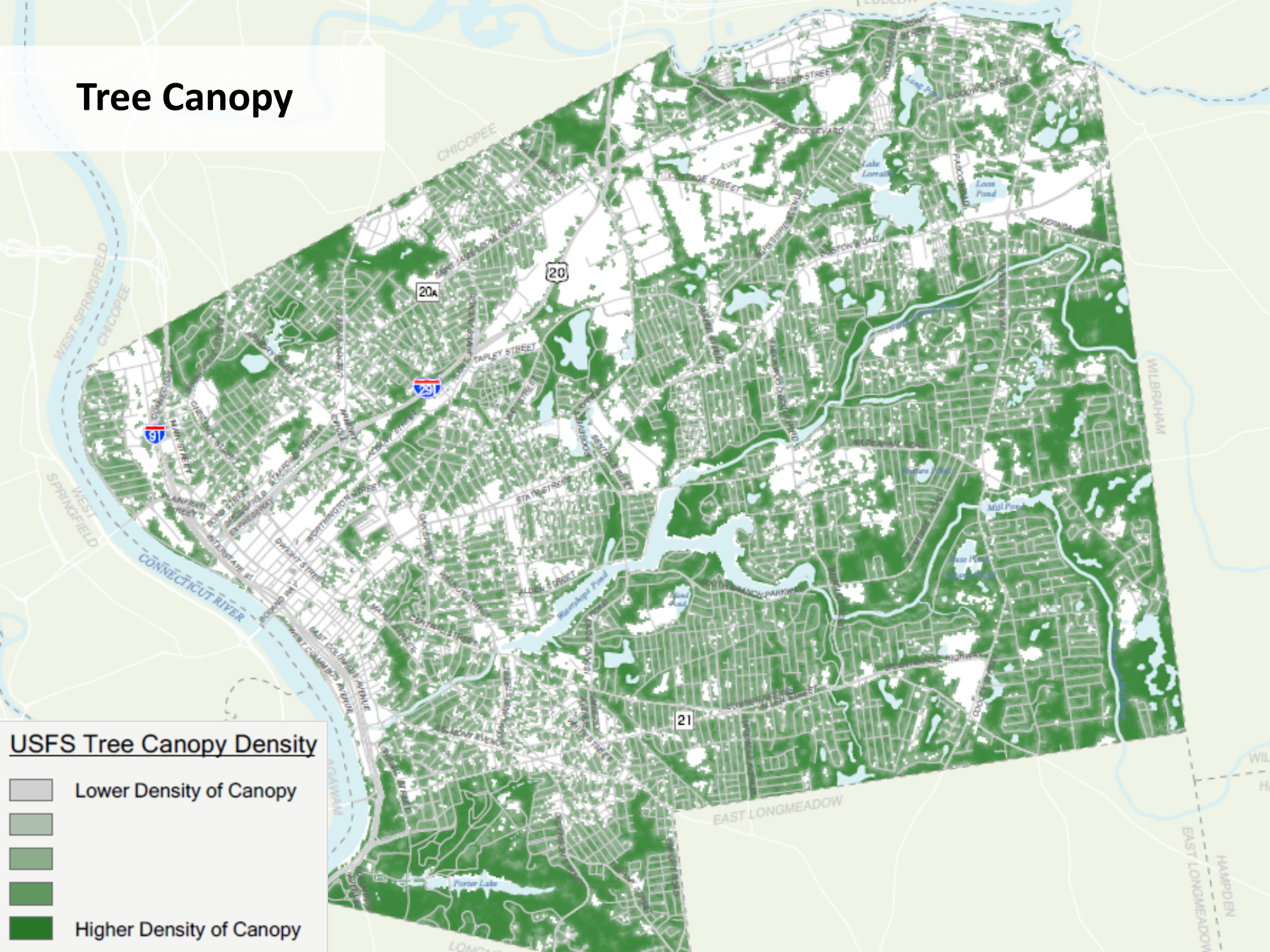
Green and Blue Roofs

Green Infrastructure Selection Tool

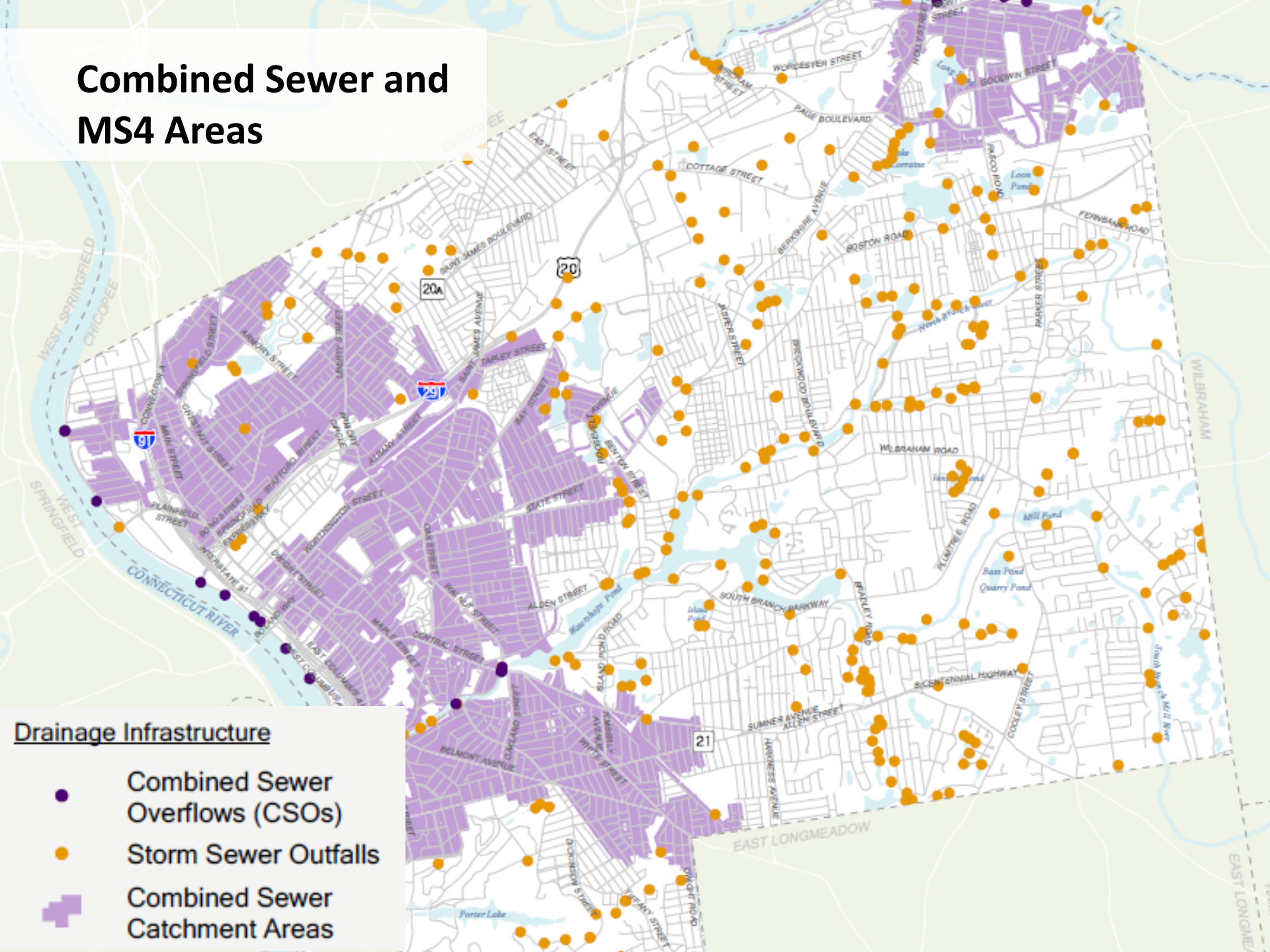
- Spreadsheet tool for use during project planning/concept design
- Allows designers to identify GI practices for specific applications and site conditions
- Specifies the City's preferred practices for certain conditions

Green Infrastructure Options	*Depth to Bedrock*			*Known Soil Contamination*		STORM SEWER		URBAN FOREST *General Area Canopy Coverage*	
	BE-1 (< 3 ft)	BE-2 (3-5 ft)	BE-3 (> 5 ft)	Yes	No	Separate (MS4)	Combined	High	Low
Street Trees	x		x		x	x	x	x	xP
Trees with Sand-Based Structural Soil			x		x	x	x	x	xP
Trees in Soil Cell			x		x		x	x	xP
Bioretention Planter with Underdrain		x	x		x	x	x	x	x
Biofilter Planter (Filtration Only Bioretention) - Impervious Bottom	x	x	x	x	x	x	x	x	x
Bioretention Curb Extension/Bump-out with Underdrain		x	x		x	x	x	x	x
Biofilter Curb Extension/Bump-out (Filtration Only Bioretention) - Impervious Bottom	x	x	x	x	x	x	x	x	x
Enhanced Grass Swale		x	x		x	x	x	x	x
Enhanced Grass Swale with Check Dam		x	x		x	x	x	x	x
Bioswale with Underdrain		x	x		x	x	x	x	x
Permeable Paving with underdrain - Pervious Concrete		x	x		x	x	x	x	x
Permeable Paving with underdrain & Impermeable Liner - Pervious Concrete		x	x	x	x	x	x	x	x
Permeable Paving with underdrain - Porous Asphalt		x	x		x	x	x	x	x
Permeable Paving with underdrain & Impermeable Liner - Porous Asphalt		x	x	x	x	x	x	x	x
Permeable Paving with underdrain - Interlocking Precast Concrete Pavers		x	x		x	x	x	x	x
Permeable Paving with underdrain & Impermeable Liner - Interlocking Precast Concrete Pavers		x	x	x	x	x	x	x	x

Tree Canopy

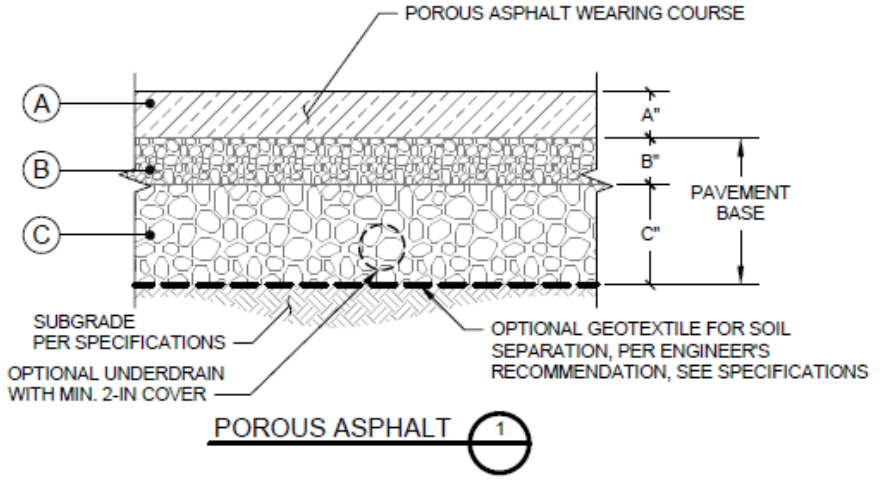

USFS Tree Canopy Density
Lower Density of Canopy
Higher Density of Canopy
CHICOPEE
WEST SPRINGFIELD
CONNECTICUT RIVER
EAST LONGMEADOW
WILBRAHAM
20
20A
21
91
291
STATE STREET
ALLEN STREET
TAPLEY STREET
Watershops Pond
Porter Lake
Lake Lorraine
Loon Pond
Mill Pond

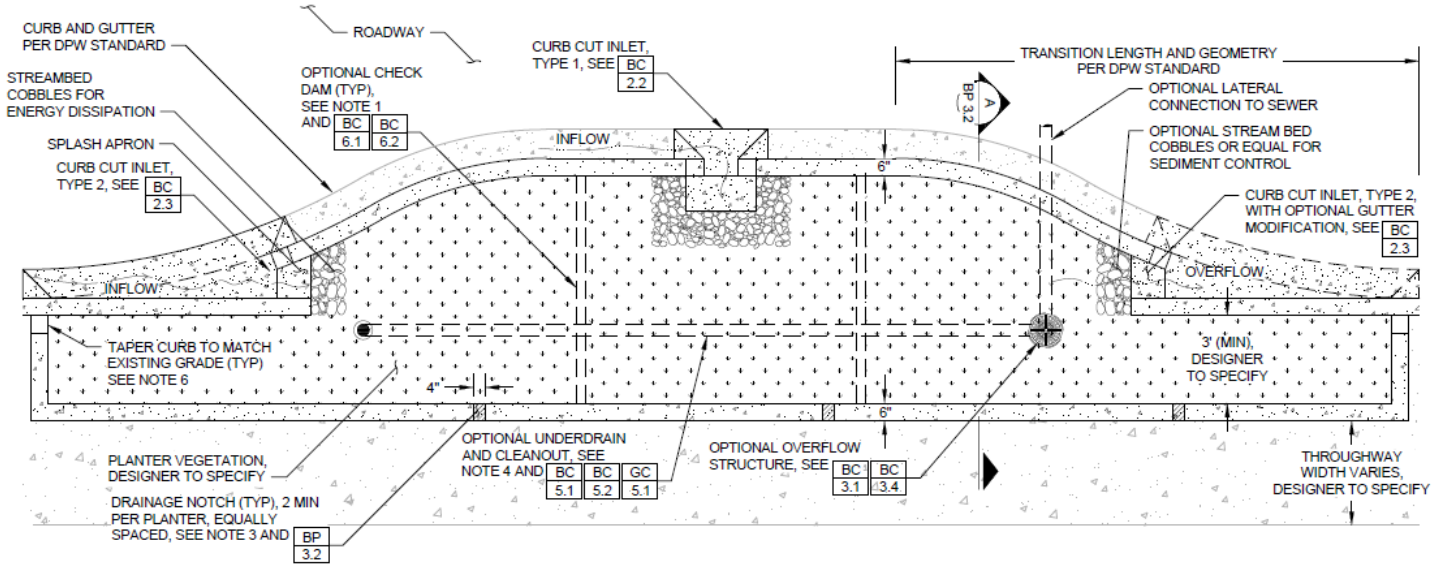
Combined Sewer and MS4 Areas



Typical Details

- Adapted from 2016 San Francisco Green Infrastructure Typical Details
- Suggested typical configurations—not standard
- Includes guidelines for tailoring designs to a project's site conditions and performance goals





Next Steps

- Draft GI Technical Guide is in progress
- Anticipating public release in summer 2019


Questions?

Acknowledgments

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