EBC Inaugural Stormwater Summit

EBC

Welcome

Ann Gisinger

Executive Director & President

Environmental Business Council of New England

Thank you to our Program Sponsors

Beveridge & Diamond

vhb

Jacobs

Nitsch Engineering

EBC

Program Planning Team

Summit Chairs:

Andrea Braga, *Jacobs*

Jennifer Johnson, *Nitsch Engineering*

Summit Planning Team Members:

Jill Baumbach, *VHB*

Peter Durning, *Burns & Levinson LLP*

Eric Klein, *Beveridge & Diamond PC*

Summit Introduction

Andrea Braga

Vice Chair, EBC Water Resources Committee

Summit Co-Chair

Principal Engineer, New England Water & Environmental Group Leader

Jacobs

EBC

Environmental Business Council of New England

Energy Environment Economy

Keynote Address

Moderator: Jennifer Johnson

Summit Co-Chair

Director of Resilience Planning & Design, Associate
Nitsch Engineering

Keynote Address

Curtis Spalding

Former Regional Administrator, U.S. EPA Region One

Senior Consultant, GZA GeoEnvironmental, Inc.

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Lessons Learned from New England Municipalities Implementing Stormwater Utilities

Moderator: Jill Baumbach

Member, Summit Planning Team

Water Resources Engineer, VHB

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Energy Environment Economy

Lessons Learned from New England Municipalities Implementing Stormwater Utilities

Gretchen Young

Environmental Project Manager
City of Dover, NH

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Energy Environment Economy

Lessons Learned from New England Municipalities Implementing Stormwater Utilities

Hillary Waite

Stormwater Manager, Stormwater Division
Town of Braintree, MA

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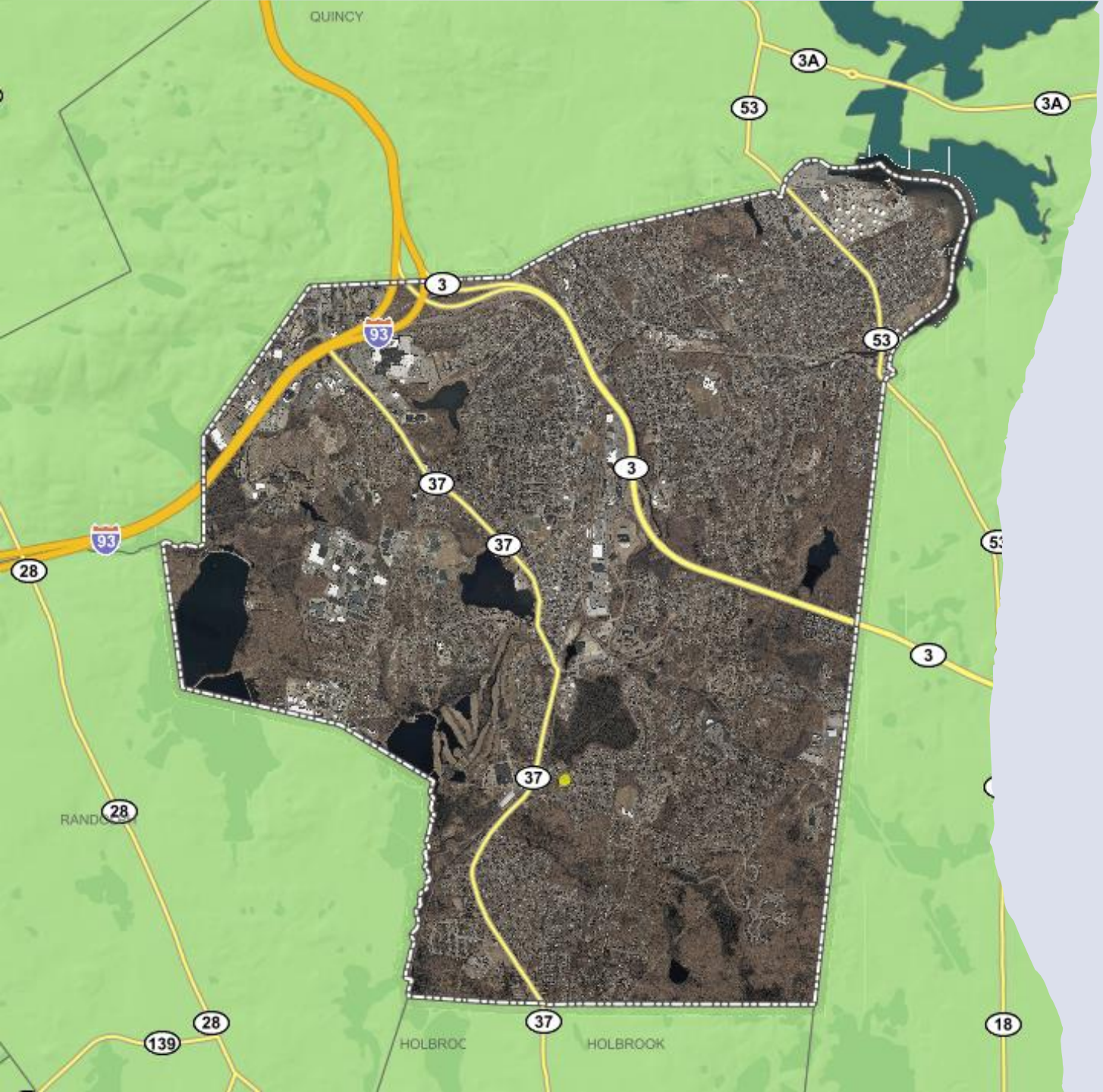


Braintree

- Pop. 39,000
- Mayor-Council
- Suburban, industrial, commercial

Timeline of Stormwater Utility Adoption

Jan. 2017
DPW re-org approved; SW utility proposed

March 2018
SW utility submitted with FY19 budget

April 2018
SW utility presented to Rules and Ordinances Committee

May 2018
Utility presented to Ways and Means Committee

May 29, 2018
SW Utility Unanimously approved by Town Council

July 2018
First SW Utility bills are mailed

October 2018
Staff of SW Division are hired

2018-22
Stormwater rates increase per approved ordinance

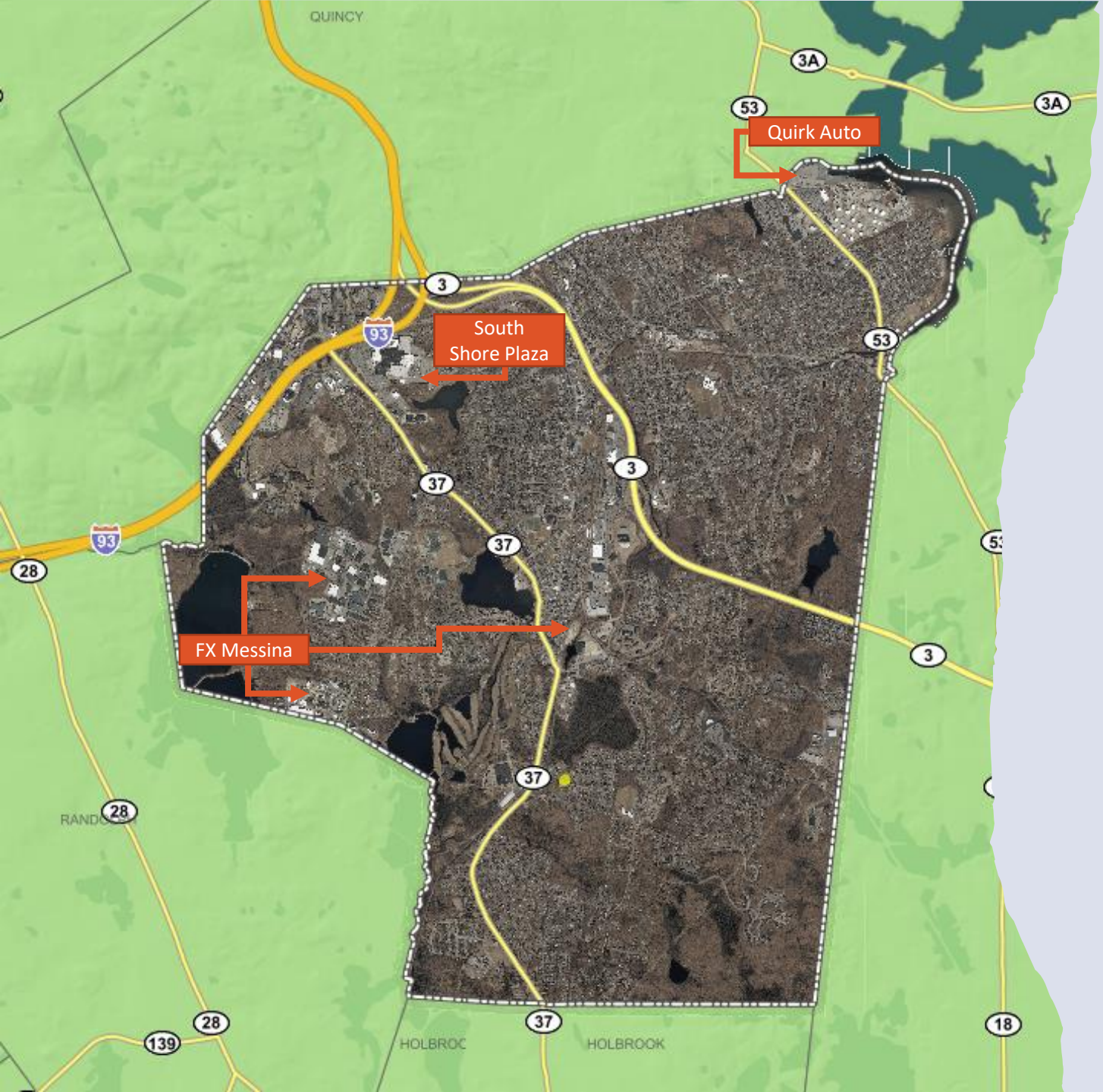
Revenue: Stormwater Utility Fee

Based on Equivalent Residential Units (ERUs)

1 ERU = 2,780 square feet = $60/year

1-3 Family Properties { 1 ERU

4+ Family, Commercial, Industrial & Tax Exempt {
- Total square footage of impervious area is divided by 2,780 to find the ERU value
- Cap of 116.7 ERUs ($7,002) per parcel



Revenue:
Stormwater Utility Fee

Impervious Area =
68,554,800 square feet

24,660 ERUs × $60 =
$1,479,600

Expenses

Operating	12 staff
	Engineering consultants
	Rehab of existing system
Capital	IDDE per MS4 permit
	Fleet replacement
	Large-scale construction

Challenges & Next steps

Billing:

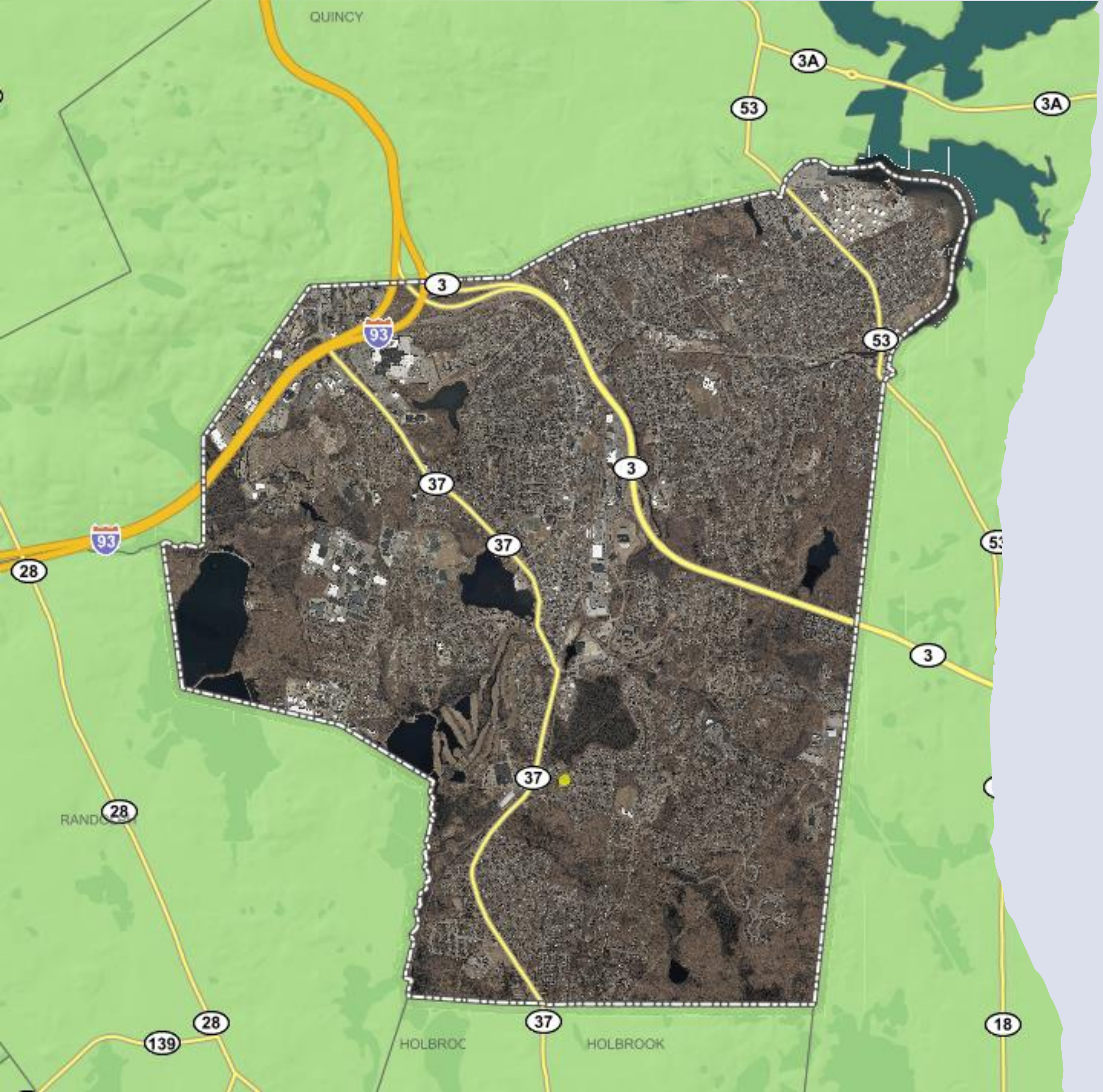
- Accounts linked to water meters; Imperfect information
- GIS-based program to assist with IA measurement
- Data cleanup

Programs:

- IDDE (time sensitive)
- Drainage master plan

Public outreach and impact

- Ongoing programs
- Larger, more visible projects


QUINCY
3A
53
3A
3
93
53
3
37
37
93
28
3
37
28
RANDO
28
139
HOLBROC
37
HOLBROOK
18

Thank you!

Lessons Learned from New England Municipalities Implementing Stormwater Utilities

Beth Rudolph

Town Manager / Town Engineer
Town of Winchester, MA

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Lessons Learned from New England Municipalities Implementing Stormwater Utilities

Moderator: Jennifer Johnson

Summit Co-Chair

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Taking Action – Stormwater Innovation for a Climate-Ready New England

Dawn Henning

Assistant City Engineer
City of New Haven, CT

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Environmental Business Council of New England
Energy Environment Economy

Building Resiliency using Green Infrastructure

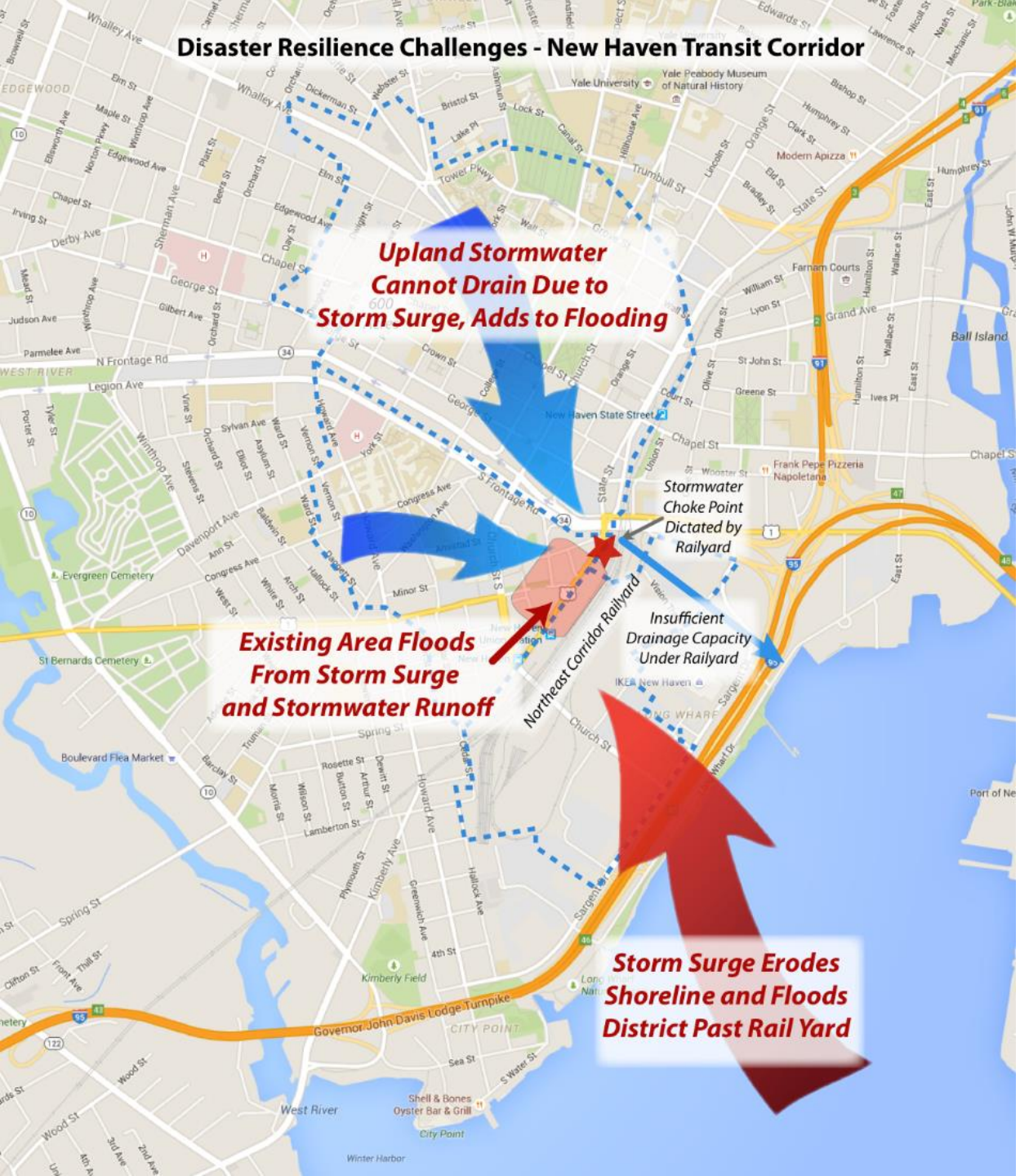
A Case Study of the City of New Haven

Dawn Henning, PE

Assistant City Engineer

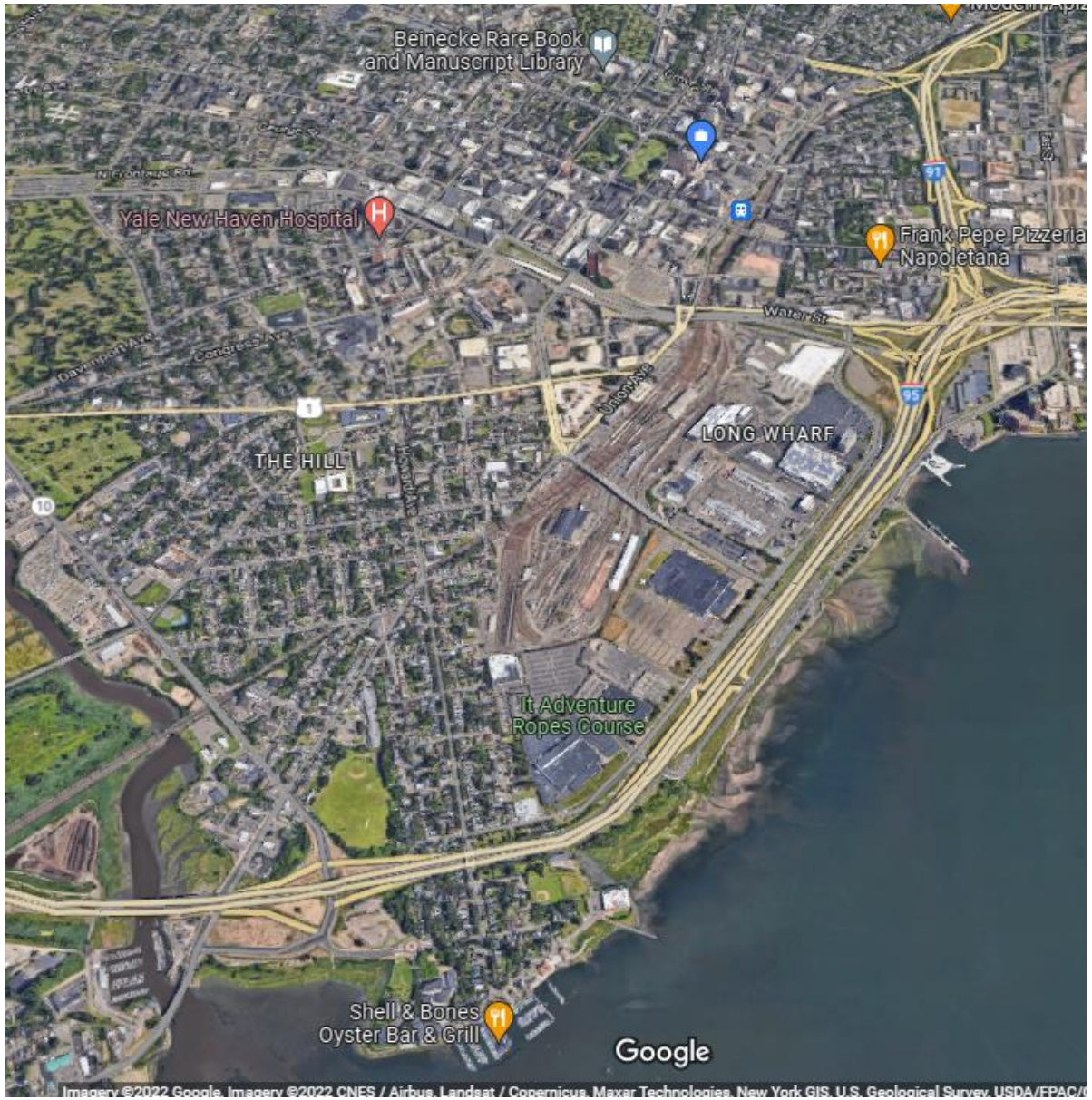
May 4, 2023


Hamden
New Haven
FAIR HAVEN
LONG WHARF
CarMax
Used car dealer
Fort Nathan Hale
EAST SHORE
New Haven
~130,000 pop
17 sq miles
Founded in 1638
Google

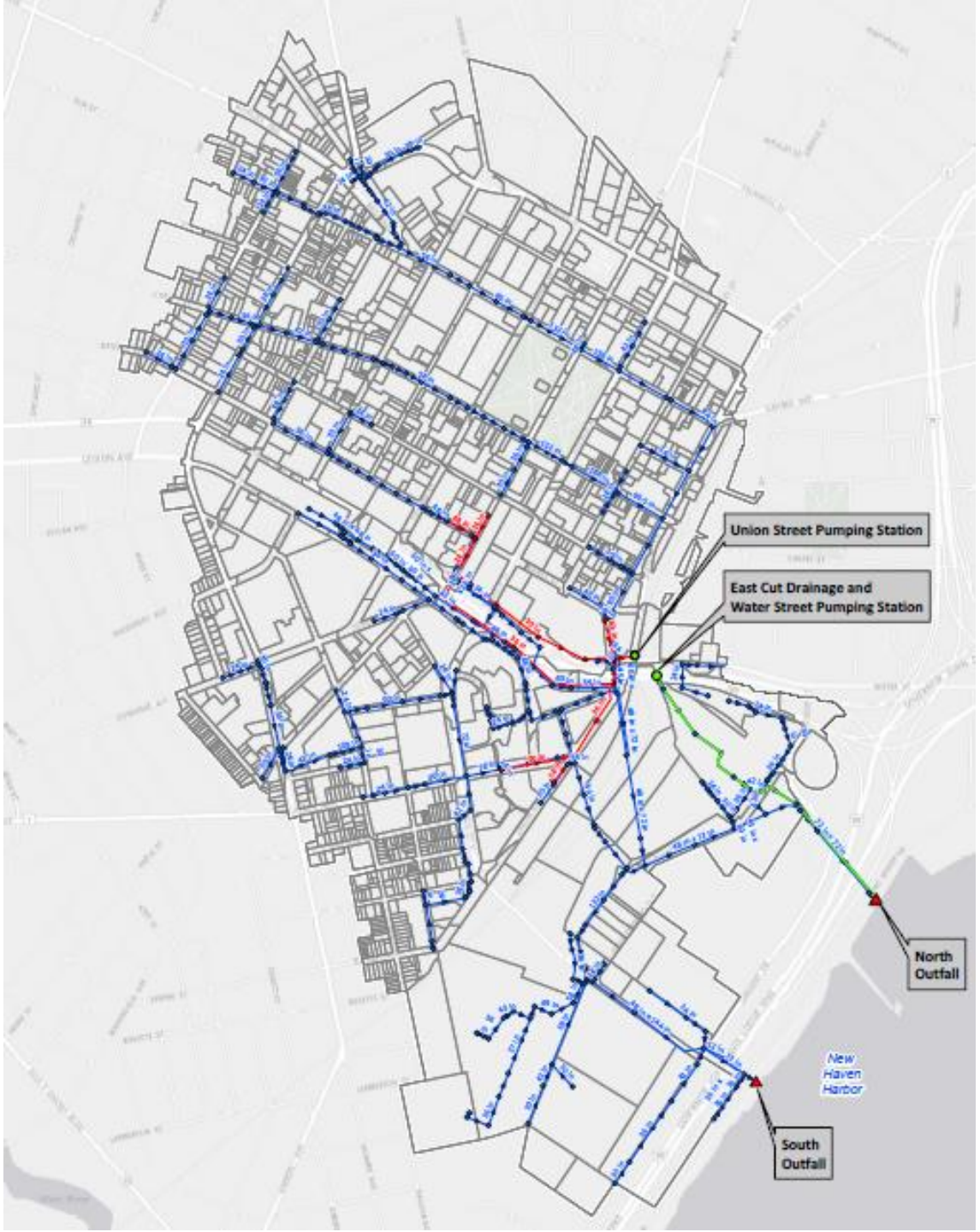

Disaster Resilience Challenges - New Haven Transit Corridor
Upland Stormwater Cannot Drain Due to Storm Surge, Adds to Flooding
Stormwater Choke Point Dictated by Railyard
Insufficient Drainage Capacity Under Railyard
Northeast Corridor Railyard
Existing Area Floods From Storm Surge and Stormwater Runoff
Storm Surge Erodes Shoreline and Floods District Past Rail Yard
Yale University
Yale Peabody Museum of Natural History
Modern Apizza
Farnam Courts
Ball Island
New Haven State Street
Frank Pepe Pizzeria Napoletana
Evergreen Cemetery
St Bernards Cemetery
IKEA New Haven
Boulevard Flea Market
Kimberly Field
CITY POINT
Governor John Davis Lodge Turnpike
Shell & Bones Oyster Bar & Grill
West River
City Point
Winter Harbor


Cart return
Please leave your cart here. Thanks


Approximate location of today's shoreline
Approximate location of the New Haven Rail Yard
6TH WARD
5TH WARD
4TH WARD
NEW HAVEN HARBOR
SOUTH PART
of City of
NEW HAVEN
TOWN OF NEWHAVEN.


Beinecke Rare Book and Manuscript Library
Yale New Haven Hospital
Frank Pepe Pizzeria Napoletana
THE HILL
LONG WHARF
It Adventure Ropes Course
Shell & Bones Oyster Bar & Grill
Google
Imagery ©2022 Google, Imagery ©2022 CNES / Airbus, Landsat / Copernicus, Maxar Technologies, New York GIS, U.S. Geological Survey, USDA/FPAC/

Strategies for Disaster Resilience - New Haven Transit Corridor



- $4M SWM Planning and Green Infrastructure Project (complete- CDBG-DR grant)
- $4M Long Wharf Living Shoreline (funding secured- state grant)
- $32M New 10-foot diameter drainage pipe and outfall (funding allocated- FEMA BRIC)
- $160M Flood Wall, Closure Gates, and Pump Station (funding allocated- ACOE)

- $4M SWM Planning and Green Infrastructure Project (complete- CDBG-DR grant)
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Bioswales

- Green infrastructure in the public right of way

Benefits of GI

- Reduces stormwater runoff
- Improves water quality
- Reduces flooding
- Reduces burden on old, aging infrastructure
- Increase efficiency of water supply
- Improved air quality
- Combat urban heat island effect
- Create habitat for wildlife
- Beautification of neighborhoods
- Green jobs

Partner with Community

- Urban Resources Initiative
- EMERGE, Inc.
- CFE/Save the Sound
- Universities including Yale FES and Quinnipiac

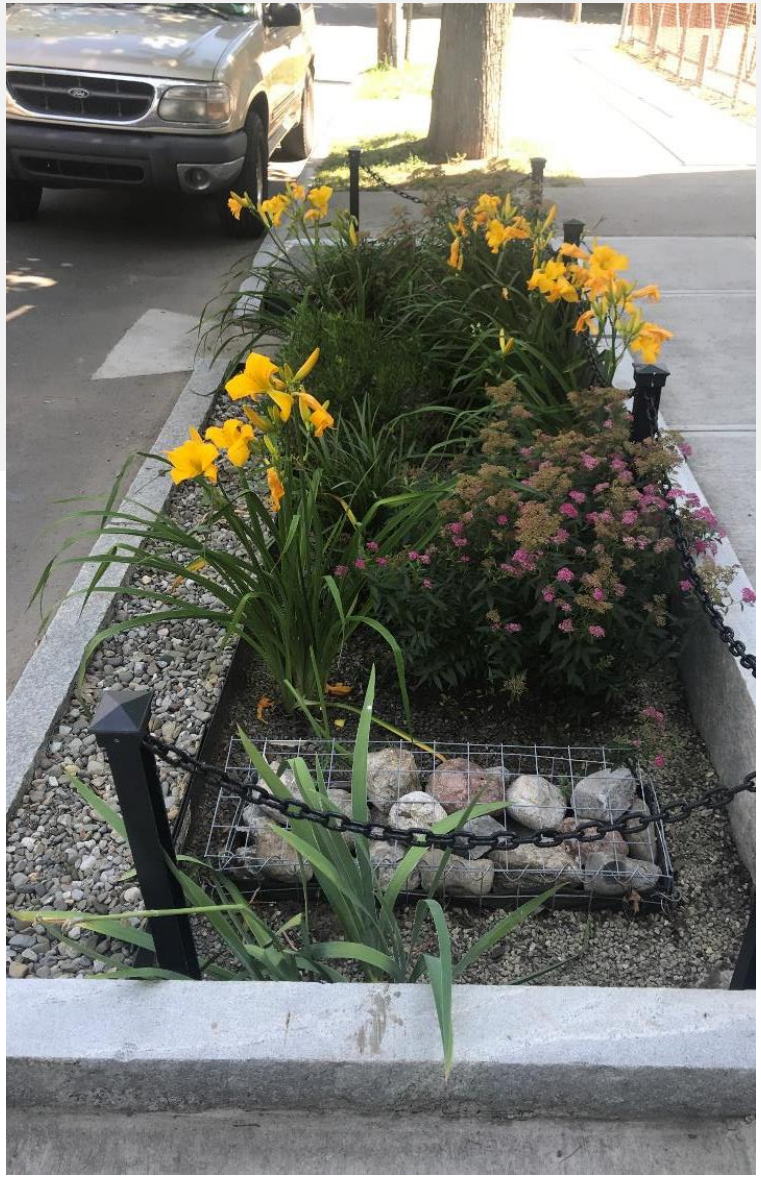
Good at things we are not!

Pilot Project

- NFWF grant funding
- Tested different materials and designs
- Researched performance
- Community Engagement and Input

Standard Design

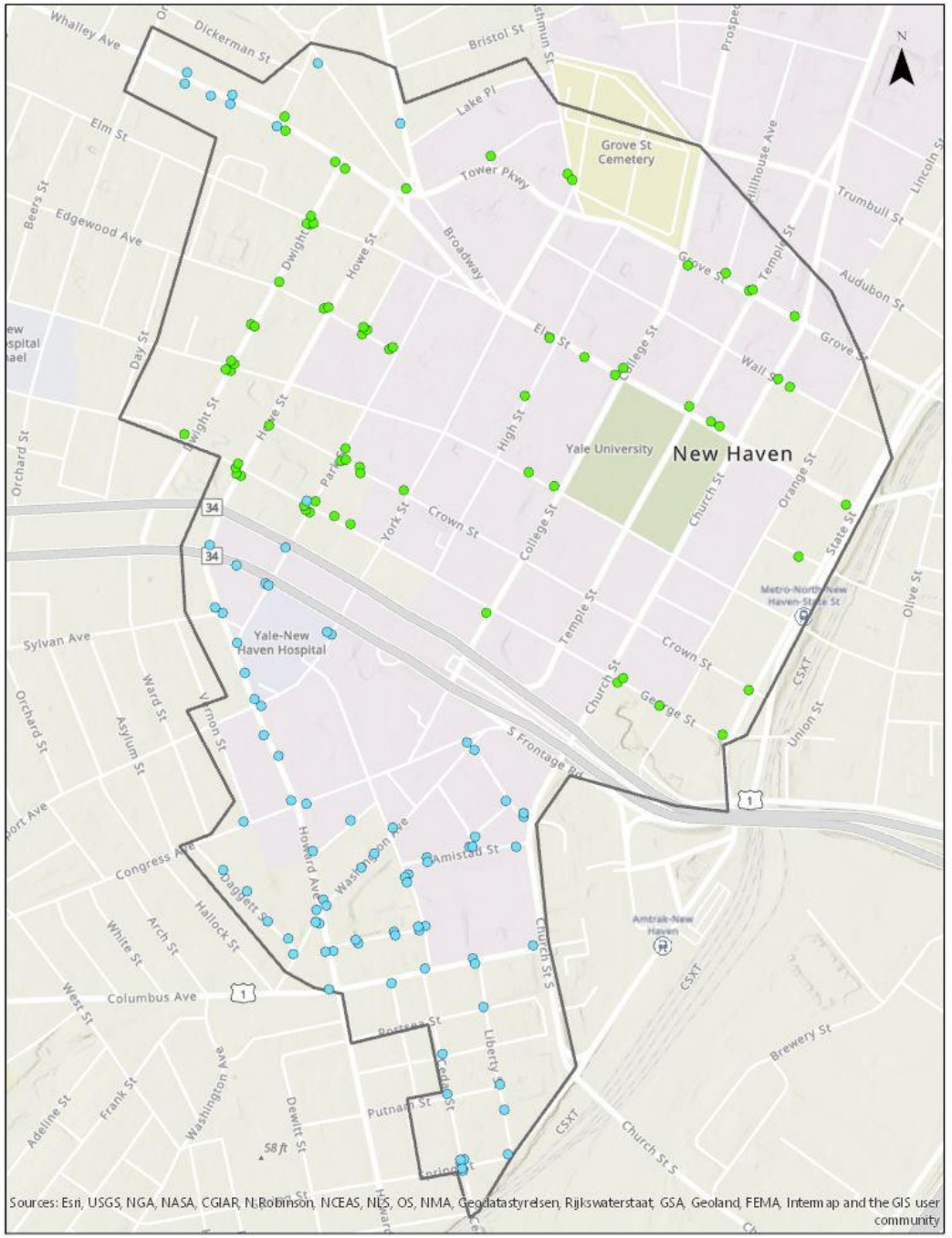
- Size: 15 feet by 5 feet
- Added Granite Curb Edging and changed fencing to add durability



Downtown Bioswale Project

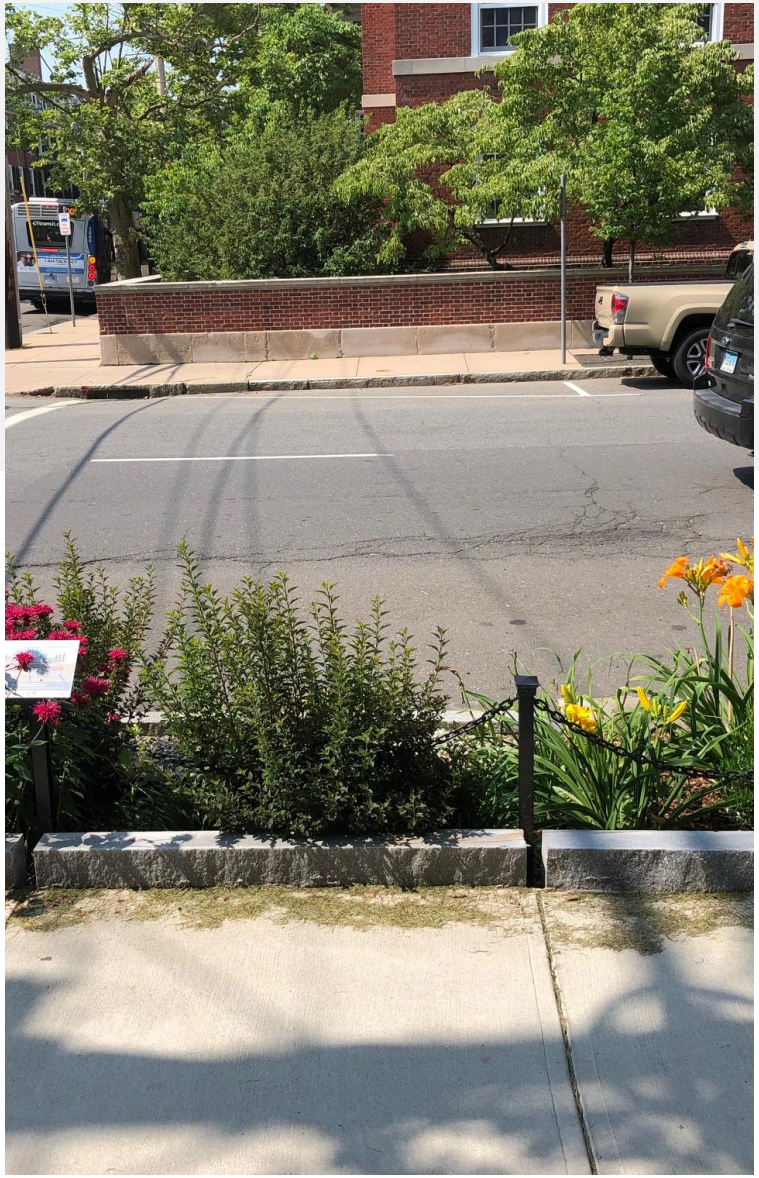
- 178 bioswales installed

CONNECTICUT
Department of Housing



Build Different

- Urban Resources Initiative/EMERGE Partnership
- Design for all skill levels
- Job skill training formally incarcerated persons
- Build community support



City of New Haven Bioswales- Coming Soon!

The City of New Haven has received a federal grant to build bioswales in the downtown area. Bioswales are part of a multifaceted approach to reducing flooding in the downtown area. Bioswales are scheduled to be installed on your street within the next month.

What is a "bioswale"?

A bioswale is an engineered planted area designed to capture and infiltrate stormwater from impervious surfaces. Right-of-way bioswales are located on sidewalks and capture stormwater as it flows down the street during rain events. Stormwater enters the bioswale through a curbcut, allowing the vegetation and soil to absorb the runoff.

What to expect during construction?

The construction of a bioswale takes about a week. First, a section of sidewalk is removed and the granite curb edging is installed. Then the site is excavated to a depth of five feet and backfilled with stone and soil. Finally, the site is planted.

What can you do to help?

Bioswales need your help! Although they are designed for minimal maintenance, they still need some help along the way, especially in the first few years after they are planted.

Water: Please consider watering the bioswale during hot and dry weather, and when the plants look like they are drooping from thirst.

Remove Leaves and Trash: Bioswales are designed to catch rainwater but they also catch other materials washed off the streets. Please consider pulling out trash so they remain but beautiful and functional and continue to infiltrate stormwater.

Weeding and Plant Health: If you recognize weeds in the bioswale, please feel free to remove them. If you are not confident you know the difference between the weeds and the bioswale plants, contact staff at the Urban Resources Initiative (URI). Also, if you notice that plants are dead or dying, please contact URI at (203) 432-6189.

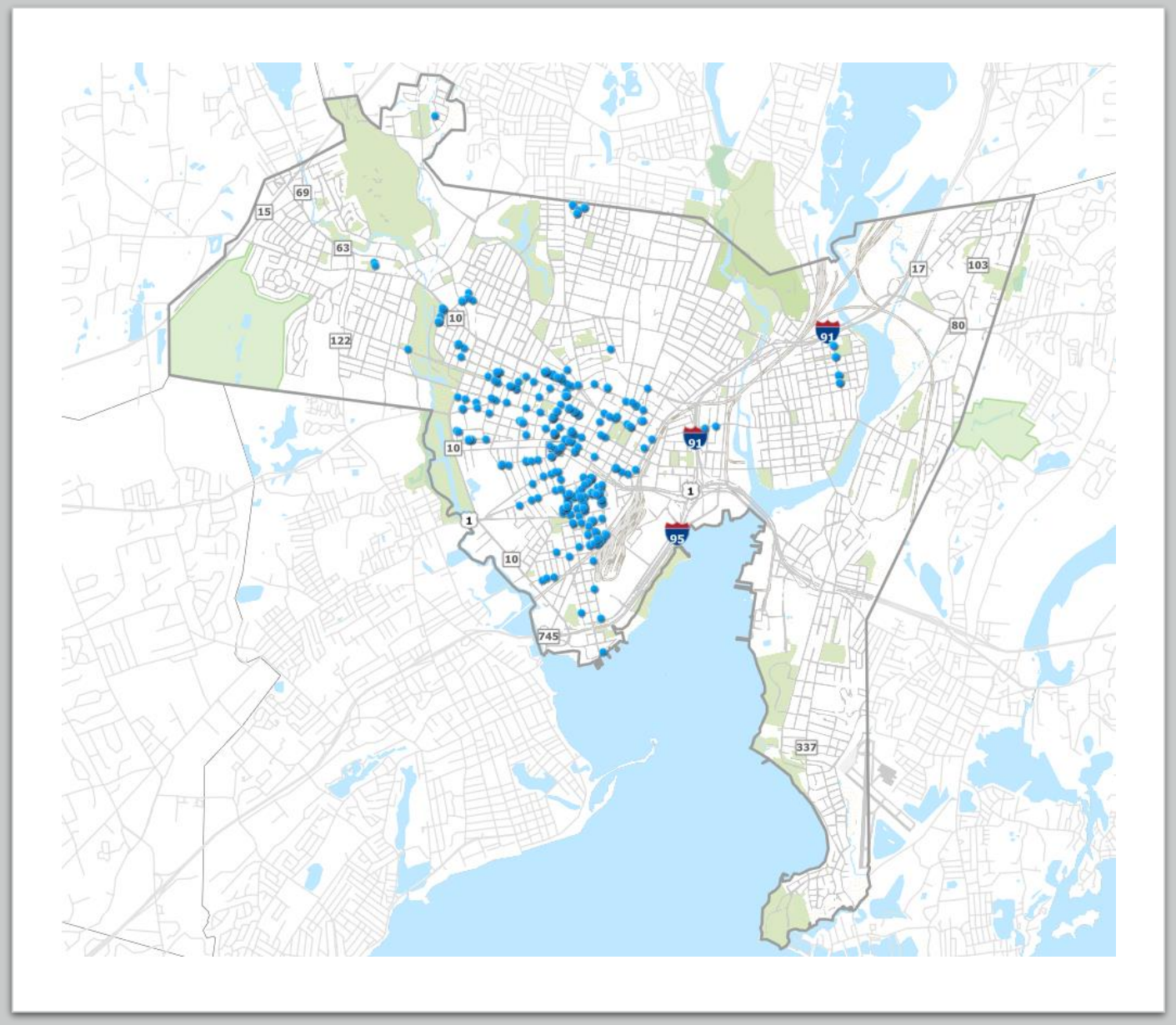
Questions?

For more information, contact Dawn Henning, Project Manager-Engineering, dhenning@newhavenct.gov, (203) 946-8101.

Outreach

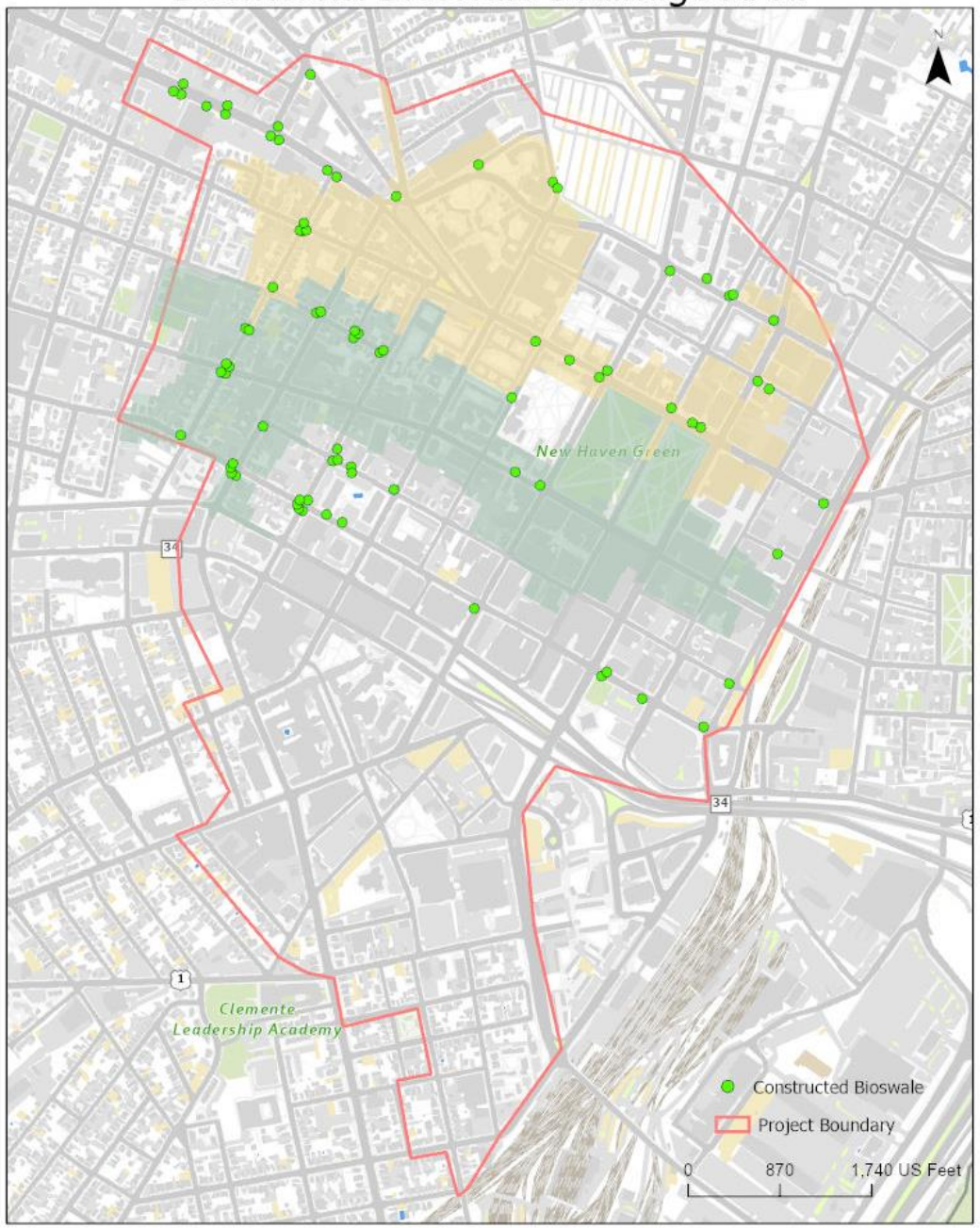
Outcomes

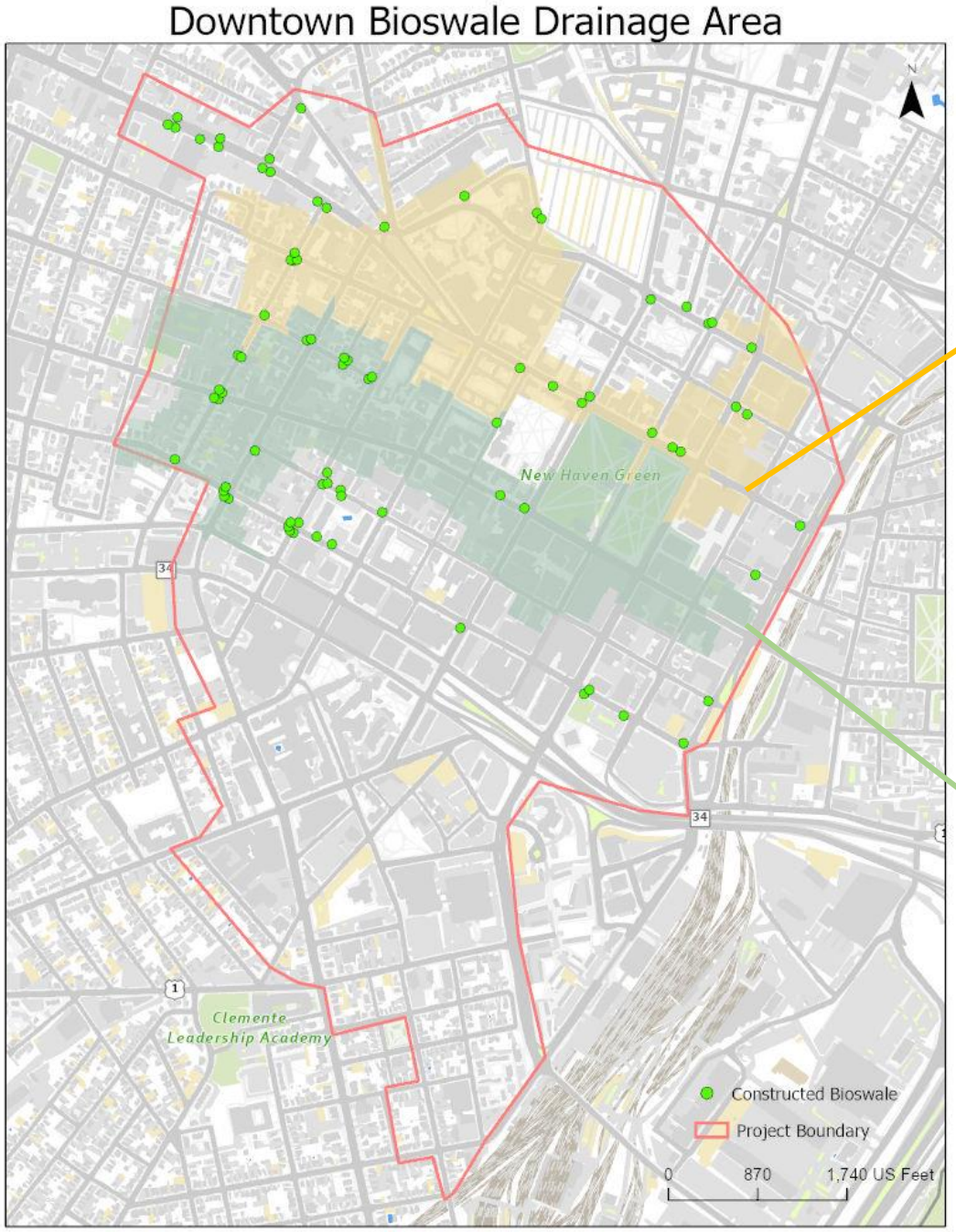
- 286 ROW bioswales
- Roughly capturing about 1% of the City's impervious surface
- About 70% of bioswales constructed by non-profit org
- Costs about $14k per bioswale



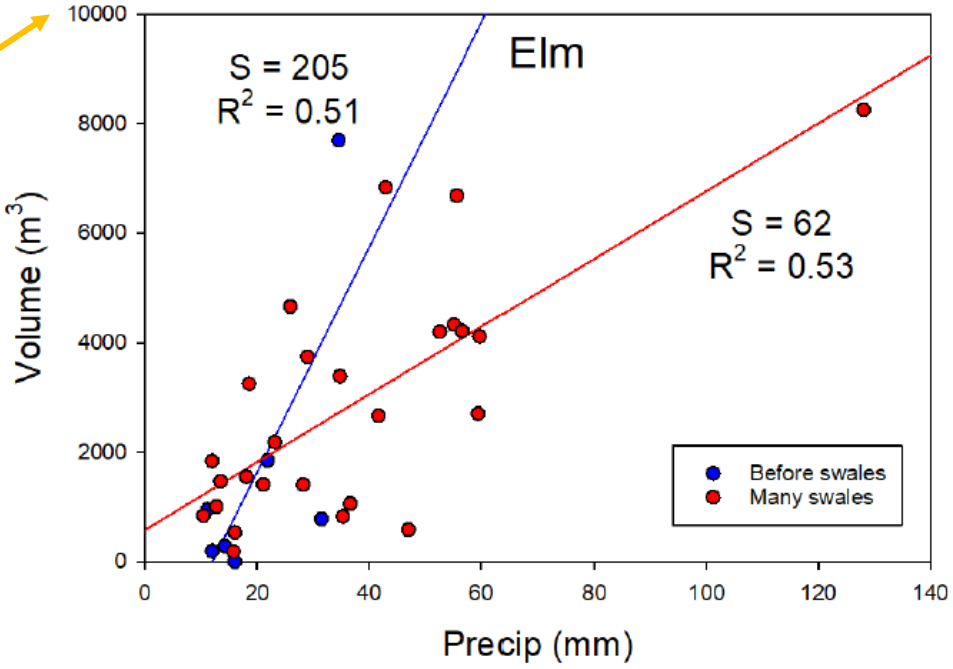
Physical Outcomes

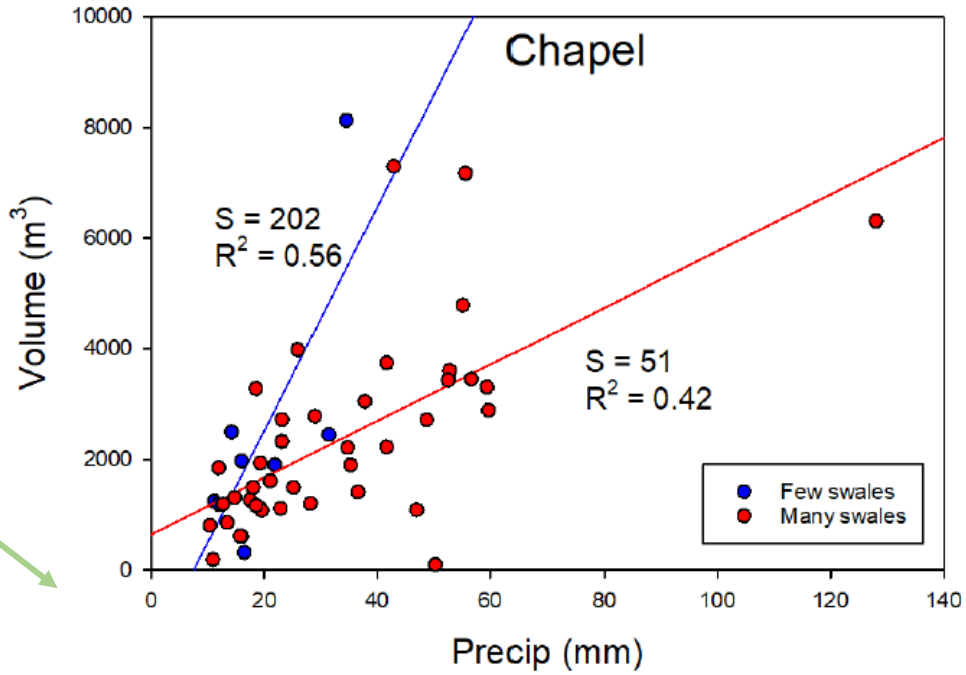
Research: Before-After-Control-Impact (BACI) Method





~70% of runoff captured!





Social Outcomes

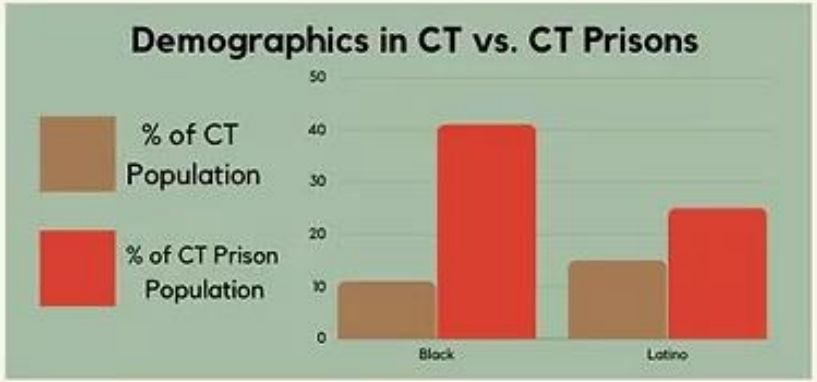
EMERGE
by the numbers

66% exit to full time employment

86% are still working 1 year later

In Connecticut,	With EMERGE,
44%	12%

are reincarcerated after 2 years



Maintenance

Thank you!

Dawn Henning
dhenning@newhavenct.gov

Taking Action – Stormwater Innovation for a Climate-Ready New England

James Houle

Director, Stormwater Center
University of New Hampshire

EBC
Environmental Business Council of New England
Energy Environment Economy

Introducing the New England Stormwater Retrofit Manual

NRWA 2023

Jamie Houle

Director – University of New Hampshire Stormwater Center

May 18th, 2022

Manual Team and Manual Funding

Presenting Today:

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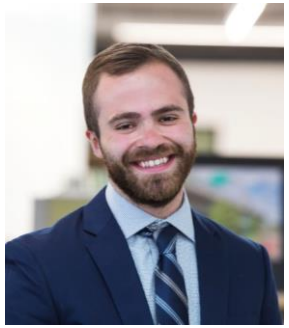
Director – University of New Hampshire Stormwater Center

Additional Authors:



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Water Resources Engineer - VHB

Mark Voorhees

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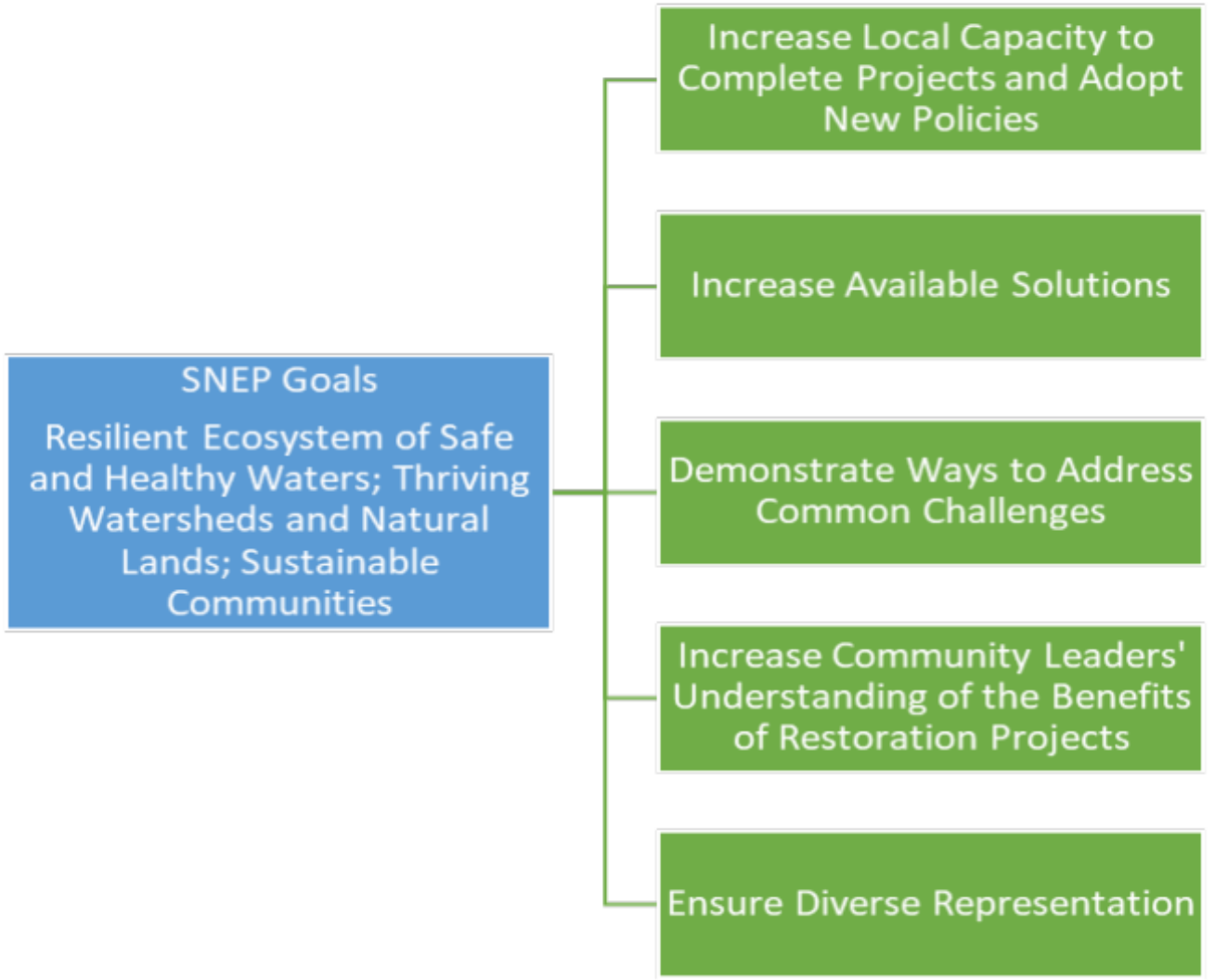
Technical Advisory Committee:

- CTDEEP
- EPA
- MADEP
- MassDOT
- MEDEP
- NHDES
- RIDEM
- RIDOT
- VTDEC
- UNHSWC

This manual was funded by a technical assistance grant provided by the EPA's Southeast New England Program (SNEP). https://snepnetwork.org/stormwater-retrofit-manual/

Southeast New England Program (SNEP) Network Context

2021 - 2025 PRIORITY ACTIONS



Source: Southeast New England Program Fact Sheet, February 2021 (epa.gov)

Goals of New England Stormwater Retrofit Manual

- Provide research-based guidance on **planning, siting, and designing** retrofit stormwater control measures (SCMS) **where regulatory requirements to not dictate prescribed specifications**
- Present an approach for **crediting pollutant and runoff volume reductions** associated with these SCMs
- Present a framework for **selecting the optimal SCM** for a specific project/site

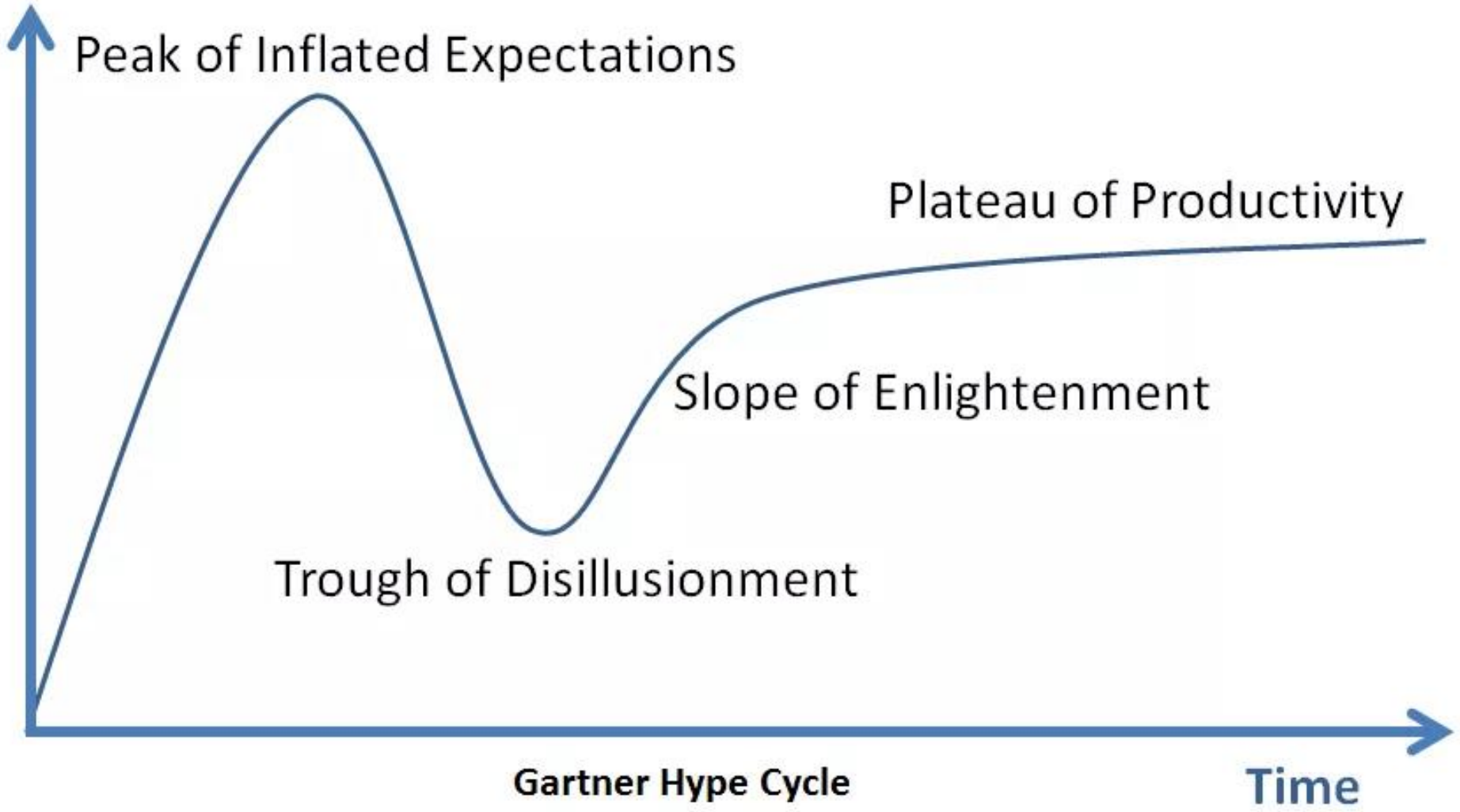
Why this Manual Matters

- This manual fills a gap in existing retrofit guidance by…
  - Encouraging designers to **move beyond prescriptive new/redevelopment mindset**
  - Helping designers **piece SCM components together to arrive at the best SCM** to meet project and site-specific needs
  - **Promoting the use of EPA-developed water quality crediting methods** to quantify SCM impact

NE Retrofit Manual

https://snepnetwork.org/stormwater-retrofit-manual/

Decadal Reflections



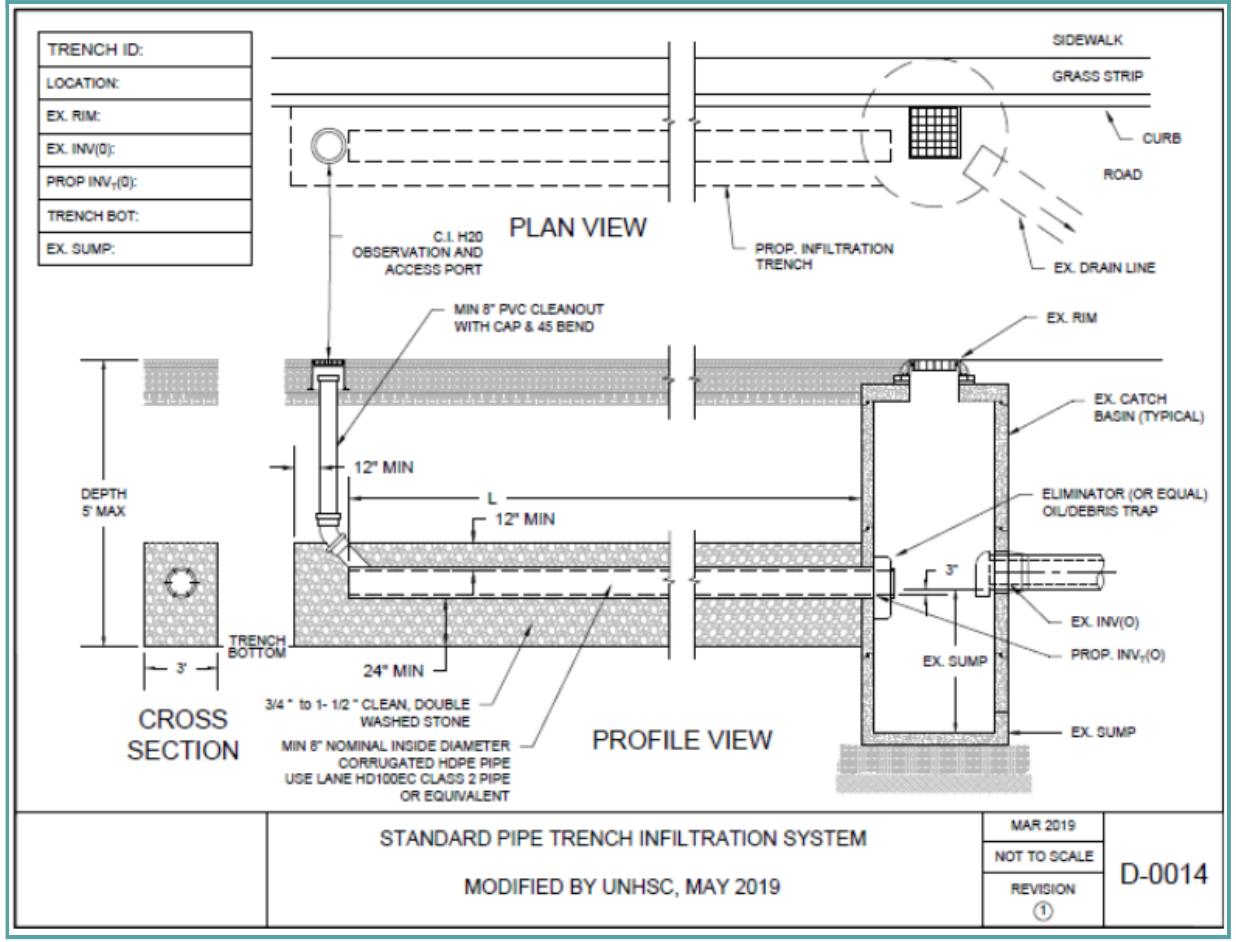
Are we at the Finish Line or the Starting Line?

Manual Highlights: Planning and Crediting

Retrofit Approach: Opportunistic Approach

- Incorporation of SCMs into already planned and needed construction projects
- Key Considerations:
  - **Be proactive in identifying opportunities.**
  - **Develop a suite of typical SCMs.**
  - **Be willing to be flexible with the project specifications**
  - **Tailor the scale and type of SCMs to the project**

Arlington, MA Standardized Trench Design

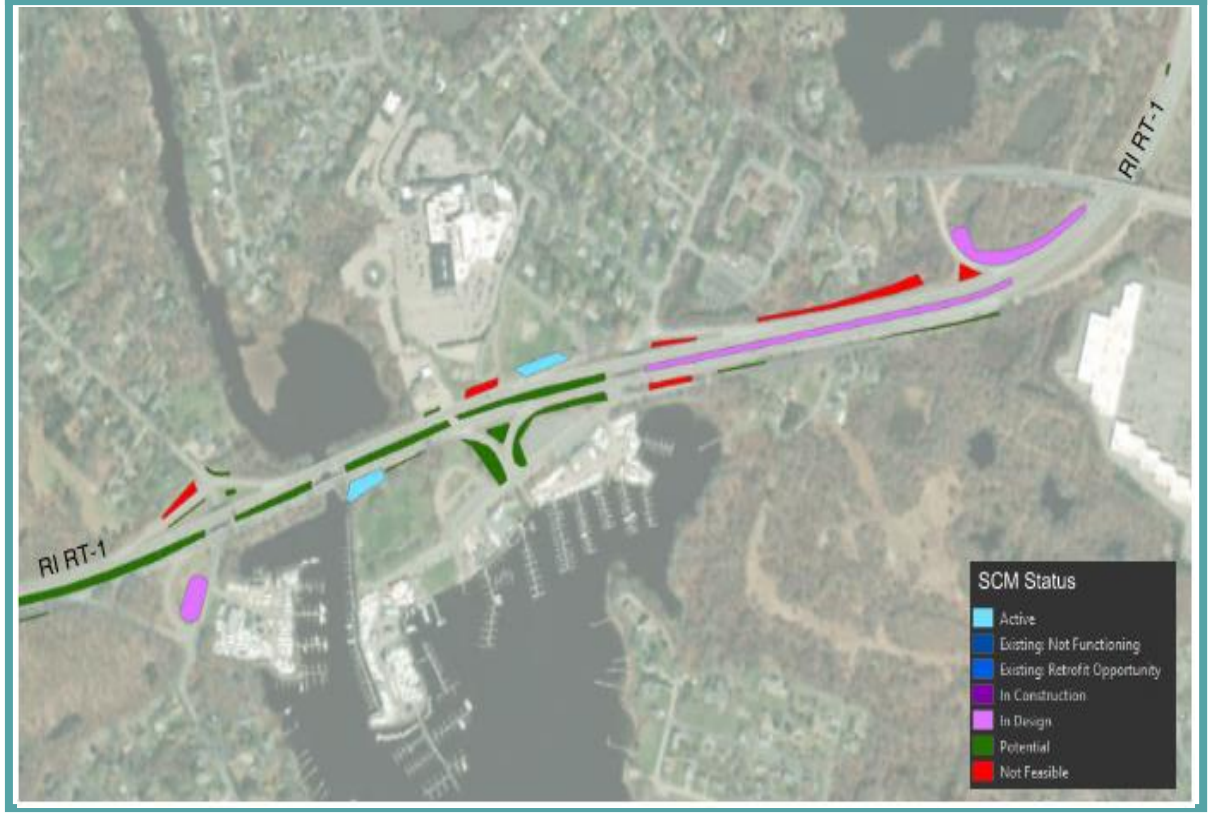


Source: https://www3.epa.gov/region1/npdes/stormwater/tools/arlington-ma-infiltration-trench-conceptual-design.pdf

Retrofit Approach: Planning Approach

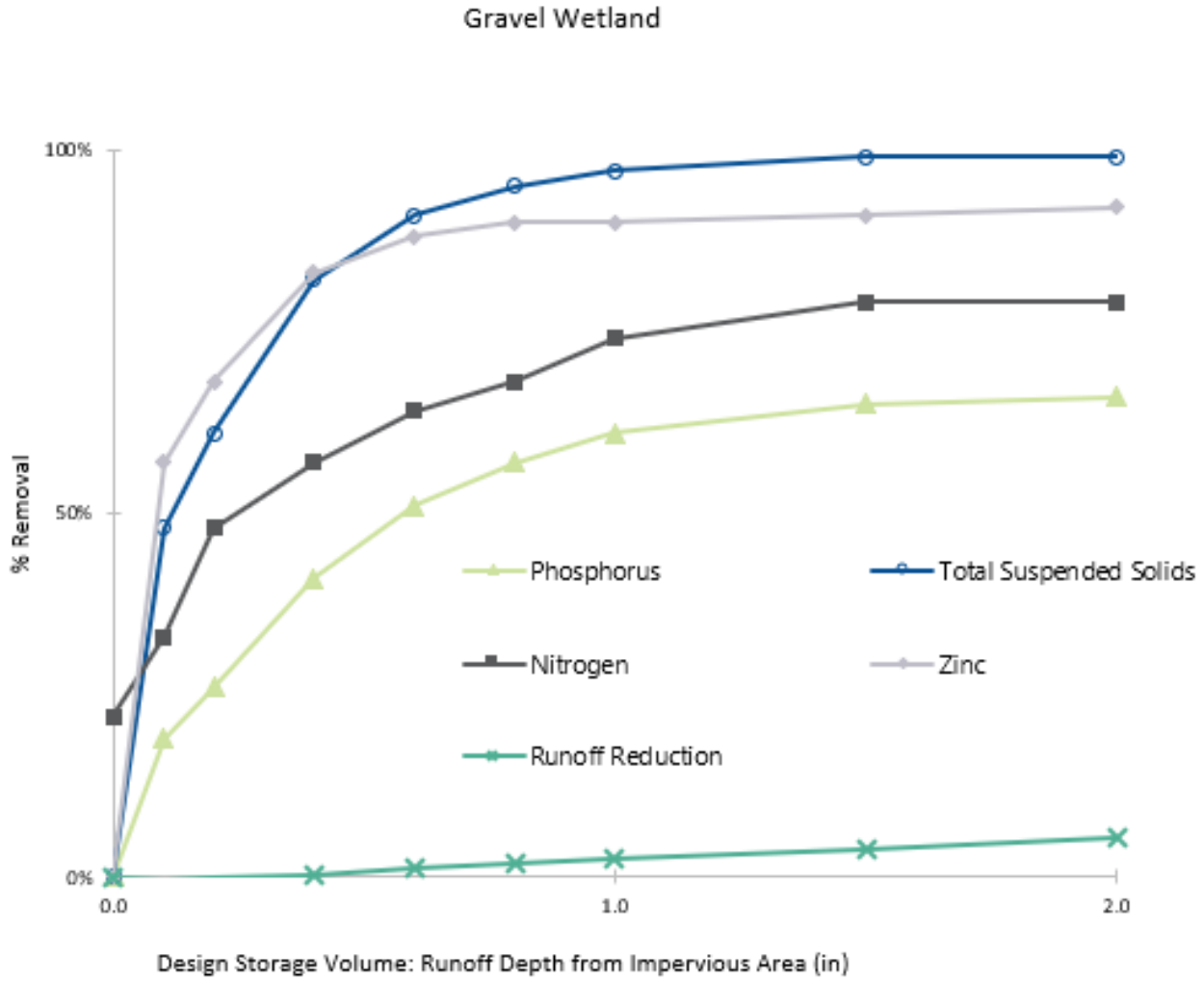
- Proactively planning retrofits and prioritizing sites
- Steps:
  1. **Understand and Quantify Goals**
  2. **Identify Potential Sites**
  3. **Identify SCMs**
  4. **Prioritize Sites and Controls**
  5. **Implement SCMs**

RIDOT Stormwater Control Plans

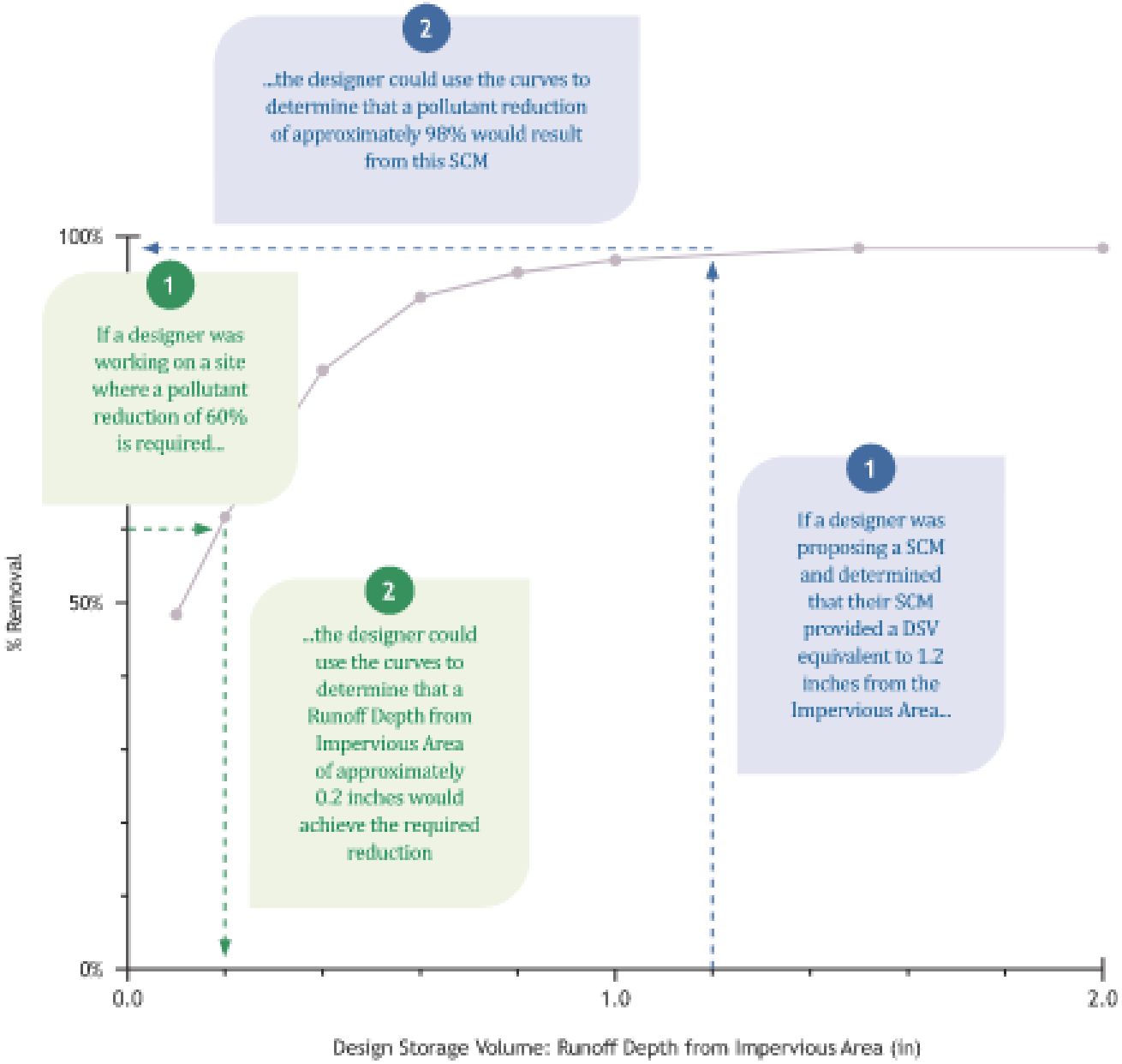


Source: https://www.arcgis.com/apps/webappviewer/index.html?id=b516ed62a55847e28d0243ac07206856

Crediting Approach: SCM Performance Curves



See our handout for more information on SCM Performance Curves and how to utilize them!


2
..the designer could use the curves to determine that a pollutant reduction of approximately 98% would result from this SCM
100%
1
If a designer was working on a site where a pollutant reduction of 60% is required..
% Removal
50%
2
..the designer could use the curves to determine that a Runoff Depth from Impervious Area of approximately 0.2 inches would achieve the required reduction
1
If a designer was proposing a SCM and determined that their SCM provided a DSV equivalent to 1.2 inches from the Impervious Area..
0%
0.0
1.0
2.0
Design Storage Volume: Runoff Depth from Impervious Area (in)

Sizing for Performance

Sizing Details

System	WQV ft^3 (m^3)	Actual WQV ft^3 (m^3)	% of normal design	Rain Event in (mm)	Sizing Method
SGWSC	7,577 (214.6)	720 (20.4)	10%	0.10 (2.5)	Static
IBSCS	1,336 (37.8)	310 (8.8)	23%	0. 23 (5.8)	Dynamic

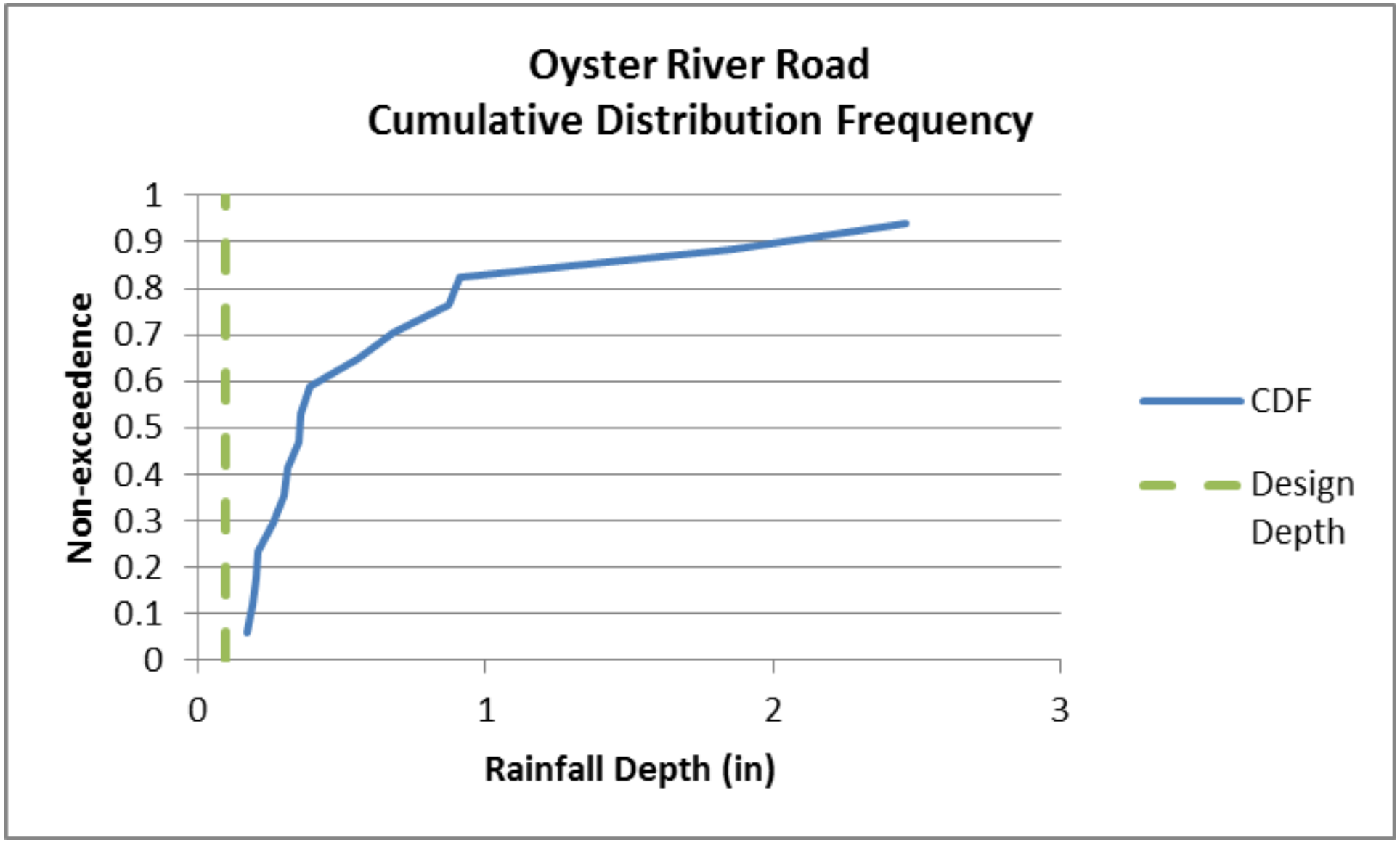
$$WQV = \left(\frac{P}{12}\right) x\ IA$$

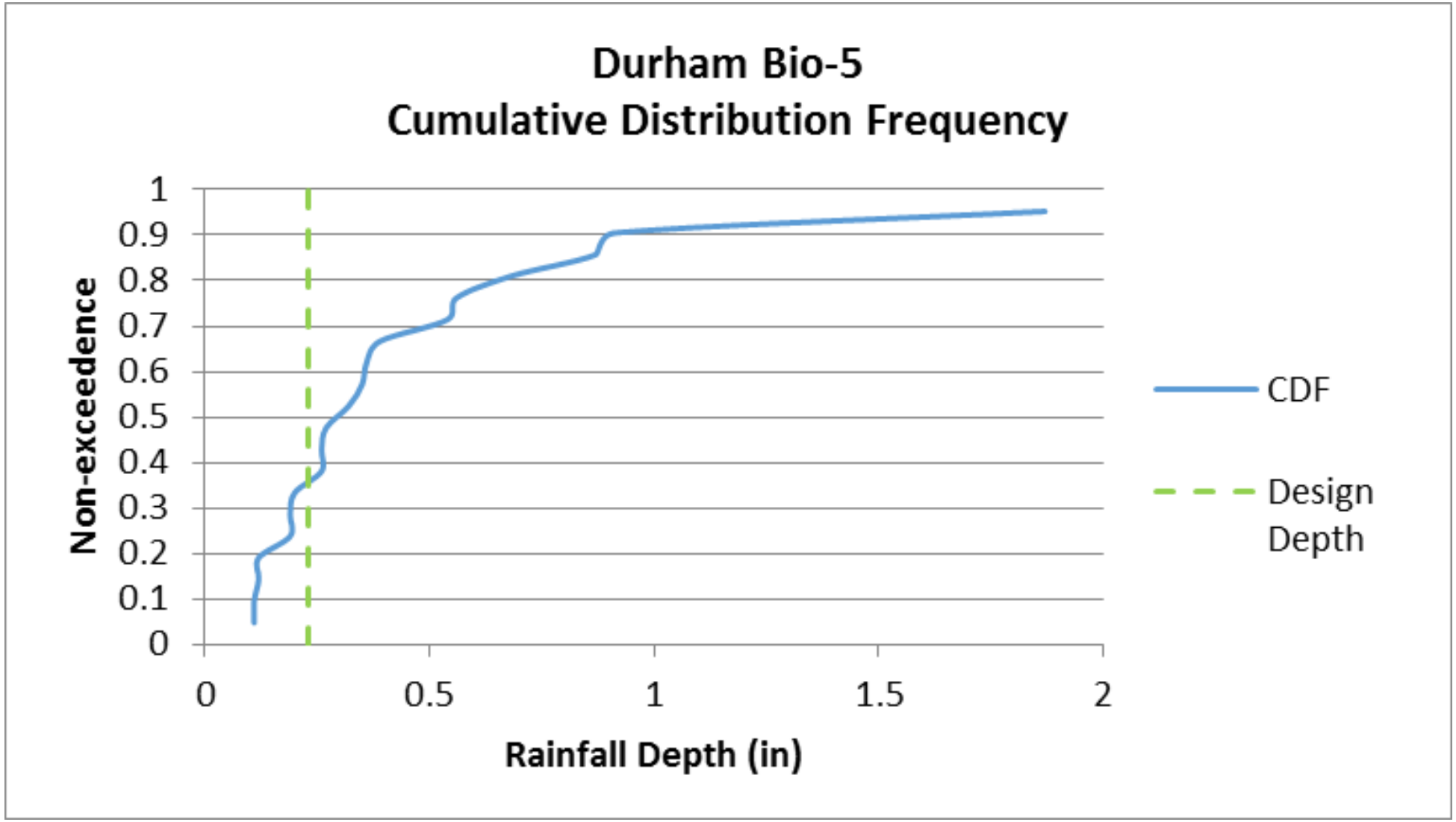
Dynamic Bioretention Sizing

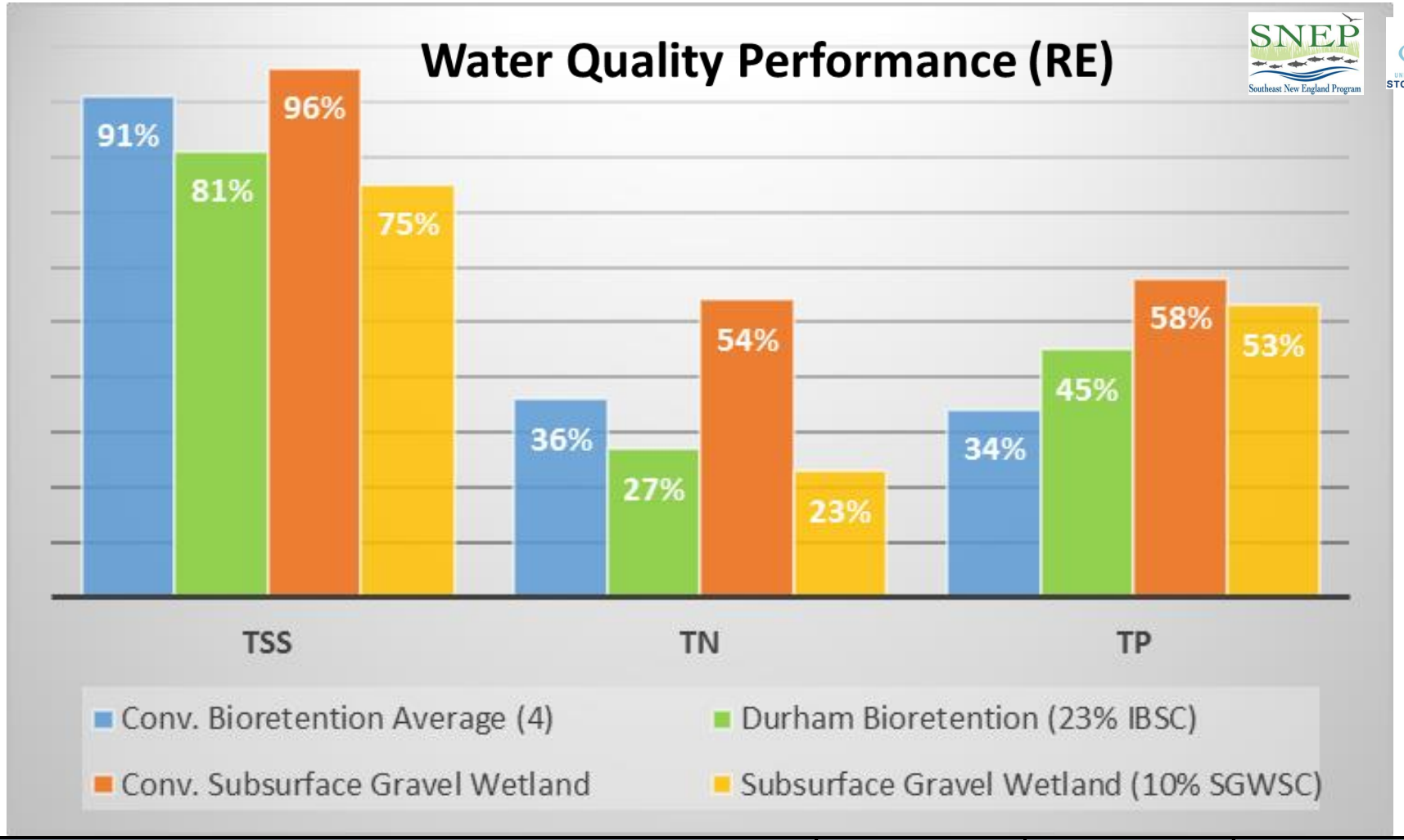
$$Af = Vwq * \frac{df}{(i(hf + df)tf)}$$

Static SGW System Sizing

$$Q = CdA\sqrt{2gh}$$


Oyster River Road
Cumulative Distribution Frequency
Non-exceedence
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
1
2
3
Rainfall Depth (in)
CDF
Design Depth


Durham Bio-5
Cumulative Distribution Frequency
Non-exceedence
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
0
0.5
1
1.5
2
Rainfall Depth (in)
CDF
Design Depth



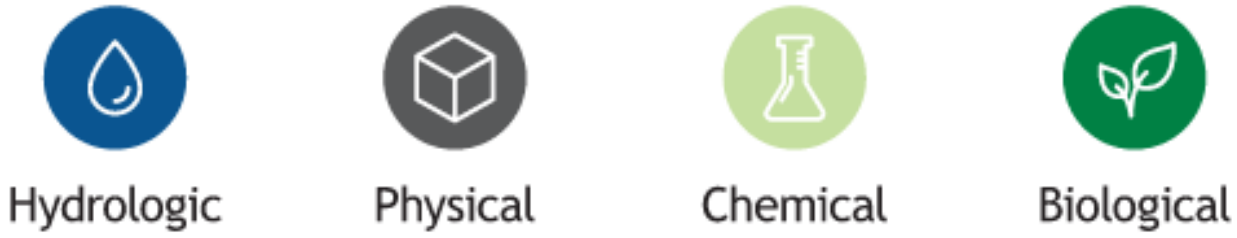
System	TSS	TN	TP
Conv. Bioretention Average (4)	91%	36%	34%
Durham Bioretention (23% IBSC)	81%	27%	45%
Conv. Subsurface Gravel Wetland	96%	54%	58%
Subsurface Gravel Wetland (10% SGWSC)	75%	23%	53%

SCM Selection and Design: Treatment Unit Operations and Processes (UOPs)

UOPs: Unit Operations and Processes

Operations: methods of treatment in which application of *Physical* and *Hydrologic* forces dominate.

Processes: methods of treatment in which *Chemical* or *Biological* activities are involved.

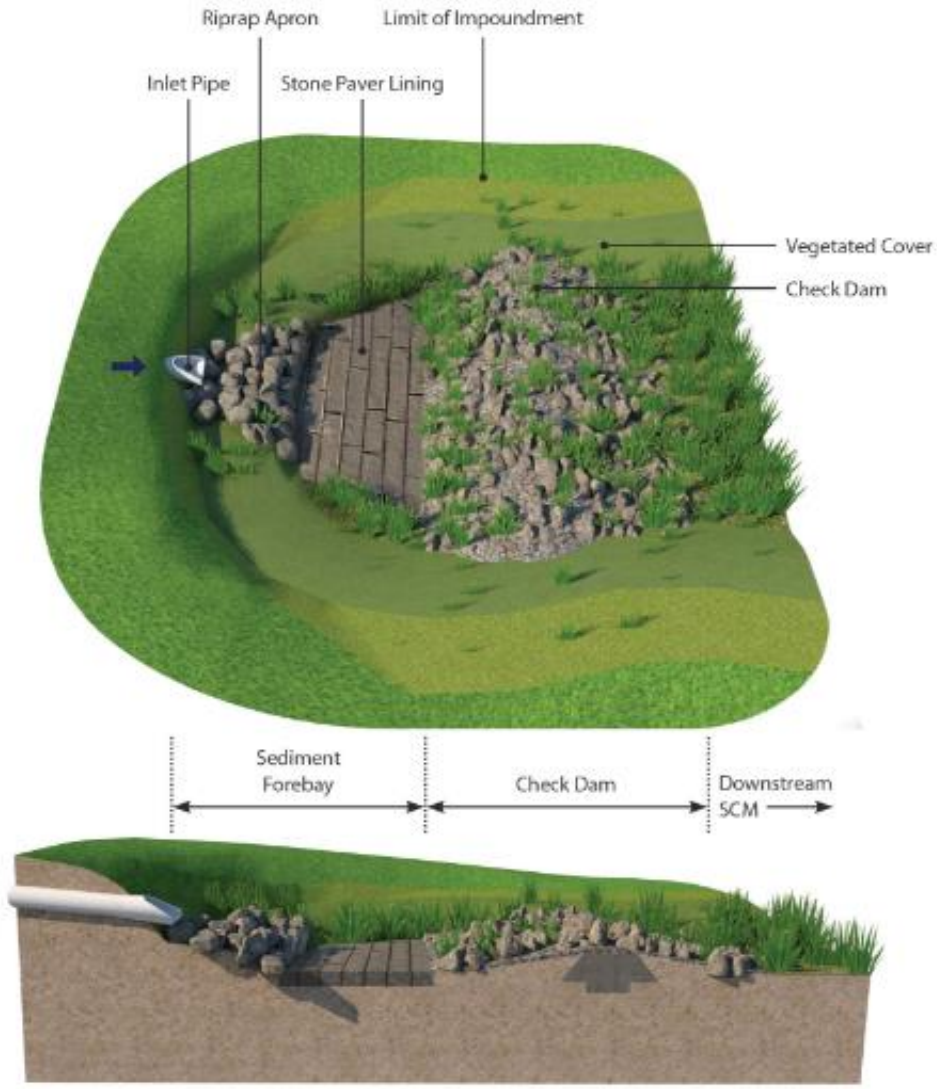


Selection and Design: Linking SCMs to UOPs and Performance Curves

SCM Type	Primary UOP	Performance Curve Category
Infiltration Swale	Hydrologic: Infiltration	Infiltration Basin
Rain Garden (with underdrain)	Physical: Filtration	Bio-Filtration
Gravel Wet Vegetated Treatment System	Biological: Nitrification/ Denitrification	Gravel Wetland

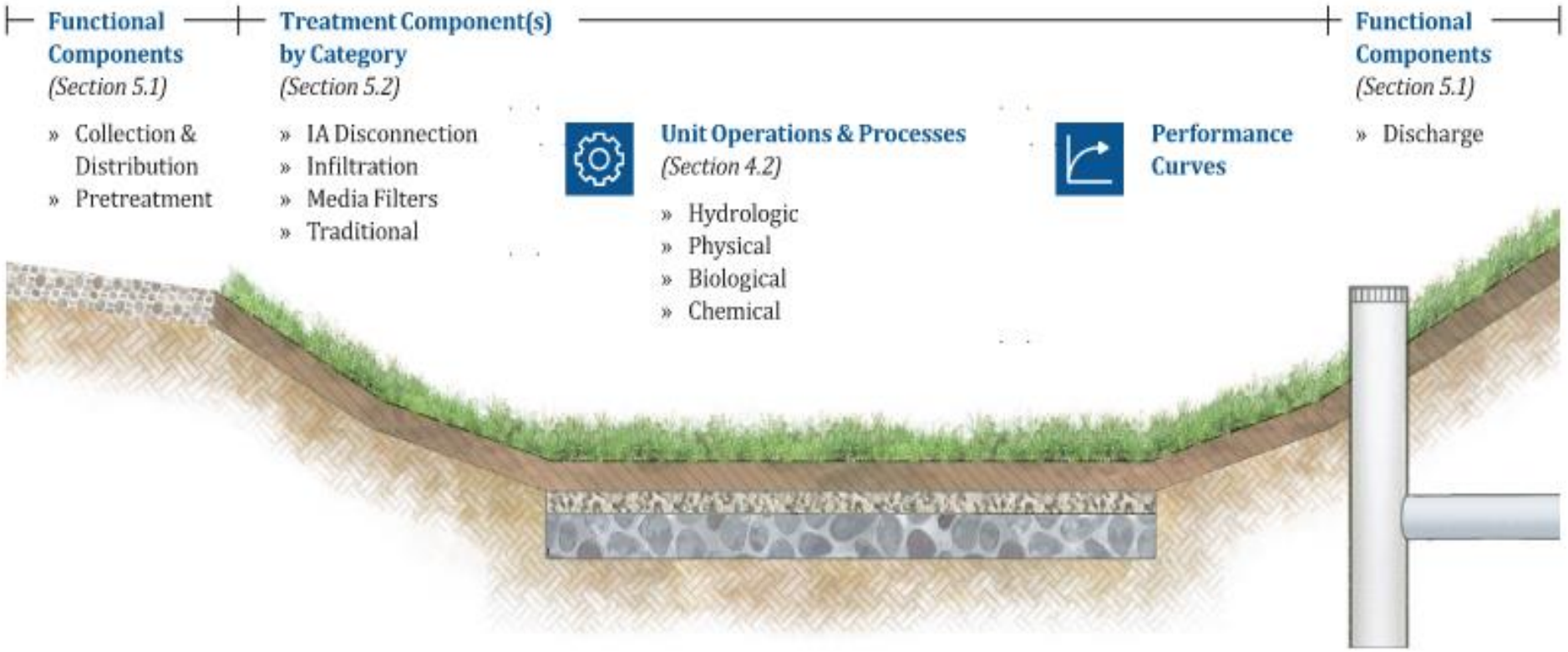
SCM Guidance: Functional Components

- Determine form and function of SCM
- Can be broken down as follows:
  - Collection and Distribution
  - Pretreatment
  - Discharge



Source: MassDOT Stormwater Design Guide, 2022

SCM Guidance: Putting It All Together



Manual Highlights: Breaking through Prescriptive Guidance

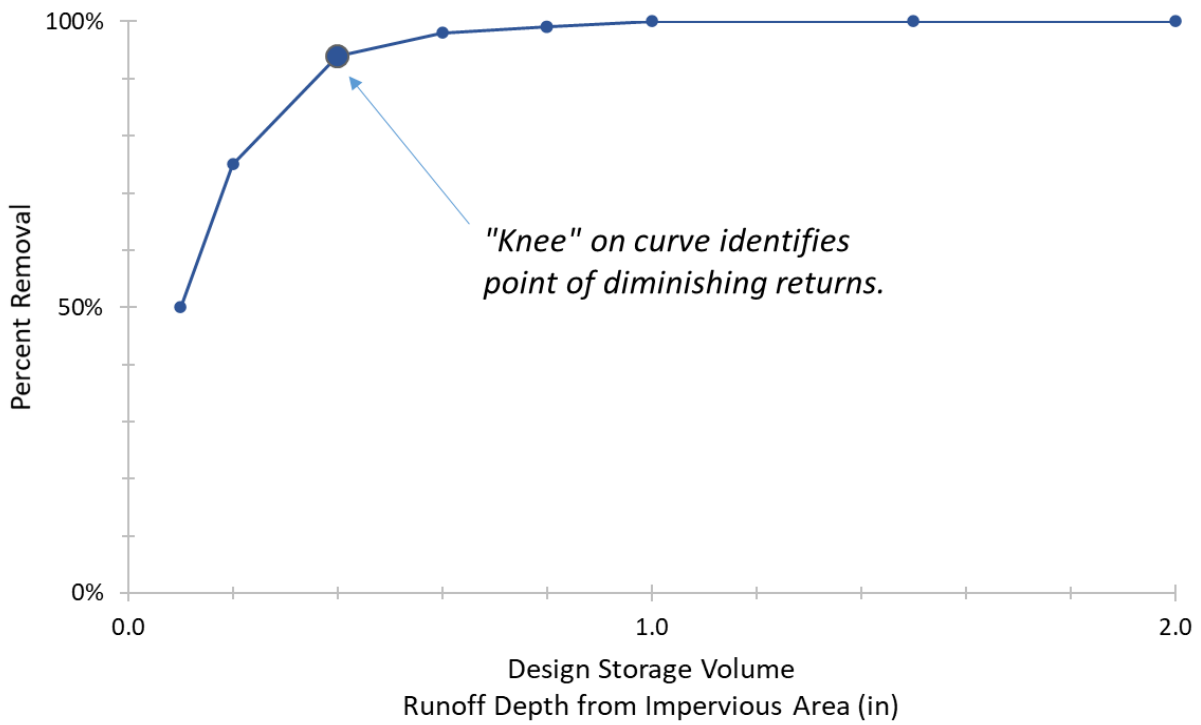
Breaking Through Prescriptive Guidance:
Sizing Requirements

Current Typical Requirement:

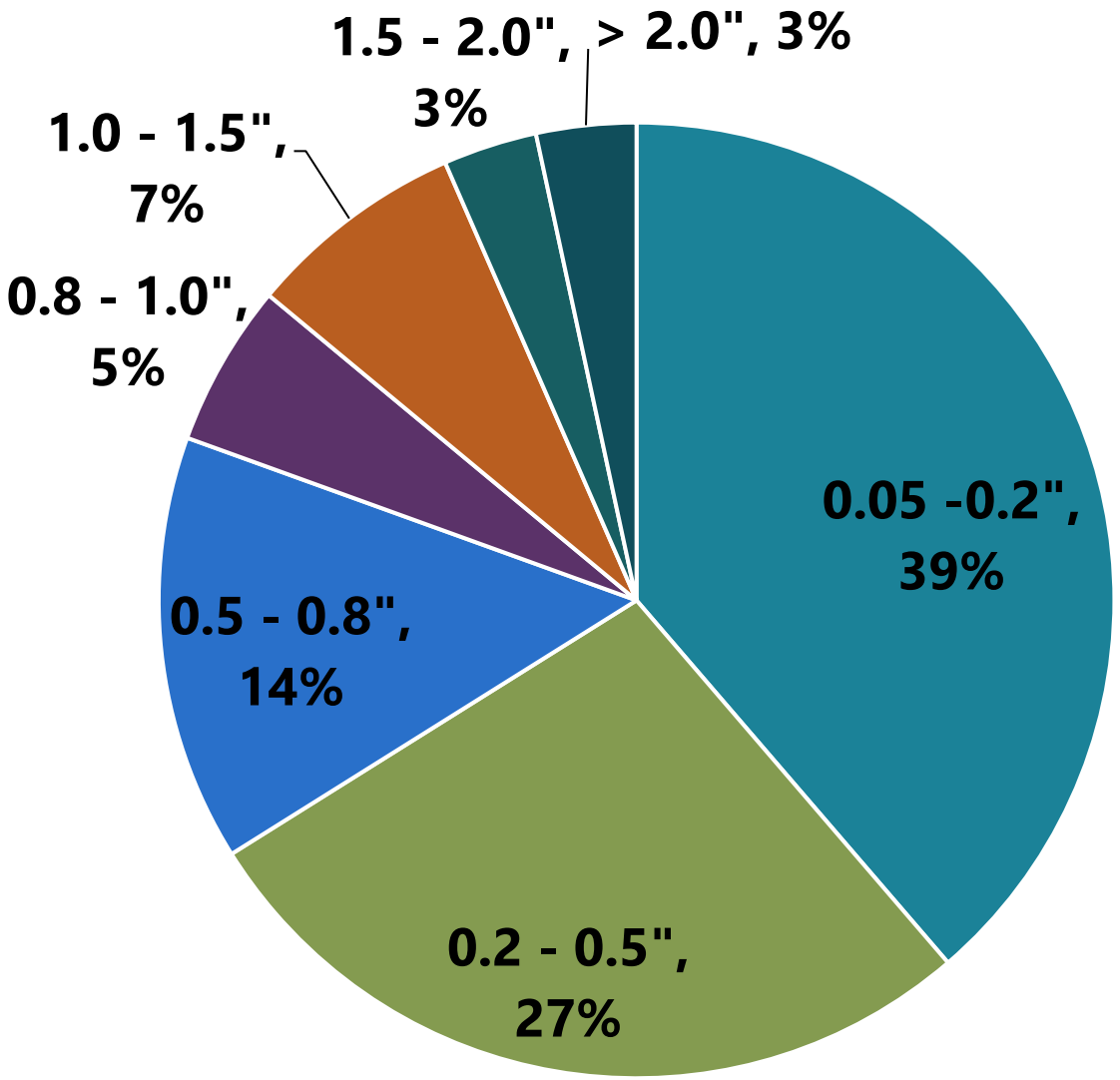
Size SCMs to meet the required WQV (typically 1 inch)

Proposed Retrofit Guidance:

Use SCM Performance Curves to size optimal cost-effective SCMs within a site



Distribution of Precipitation Events by Depth; Boston, MA 1992-2014



Precip Depth (in)	Probability %
0.05-0.2	39
0.2-0.5	66
0.5-0.8	80
0.8-1.0	85
1.0-1.5	92
1.5-2.0	95
>2.0	98

In Summary…

- Be creative in retrofit scenarios!
- Some treatment (even small!) is better than none at all
- The SCM Performance Curves are powerful tools for sizing and crediting SCMs
- Construct an SCM that works best for your site/project
- Don’t be constrained!

Acknowledgments

- EPA and SNEP Network
- Elizabeth Scott
- Kimberly Groff
- TAC
  - Tom Ballestero – UNHSWC
  - Henry Barbaro – MassDOT
  - Eric Beck – RIDEM
  - Ian Dombrowski - EPA
  - Kathleen Knight – CTDEEP
  - Daniel Macadam – UNHSWC
  - Tom Maguire – MADEP
  - Padraic Monks – VT
  - Brian Moore - MassDOT
  - Nick Pisani – RIDEM
  - Cody Ray – EPA
  - Matthew Reardon – MADEP
  - Alisa Richardson – RIDOT
  - Michael Sadler – VT
  - Laura Schifman – MADEP
  - Newt Tedder – EPA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Taking Action – Stormwater Innovation for a Climate-Ready New England

Julie Wood

Climate Compact Director
Charles River Watershed Association

EBC
Environmental Business Council of New England
Energy Environment Economy

Solutions for Future Flooding: Charles River Watershed

Julie Dyer Wood

EBC Stormwater Summit

May 4, 2023

Charles River Watershed Association

Charles River Watershed Association

Mission: To protect, restore, and enhance the Charles River and its watershed through science, advocacy, and the law.

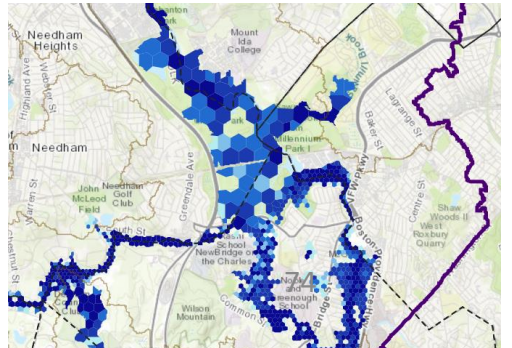
Nuestra misión: Protegemos, restauramos y mejoramos el río Charles y su cuenca a través de **la ciencia, la defensa** y **la ley**. Desarrollamos estrategias con base científica para **aumentar la resiliencia, proteger la salud pública y promover la equidad** ambiental mientras nos enfrentamos a un clima cambiante.

我們的使命

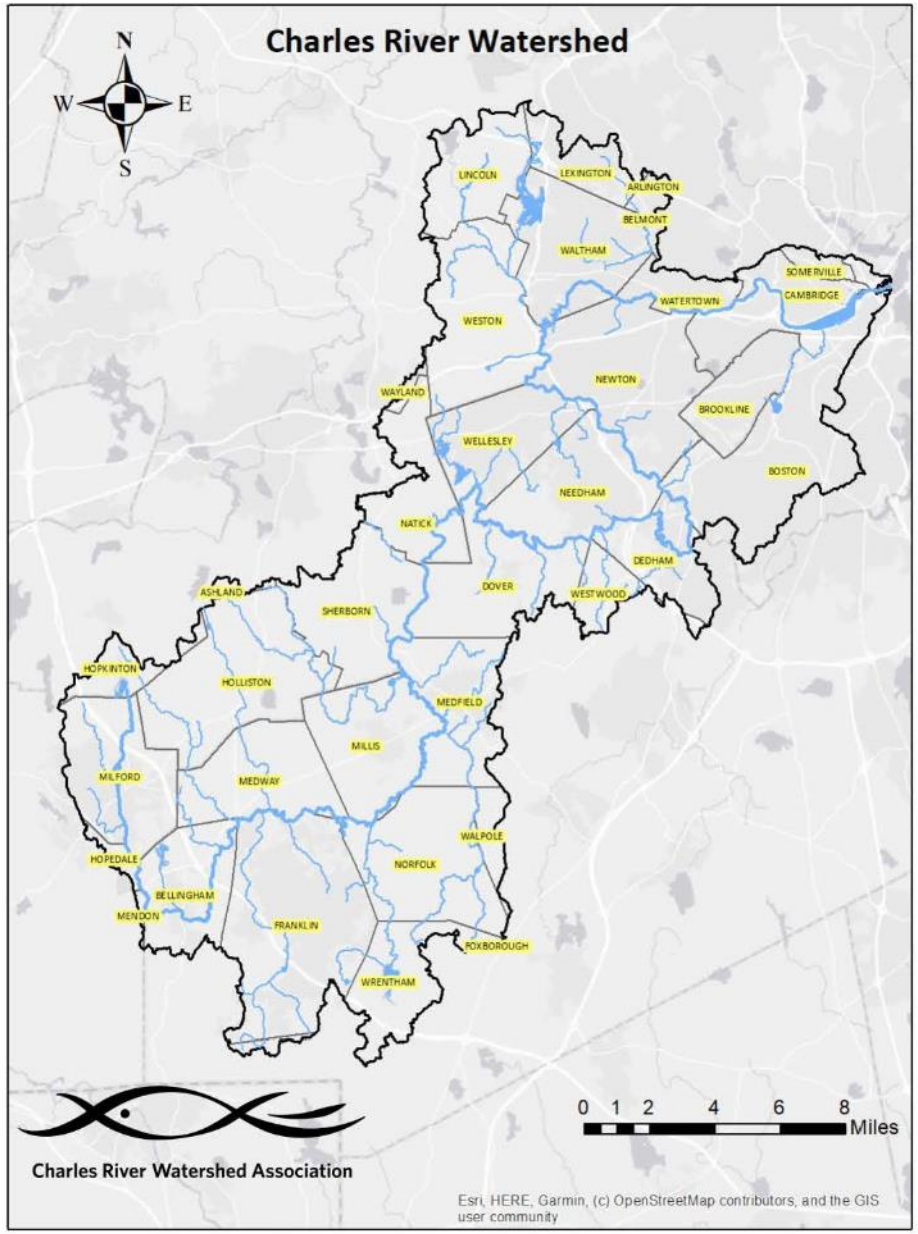
我們通過科學、**宣傳**和**法律**保護、**恢復**和**改善**查理斯河及其流域。我們制定基於科學的戰略，以在應對氣候變化時**提高復原力、保護公眾健康並促進環境公平**。







Charles River Watershed Association

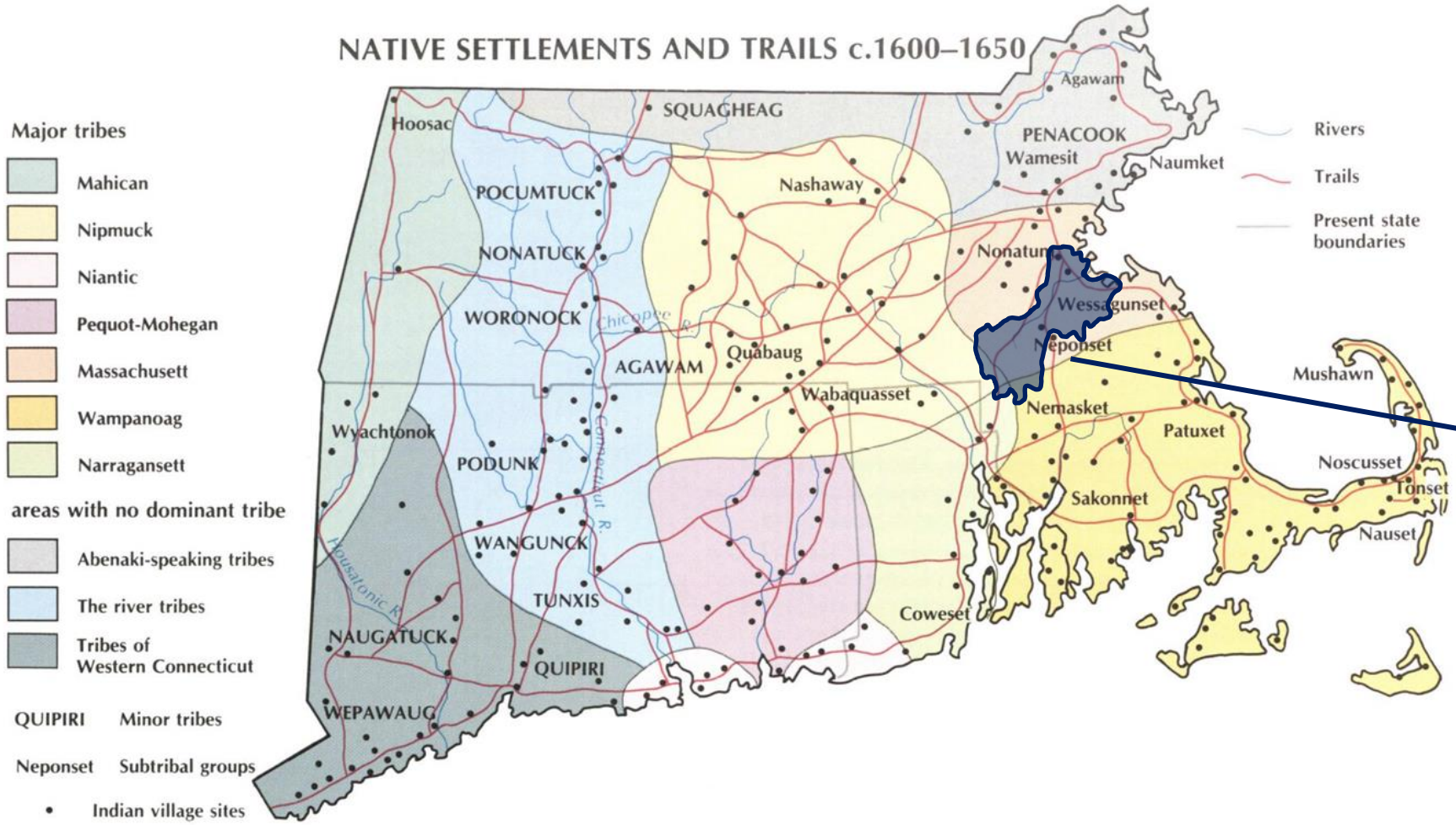


CRWA takes a watershed-scale view

- 80 mile river
- 35 towns in watershed
- 308 mi^2 watershed
- Approximately 1 million residents
- >60% of population lives in Environmental Justice neighborhoods

Land Acknowledgement

Charles River Watershed Association



The Charles River Watershed resides on occupied territory of the **Massachusetts, Nipmuck and Wampanoag** tribes.

Map image of native settlements and trails c. 1600-1650 in Southern New England. Source credit: Harvard Map Collection

Charles River Climate Compact

Charles River Watershed Association

- Charles River Climate Compact (CRCC) was founded in 2019
- Regional partnership of cities and towns focused on climate resilience
- CRCC Strategic Plan complete April 2023

Charles River Climate Compact

CRCC Mission Statement

The Charles River Climate Compact's mission is to work collaboratively to increase climate resilience for people, and the natural ecosystems in the Charles River watershed by taking a regional approach to implementing climate adaptation and mitigation solutions.

Charles River Flood Model

Charles River Watershed Association

Project Objectives:

- Use the Charles River Flood Model (CRFM) to identify and assess various alternative “pathways” to mitigate flooding
- Develop concept designs for numerous flood mitigation projects (site & neighborhood scale)
- Meaningfully engage the community in climate adaptation planning activities
- Conduct culvert assessments
- Publish a *Charles River Climate Adaptation Flood Mitigation Plan*

Project Team

Charles River Climate Compact

CREW Communities Responding to Extreme Weather

Weston & Sampson

Charles River Watershed Association

Thank you to MA MVP Action Grant Program for funding this project.

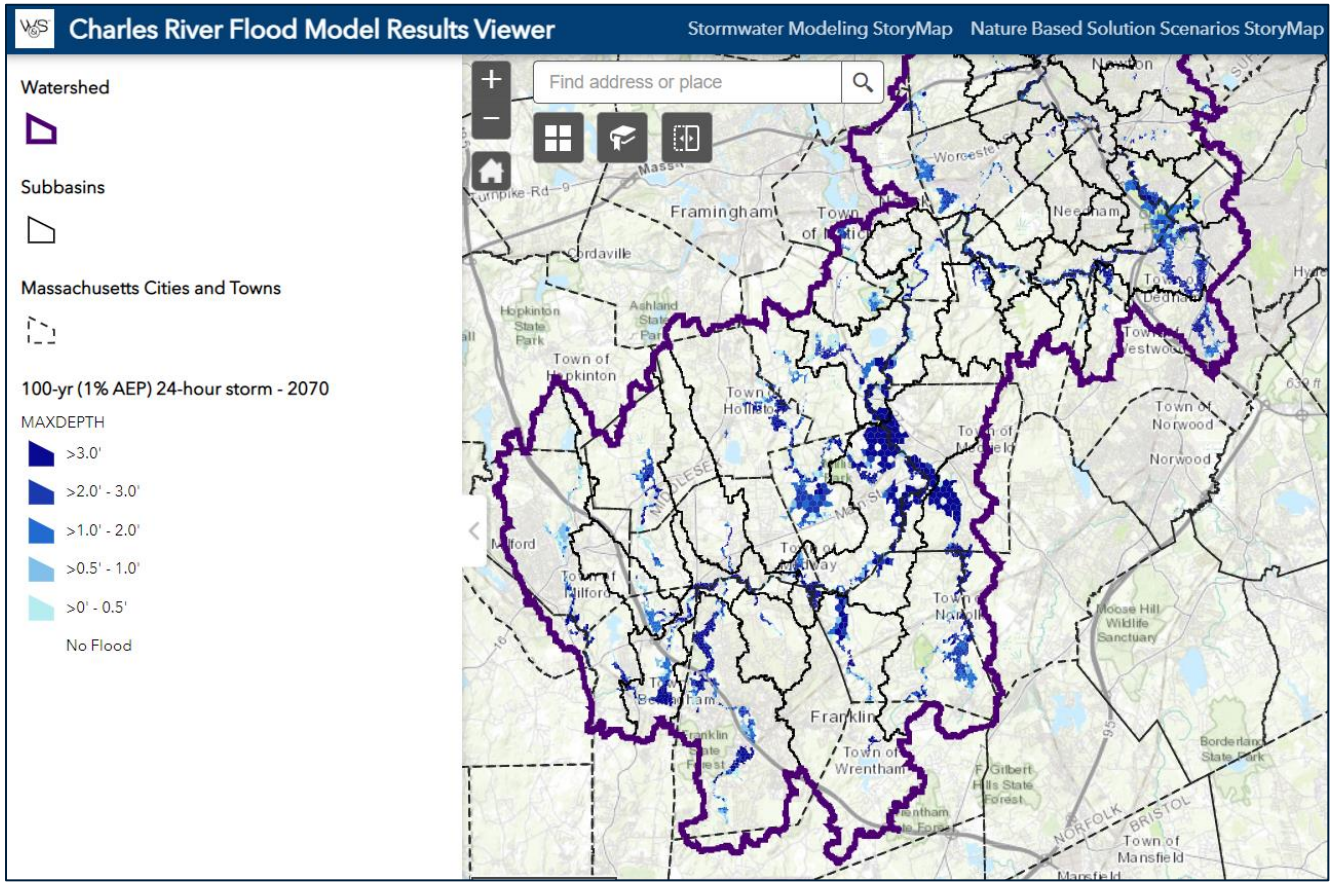
Arlington
Belmont
Boston
Brookline
Cambridge
Dedham
Dover
Franklin
Medfield
Medway
Millis
Natick
Needham
Newton
Sherborn
Waltham
Watertown
Wellesley
Weston
Wrentham

Charles River Flood Model

Charles River Watershed Association

Charles River Flood Model (CRFM)

- Developed in 2021, updated in 2022
- Shows **flooding under future climate projections** (2030 & 2070)
- Shows approximate **location and depth** of flooding
- Covers **Charles River** from Watertown & Newton upstream to Milford/Hopkinton
- Assesses mitigation benefits at **multiple scales**
- All **results available online!**



www.crwa.org/watershed-model

The Watershed Approach

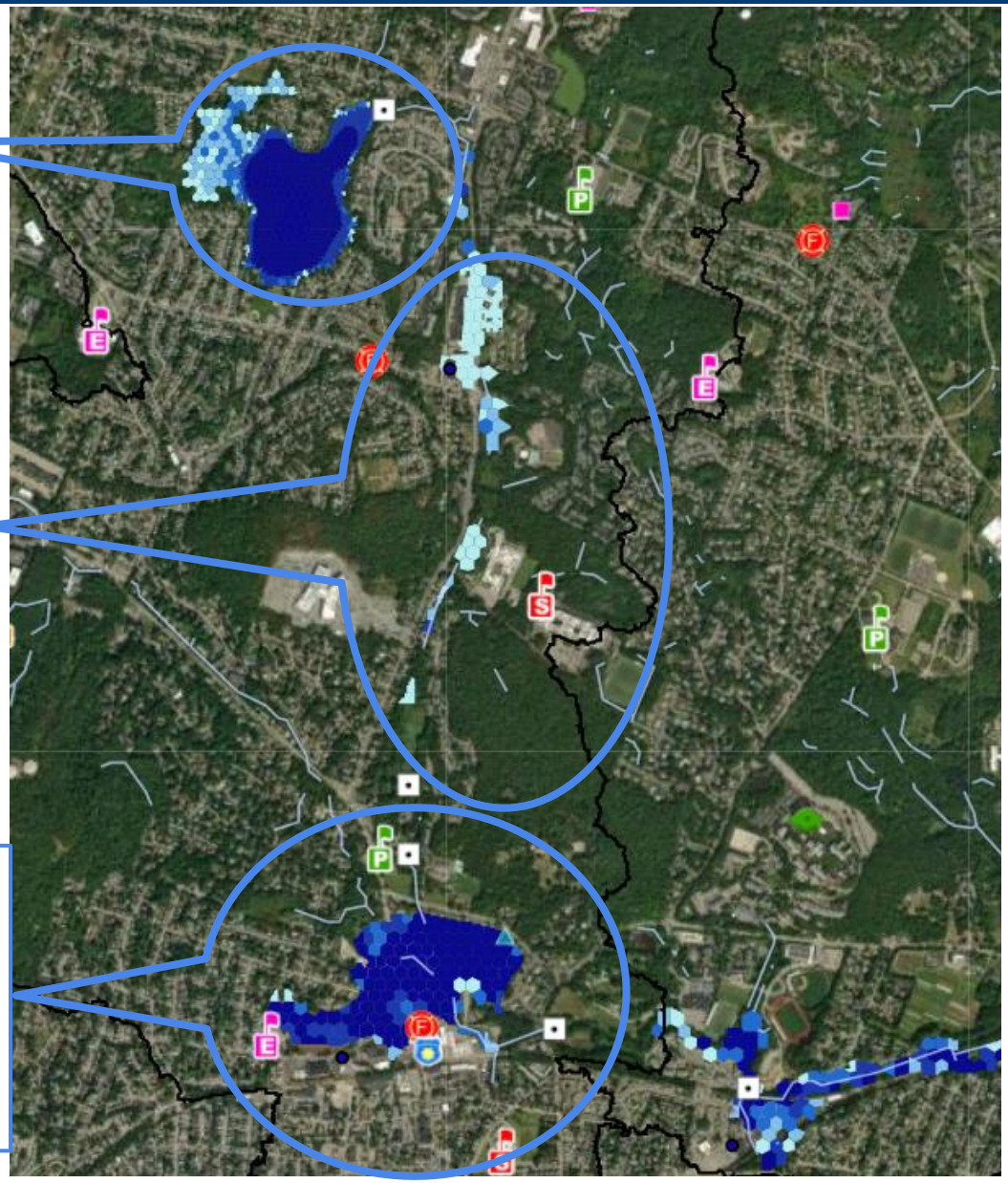
Charles River Watershed Association

Watershed Approach means you have more tools available in the tool box!

Headwaters: storage

Middle watershed: storage and conveyance

Downstream/ confluence: conveyance or retreat/protect



The Watershed Approach

Charles River Watershed Association

Watershed Approach means you have more tools available in the tool box!

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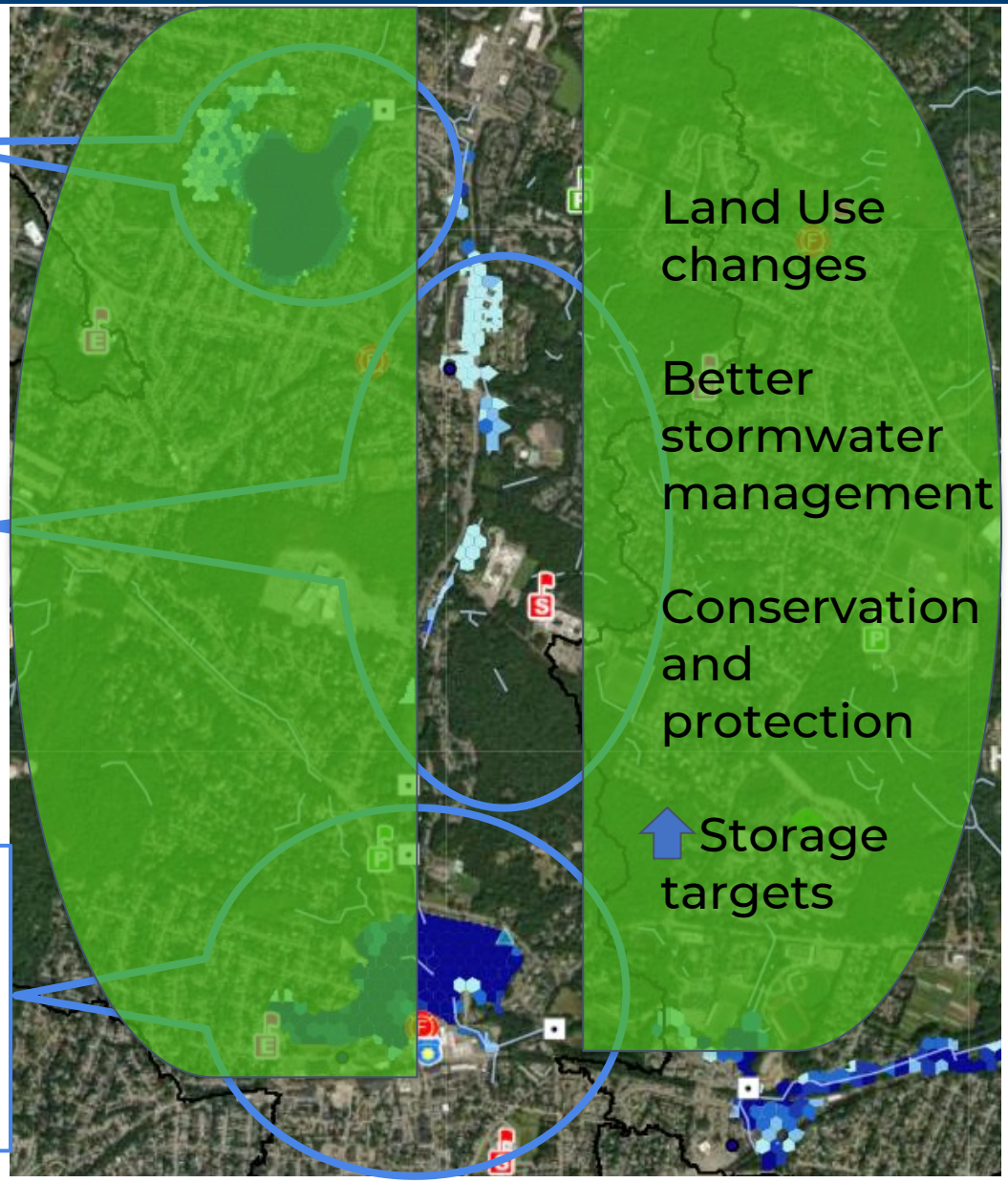
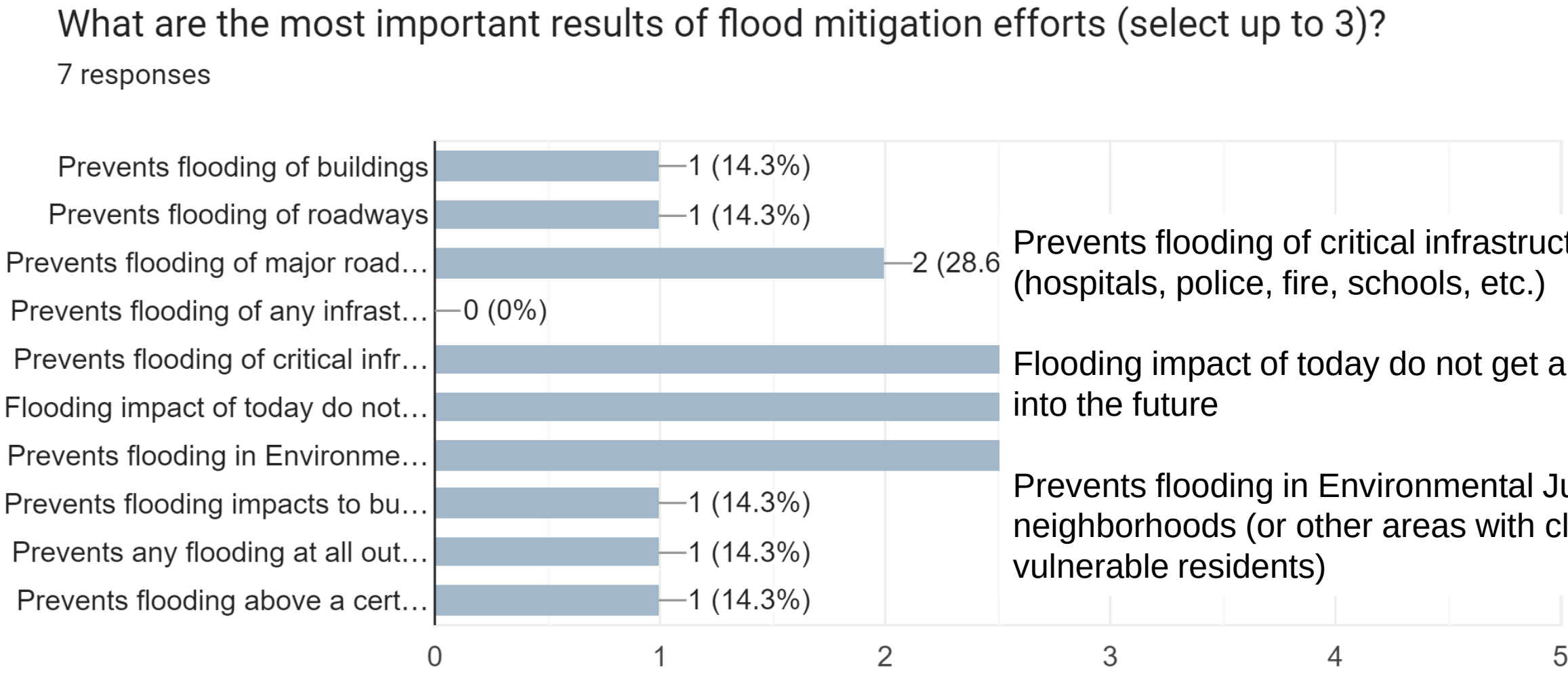


Flood Mitigation: What's the Goal?

Charles River Watershed Association



Prevents flooding of critical infrastructure (hospitals, police, fire, schools, etc.)

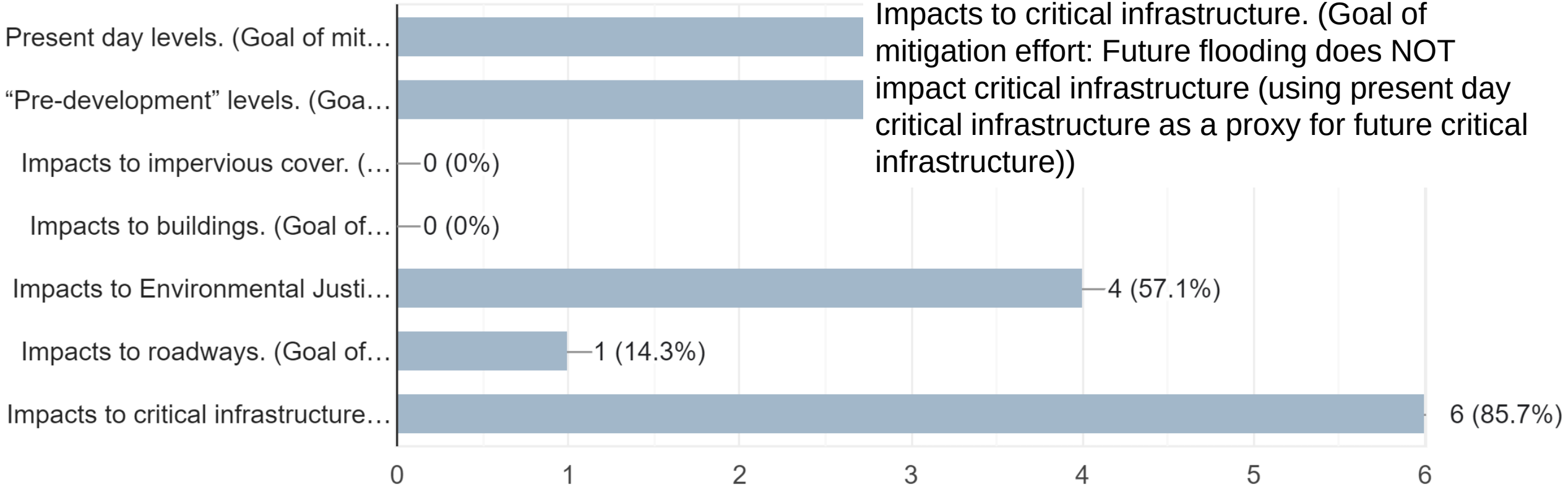
Flooding impact of today do not get any worse into the future

Prevents flooding in Environmental Justice neighborhoods (or other areas with climate vulnerable residents)

Flood Mitigation: What's the Goal?

Which of the following metrics would you like to see us use to assess the benefits of future flood mitigation model runs? Note: some of these goals ma...and depths of future flooding to (select up to 3):

7 responses



Impacts to critical infrastructure. (Goal of mitigation effort: Future flooding does NOT impact critical infrastructure (using present day critical infrastructure as a proxy for future critical infrastructure))

Stormwater Flooding Mitigation: Watershed Scale

Charles River Watershed Association

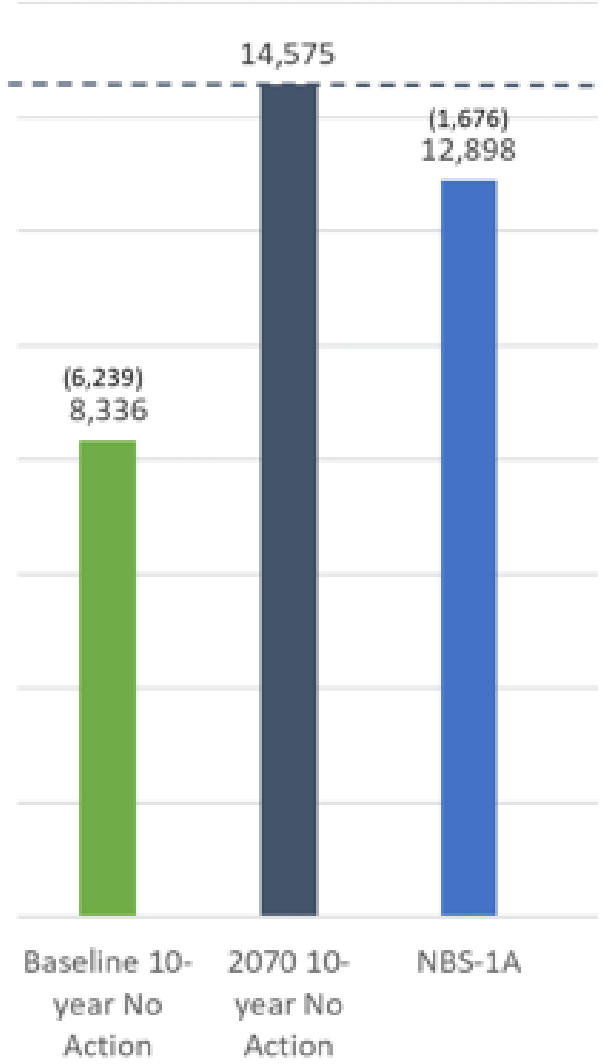
What have we learned?

- We can do things to **reduce** future flooding impacts
- Example: Updating regulations to require flood storage

Modeling Scenario NBS-1A

Use green stormwater infrastructure (GSI) to store the 2070 2-year storm (4.5") runoff from 50% of all impervious cover

Total runoff volume during the 2070 10-year event



Stormwater Flooding Mitigation: Watershed Scale

Charles River Watershed Association

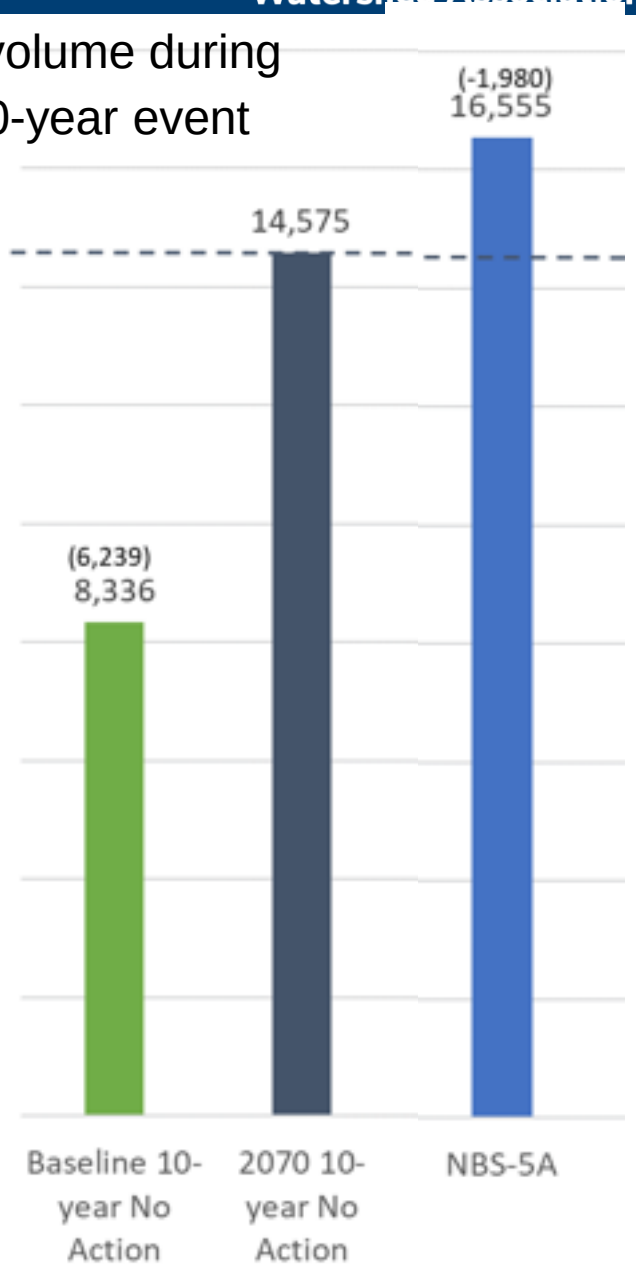
What have we learned?

- We can do things to **exacerbate** future flooding impacts
- Example: Not valuing the flood protection properties of undeveloped areas

Modeling Scenario NBS-5A

15% of current undeveloped/ unprotected land is developed

Total runoff volume during the 2070 10-year event



Stormwater Flooding Mitigation: Site Scale

Charles River Watershed Association

Natick High School

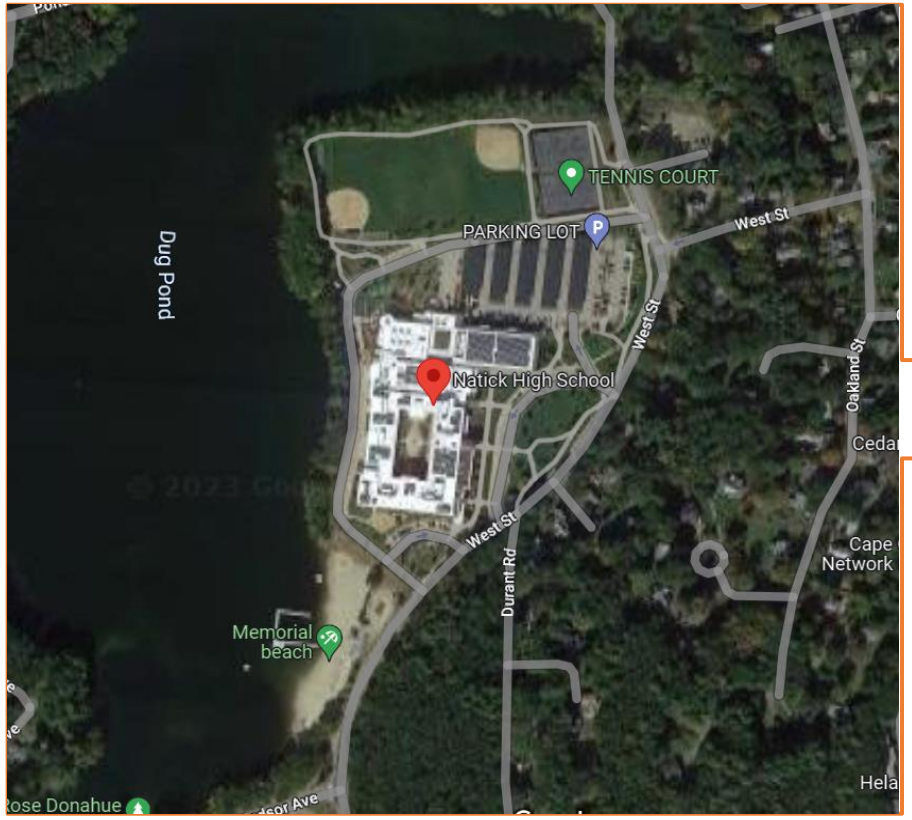
Hardy Pond, Waltham

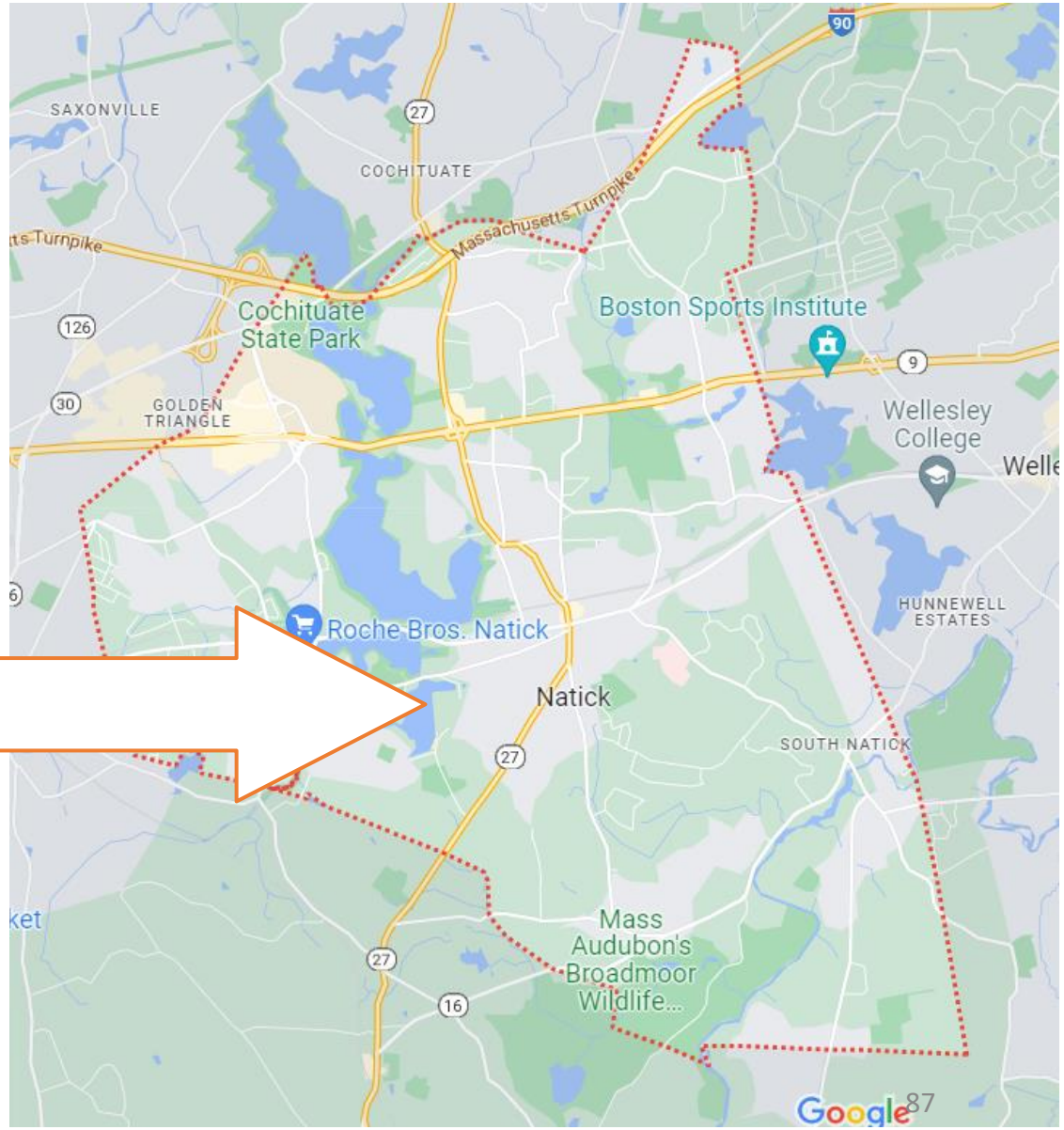
Albemarle Field, Newton

Natick High School

Charles River Watershed Association

Project Location





Dug Pond/Subwatershed Contexts

Subbasins

10-yr (10% AEP) 24-hour storm - 2070

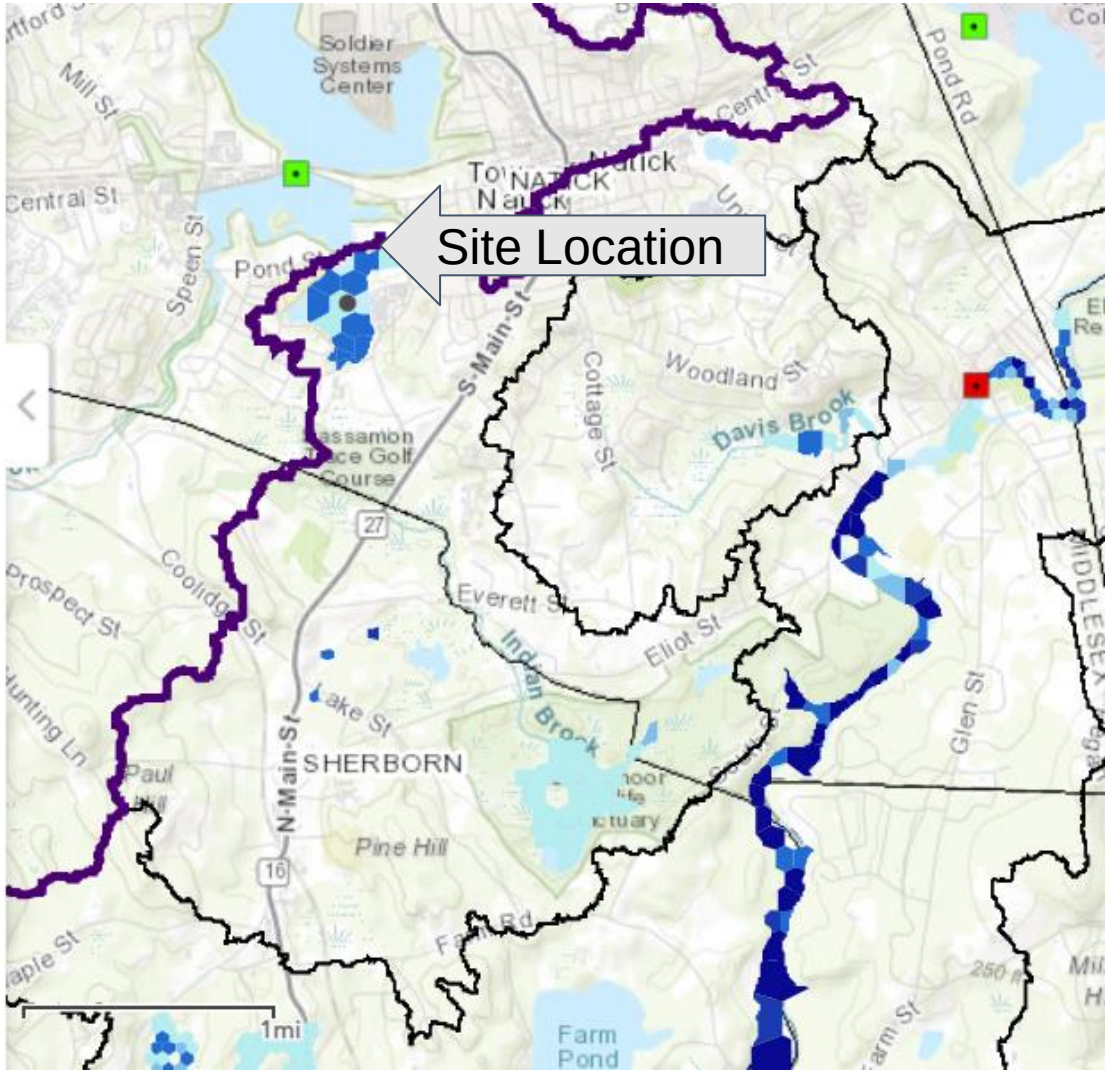
MAXDEPTH

- >3.0'
- >2.0' - 3.0'
- >1.0' - 2.0'
- >0.5' - 1.0'
- >0' - 0.5'

No Flood

Massachusetts Boundaries

Massachusetts Municipalities



Natick High School

Charles River Watershed Association

Future Flooding Projected at Natick HS

Subbasins

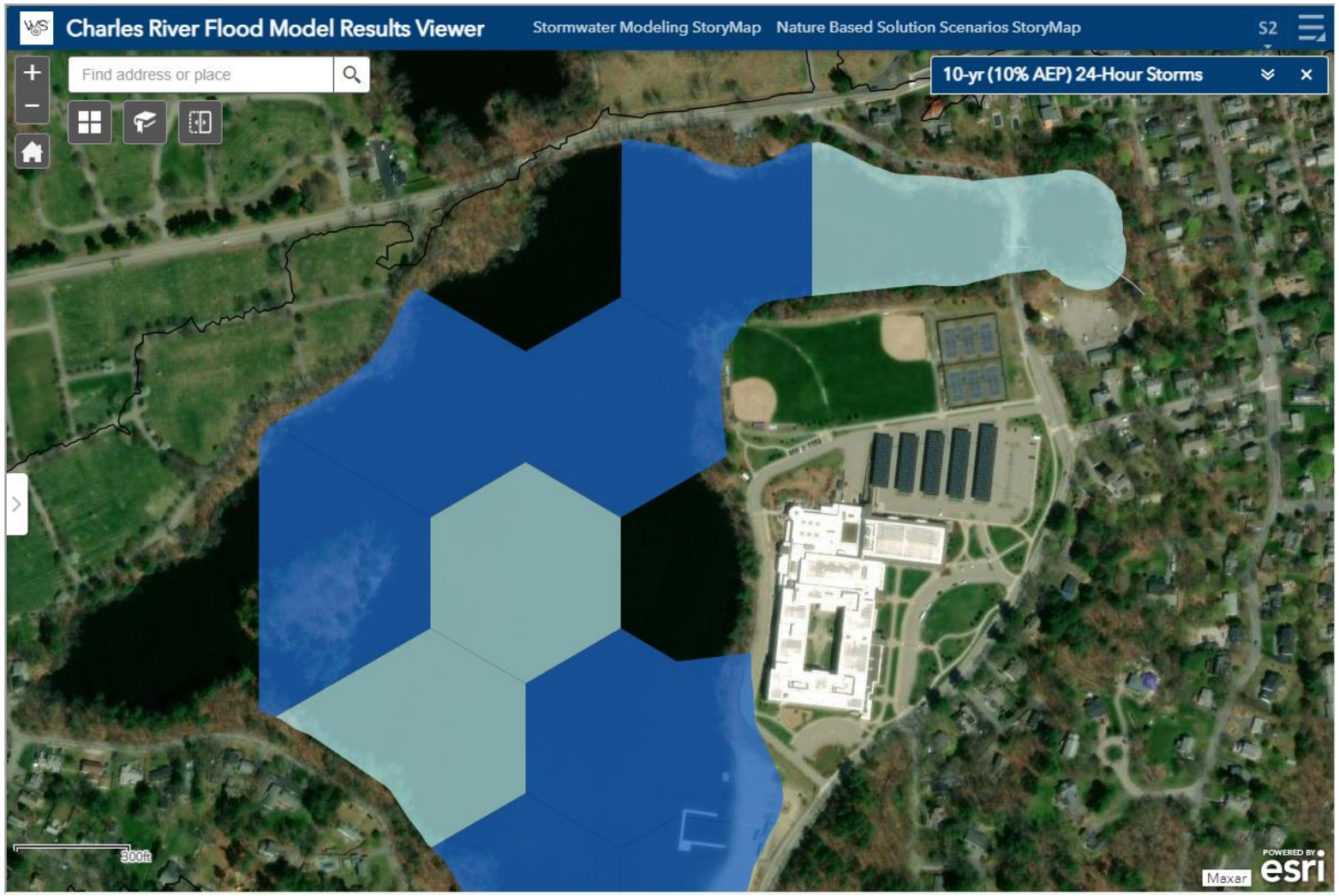
10-yr (10% AEP) 24-hour storm - 2070

MAXDEPTH

- >3.0'
- >2.0' - 3.0'
- >1.0' - 2.0'
- >0.5' - 1.0'
- >0' - 0.5'
- No Flood

Massachusetts Boundaries

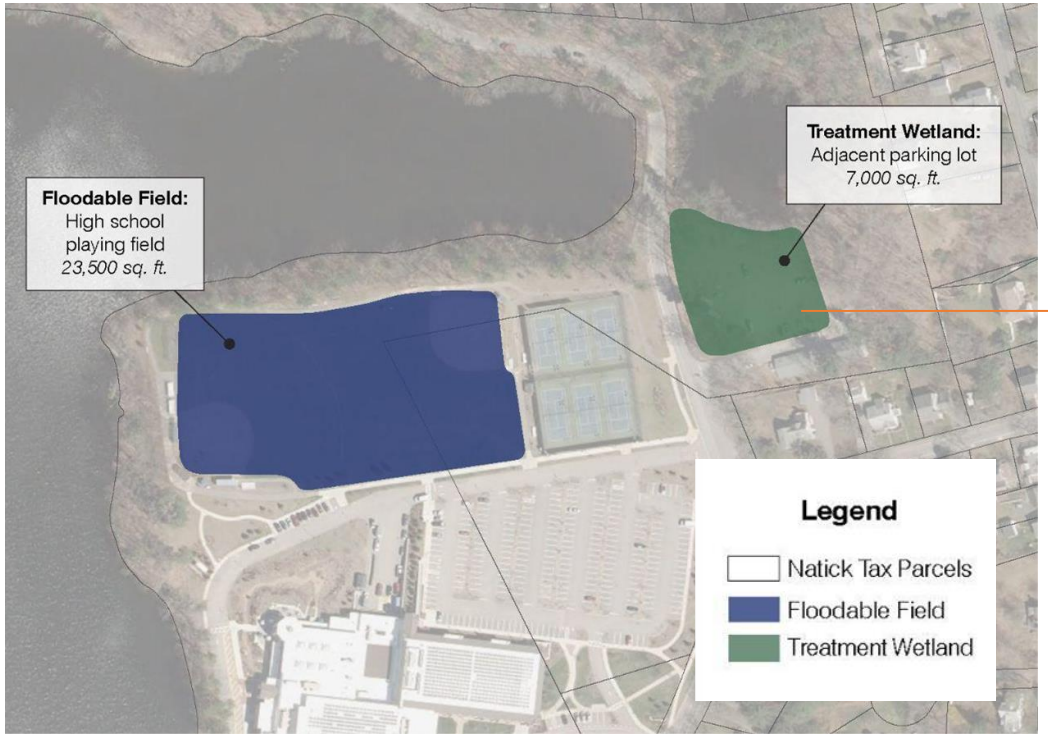
Massachusetts Municipalities



Natick High School

Opportunities

- Auxiliary parking lot
- Frequent flooding from small pond (yellow circle)
- Underground storage with controlled outlet structure
- Combined grey and green infrastructure
- Enhance existing stormwater system



Renaturalize space

Constructed Wetland

Additional floodable storage space

Natick High School

Charles River Watershed Association

Benefits and Co-Benefits

- Water quality improvement
- Increased storage capacity
- Increased rain water harvesting and reuse
- Education / STEM resource
- Less-intense and more frequent storms can be managed

Potential Challenges and Concerns

- Already significant stormwater management upgrades
- Large scale flood benefits require a big footprint
- Playing field improvements: need to maintain function for students
- Auxiliary parking lot: Field house present, need to maintain access

Hardy Pond

Project Description:

- Alter pond outlet to provide more runoff storage during wet weather
- Remove fill to restore adjacent wetlands
- Implement green stormwater infrastructure to treat runoff going into the pond

Hardy Pond

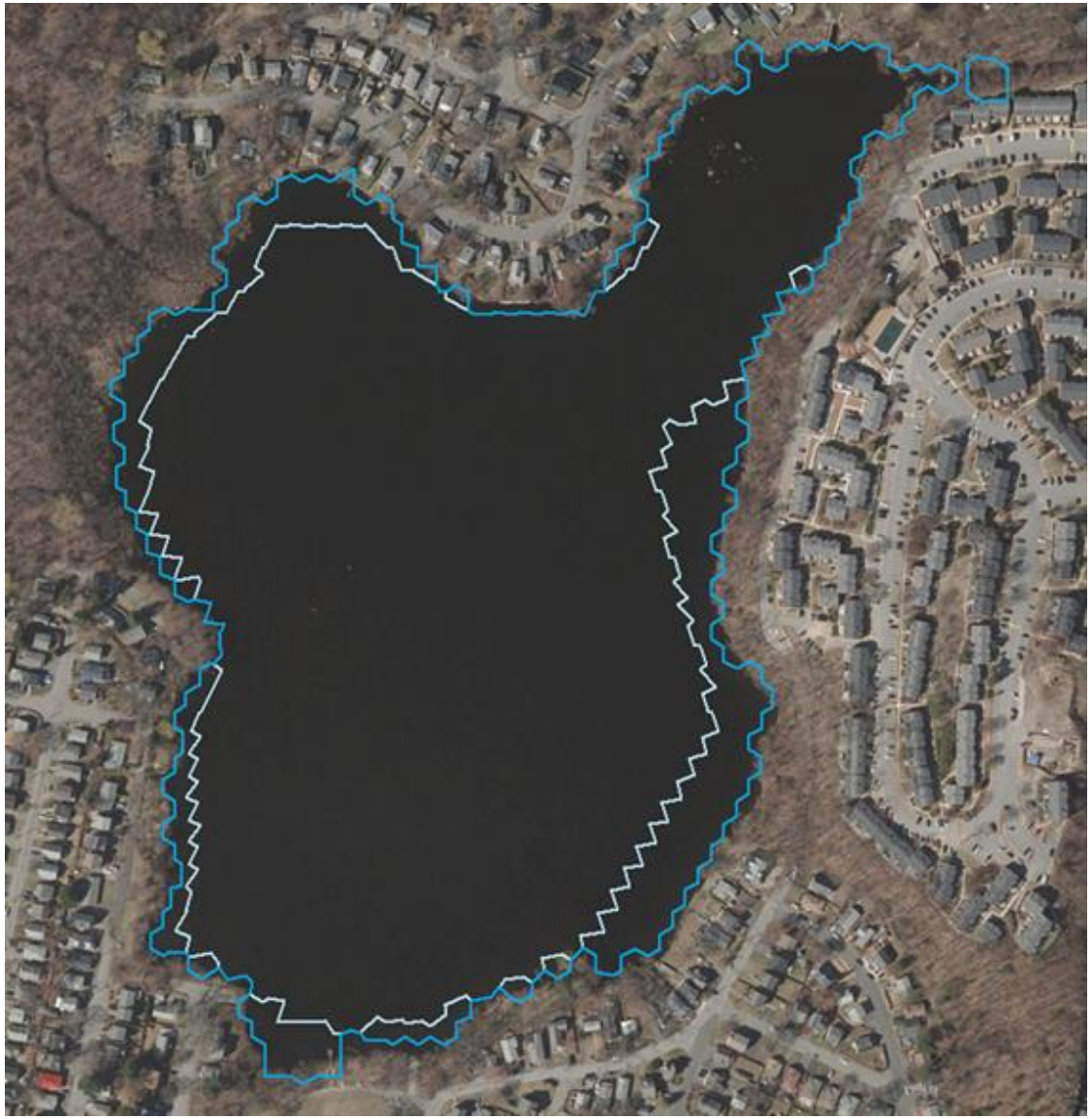


Figure: Inundated Area During the Baseline Climate, 2-year, 2-hour event, Proposed (light blue) Concept vs. No Action (medium blue)

Number of Impacted Houses

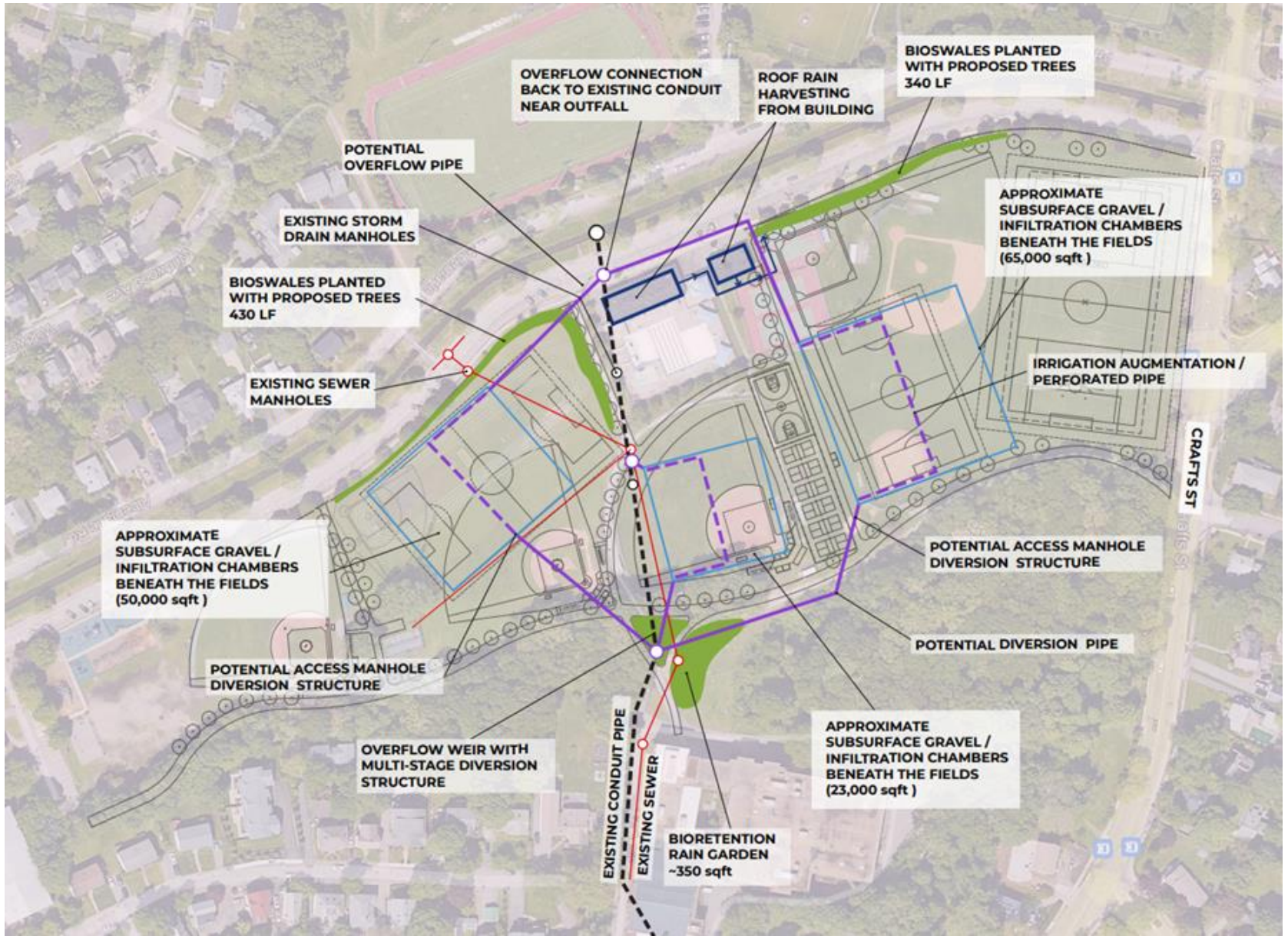
Duration	Recurrence Interval	2070 Climate	
		No Action	Proposed
2-hour	2-year	1	0
	10-year	3	0
24-hour	2-year	3	0
	10-year	8	1

Albemarle Park

Charles River Watershed Association

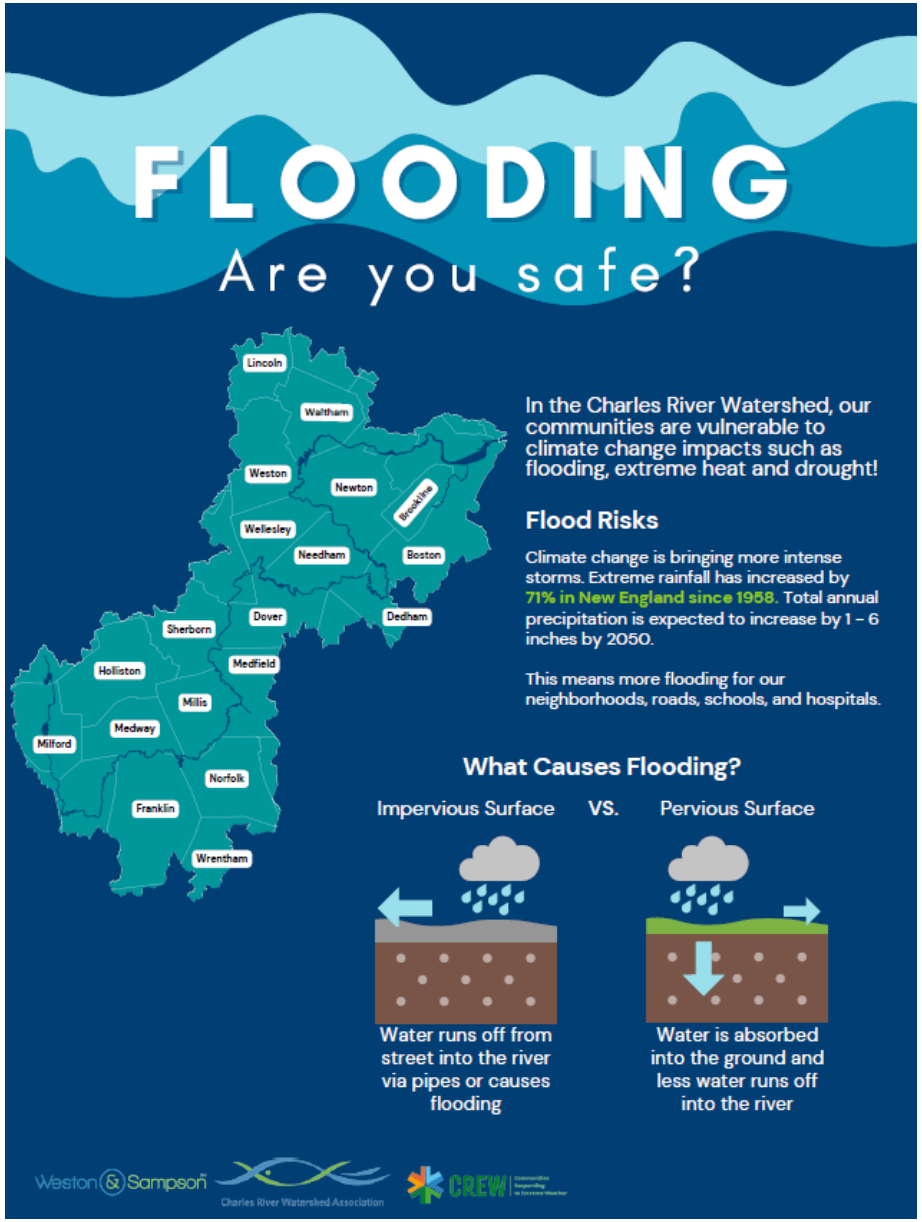
Legend

- BMPS / Bioswales
- Roof Rain Harvesting
- Conveyance
- Existing Conduit
- Underground Storage
- Potential Underground Storage Extension
- Diversion Pipe
- Perforated Pipe
- Existing Outfall
- Proposed Overflow Connections / Manhole Access



Thank you!

Charles River Watershed Association



Julie Dyer Wood
Climate Compact Director
jwood@crwa.org

Learn more at: crwa.org

Show me the Money! Funding & Financing Options for Stormwater Infrastructure

Moderator: Andrea Braga

Summit Co-Chair

Jacobs

EBC

Environmental Business Council of New England

Energy Environment Economy

Show me the Money! Funding & Financing Options for Stormwater Infrastructure

Heather Dumais

State Hazard Mitigation Officer
Maine Emergency Management Agency (MEMA)

EBC
Environmental Business Council of New England
Energy Environment Economy

FEMA HAZARD MITIGATION ASSISTANCE (HMA) GRANTS

Heather Dumais

State Hazard Mitigation Officer

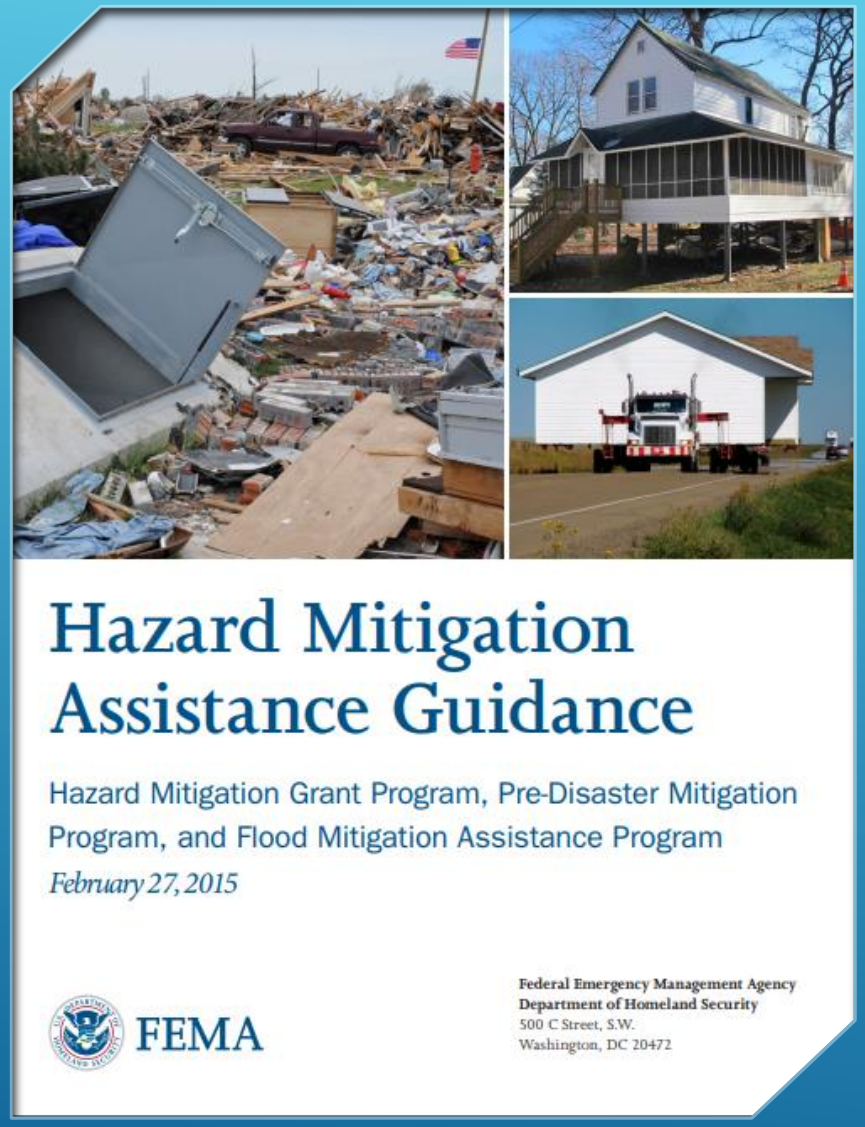
207 441 9510

heather.dumais@maine.gov

HAZARD MITIGATION ASSISTANCE (HMA)

Hazard mitigation is any **sustainable** action that **reduces** or **eliminates** long-term risk to people and property from **future disasters.** Mitigation planning breaks the cycle of disaster damage, reconstruction and repeated damage.

Hazard mitigation includes long-term solutions that reduce the impact of disasters in the future.



HAZARD MITIGATION ASSISTANCE GUIDANCE

https://www.fema.gov/sites/default/files/2020-07/fy15_HMA_Guidance.pdf

DISASTER

Hazard Mitigation Grant Program
(HMGP)

Non Disaster

Flood Mitigation Assistance Grant
(FMA)

Building Resilient Infrastructure and Communities Grant
(BRIC)

Legislature Pre-Disaster Mitigation Grant
(LPDM)

WHAT IS A DISASTER GRANT?

A **presidential major disaster declaration** makes funds available if requested by a governor or tribal executive in eligible communities in a state, tribe or territory. The amount of funding is based on the estimated total federal assistance, subject to a sliding scale formula.

MAINE

CLOSED: DR-4522: For the major disaster declared for the COVID-19 pandemic, the President has authorized, pursuant to section 404 (42 U.S.C.5170c) of the Robert T. Stafford Act Disaster Relief and Emergency Assistance Act ("Stafford Act"), FEMA to provide the State of Maine the Hazard Mitigation Grant Program.

CLOSED: DR-4647: On March 15, 2022, President Biden awarded Knox, Waldo, and York Counties a Disaster Declaration for the Halloween Storm Event, October 30-31, 2021. Maine Emergency Management Agency allows all counties in Maine to apply for this funding.

WHAT IS A NON DISASTER GRANT?

FEMA pre-disaster hazard mitigation program: "…. to implement a sustained **pre disaster** natural hazard mitigation program to reduce overall risk to the population and structures from future hazard events, while also reducing reliance on Federal funding in future disasters. "

BRIC and FMA are
ANNUAL GRANTS
Currently annual: LPDM

SUB APPLICANT ELIGIBILTY CRITERIA

►**Local governments, including cities, townships, counties, special district governments, state agencies, and tribal governments** (including federally recognized tribes who choose to apply as sub applicants) are considered sub applicants and must submit sub applications to their state/territory/tribal applicant agency. DISASTER GRANTS 501C3 CAN ALSO APPLY

►Tribal governments (federally recognized) and non-federally recognized tribes can choose to apply as a sub applicant to an eligible state or territory.

►**Homeowners, business operators, and non-profit organizations **cannot** apply directly to FEMA Non-Disaster Grant BUT can apply to Disaster grants.

ALL GRANTS: REIMBURSEABLE WITH A COST SHARE GRANT (75/25 SPLIT)

* A letter of commitment must accompany application

75% federal share
25 % non federal share (in kind is allowed)

SMALL IMPOVERISHED COMMUNITIES:
FEMA may provide up to 90% of the cost of eligible mitigation activities.

90% federal share
10 % non federal share
(in kind is allowed)

FUNDS MAY BE USED FOR:

- **Capability and Capacity Building (C&CB) Activities: VARIES BETWEEN DISASTER AND NON DISASTER**
  - **Mitigation planning and planning-related activities:** Under the allocation, only up to $500,000 may be used for mitigation planning and planning-related activities…may be used for mitigation planning and planning-related activities per Applicant. (DOES NOT NEED A BCA OR a currently approved LHMP)
  - **Project Scoping:** activities are designed to develop mitigation strategies and obtain data to prioritize, select, and develop complete applications in a timely manner that result in either an improvement in the capability to identify appropriate mitigation projects or in the development of an application-ready mitigation project for BRIC or another. (DOES NOT NEED A BCA)
  - **Building codes activities:** building code adoption and enforcement efforts (DOES NOT NEED A BCA)
  - **Partnership activities:** support and promote the proposed project, help generate community-wide awareness of the risks the proposal is designed to address, provide advice or assistance, etc. Potential partners may include non-governmental organizations, colleges and universities, private organizations, or other government entities. (DOES NOT NEED A BCA)

Funds may be used for….

- **Mitigation Projects: …**to implement cost-effective SHOVEL READY mitigation projects designed to increase resilience and public safety and reduce injuries, loss of life, and damage and destruction of property, including damage to critical services and facilities.

  - **PHASED PROJECTS (Non Disaster ONLY):** Phased projects are allowed for complex projects to prepare all technical and environmental information, including design, engineering studies, final benefit cost analysis and permitting, before issuing a full construction approval. Phasing is for projects that are further along in development but for which funding is lacking to complete certain technical pieces. Phasing a project allows funds to be reserved through the same grant cycle.

Funds may be used for….

- **Management Costs: …**FEMA may provide financial **assistance to reimburse the recipient and subrecipient(100%)** for eligible and reasonable indirect costs, direct administrative costs, and other administrative expenses associated with a specific mitigation measure or project in an amount up to 15% of the total amount of the grant award, of which not more than 10% of the total award amount may be used by the recipient and 5% by the subrecipient for such costs.

- **Pre-Award Cost:** Pre-award costs are directly related to developing the BRIC grant application or subapplication. Applicants and subapplicants who are not granted awards or subawards will not receive reimbursement for the corresponding pre-award costs. Pre-award costs **are incurred prior to the date of the grant award. There is no start date for when they can be incurred.** They can be incurred any time prior to award. **IF THE GRANT IS NOT APPROVED AND AWARDED, THE Pre-Award Cost IS AT THE DUTY OF THE SUB APPLICANT TO PAY.**

FOR MORE INFORMATION

Hazard Assistance Grant Program
https://www.fema.gov/grants/mitigation/hazard-mitigation

Flood Mitigation Assistance (FMA) Program

https://www.fema.gov/grants/mitigation/floods

Building Resilient Infrastructure and Communities (BRIC)
https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities

? QUESTIONS ?

- Heather Dumais
- State Hazard Mitigation Officer
- 207 441 9510
- heather.dumais@maine.gov

Show me the Money! Funding & Financing Options for Stormwater Infrastructure

Jeffrey Diehl

Executive Officer & CEO
Rhode Island Infrastructure Bank (RIIB)

EBC
Environmental Business Council of New England
Energy Environment Economy

Funding & Financing Stormwater Management

RHODE ISLAND
INFRASTRUCTURE BANK

EBC Inaugural Stormwater Summit

May 4, 2023

About the Rhode Island Infrastructure Bank

Rhode Island's centralized hub of local infrastructure investment

- Clean Water
- Drinking Water
- Municipal Road & Bridge
- CSSLP & STILF
- Efficient Buildings Fund
- Brownfields
- C-PACE
- Water Quality Protection
- Stormwater Accelerator
- Municipal Resiliency
- Municipal Infrastructure Grant Program
- OSCAR
- OSG

Stormwater BMP Funding & Financing Options

State

- Clean Water State Revolving Fund
- Municipal Resilience Program
- Stormwater Project Accelerator
- Ocean State Climate Adaptation & Resilience Fund (OSCAR)

Federal

- Sewer Overflow and Stormwater Reuse Grant (OSG)
- Bipartisan Infrastructure Law

Clean Water State Revolving Fund (CWSRF)

Overview: CWSRF provides affordable, long-term financing for the completion of wastewater, stormwater and other water pollution abatement projects. The American Recovery Act of 2009 (ARRA) requires all CWSRF programs to use a portion of their federal grant for projects that address green stormwater infrastructure (GSI), water and energy efficiency, or other environmentally innovative activities.

Key Facts:

- **Below Market Rate Loan –** Interest is subsidized at 33% below the borrower's market rate.
- **Flexible Repayment –** May be repaid over a period of up to 30 years and can be structured to meet the repayment abilities unique to each borrower.
- **Loan Forgiveness Available –** Principal forgiveness options for green projects and disadvantaged communities.
- **Eligible Entities –** Municipalities, quasi-public agencies, and private entities.
- **Eligible Projects –** Wastewater and stormwater collection and treatment facilities, non-point source pollution best management practices, and other water pollution abatement and water quality protection activities.

Two athletic fields in Central Falls, Macomber Field and Perez Field, were built as GSI to help manage stormwater while also providing much needed athletic field space to the City.

Municipal Resilience Program (MRP) Action Grants

Overview: MRP Action Grants enable participating municipalities to implement climate resilience projects identified in their MRP workshops.

Key Facts:

- **Grant –** Does not have to be repaid; no interest rates or administrative fees.
- **25% Match –** Match of 25% of the grant award is required, up to half eligible to be in-kind.
- **Eligible Entities –** Municipalities
- **Eligible Projects –** Design and construction. Projects must respond to climate change vulnerabilities (ex. increasing flooding, temperatures, storm events) with sustainable approaches and long-term vision. Projects incorporating co-benefits, utilizing green infrastructure and nature-based solutions, and delivering social equity benefits are strongly prioritized.

Watershed Restoration at Bristol Golf Course & Tupelo Street – Constructed with MRP Action Grant Funds by Town of Bristol

Stormwater Project Accelerator (SPA)

Overview: SPA provides upfront capital for green stormwater infrastructure projects that will eventually be funded through federal, state, and local reimbursement grants.

Key Facts:

- **Bridge Loan –** Funds to cover up front costs for projects with reimbursement grants.
- **Interest Free –** 1.5% free charged to cover loan administration, which can often be baked into grant budget ask.
- **Eligible Entities –** Municipalities, non-profit organizations, and utilities.
- **Eligible Projects –** Green infrastructure and nature-based solutions which address water quality issues and flooding concerns.

Citizen's Bank Parking Lot & San Souci Bikeway – Constructed with Stormwater Project Accelerator Financing by Woonasquatucket River Watershed Council

Ocean State Climate Adaptation & Resilience Fund (OSCAR)

Overview: OSCAR funds can support projects that protect or enhance coastal or riverine habitats to address climate change impacts. $4 million has been allocated to date, with upcoming round RFP release date TBD. Regulatory partners include RIIB, CRMC, and DEM.

Key Facts:

- **Grant –** Does not have to be repaid; no interest rates or administrative fees, and no match requirement.
- **Eligible Entities –** Any entity that owns or controls public land
- **Eligible Projects –** Removal or relocation of infrastructure, stream restoration, wetland revegetation, land acquisition for shoreline public access, culvert resizing, additional coastal adaptation & resilience projects. Project examples include:
  - Green infrastructure & nature-based solutions
  - Relocation of infrastructure from high hazard floodplain areas
  - Other criteria to be determined by CRMC and DEM in the coming months
- **Project Stages Funded:** Planning, Design, Engineering & Permitting, Construction

Sewer Overflow and Stormwater Reuse Grant (OSG)

- Administered by EPA, the program supports sub-awards to municipal entities to complete combined sewer overflow (“CSO”), sanitary sewer overflow (“SSO”) and stormwater management projects.
- RIIB was allocated $605,000 for RI stormwater management grants and provided technical assistance to identify ~ 200 stormwater projects.
- These projects were ranked based on various criteria such as direct water quality benefits, project cost and feasibility, and engagement of environmental justice communities.
  - Top projects selected to receive conceptual design services and cost estimates include:
    - Bioretention planters at **Slater Park North Parking Lot in Pawtucket**
    - Retrofitting of drainage swales and installation of bioretention basin and pervious paver system at **Taylor’s Lane in Little Compton**

- Stormwater treatment, green space and tree canopy improvements at the **Agnes Hennessey Elementary School in East Providence** (existing conditions above)

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Show me the Money! Funding & Financing Options for Stormwater Infrastructure

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Environmental Business Council of New England
Energy Environment Economy

The DEEP Climate Resilience Fund:

Connecticut's Community Climate Resilience Grant Program

Sarah Watson
Senior Environmental Analyst
Office of Climate Planning
Office of the Commissioner

Presentation for the Environmental Business Council Stormwater Summit
May 4, 2023

Program Goals: DEEP Climate Resilience Fund

- Support Connecticut communities in resilience planning and preparing for the impacts of climate change
- Foster the development of resilience project pipelines that can compete for and win federal implementation funding
- Build resilience capacity in Connecticut

DEEP Climate Resilience Fund

- Up to $10 million available in first round. NO MATCH REQUIRED.
- 40% of funds must go to vulnerable communities, including EJ
- Must develop strategy for local match funding for implementation
- Preparing federal grant applications for construction is required

Track 1: Planning

Track 2: Project Development

NOTE: Implementation & Construction to be funded by federal grants

What Does Climate Resilience Mean?

> "(T)he ability to prepare for and adapt to changing conditions and withstand and recover rapidly from deliberate attacks, accidents or naturally occurring threats or incidents, including, but not limited to, threats or incidents associated with the impacts of climate change."

- What do impacts from hazards mean to people, property, livelihoods, health, and community services/lifelines?
- How can we reduce disruption, damage, and/or other impacts?

What Does Climate Resilience Mean?

Hazards include:

- Extreme precipitation
- Flooding from riverine, stormwater, tidal sources, or a combination
- Sea level rise (including groundwater impacts)
- Extreme temperatures (heat and cold)
- Extreme weather (winter storms, nor'easters, severe thunderstorms, tornadoes)
- Tropical storm and hurricane impacts
- Windstorms
- Wildfire
- Drought

How do these hazards change due to climate change through at least 2050?

What does changing risk mean to people, property, livelihoods, health, and community services/lifelines?

Track 1 – Planning: Overview

FY 2022 Overview:

- **Duration:** Up to 24 months
- **Amount:** Up to $250,000
- **No match required**

Climate resilience planning

Regional, Municipal, or neighborhood (hyper-local) scale

Community engagement to support equitable climate resilience planning

Grant writing for next steps

Track 2 – Project Development: Overview

FY 2022 Overview:

- **Duration:** Up to 18 months
- **Amount:** Expect to fund a range between $300,000 and $700,000, but no limit.
- **No match required**

- Site studies and selection
- Preliminary designs
- Engineering studies
- Benefit cost analyses
- Community engagement
- Federal grant writing

- Anything else that supports a competitive application to federal resilience competitions.

- **<u>Does Not Include</u> funding for implementation or construction**

Differences Between Tracks

Track 1 – Planning

- Develop a plan
- Identify potential projects
- Identify vulnerability
- Engage community and stakeholders

- Typical applicants: local government, councils of government, utilities, non-profits/academia/consulting firms already partnering with communities

- Typical applications may have multiple partners involved

Track 2 – Project Development

- Already have a plan
- Ready to advance identified projects
- Already understand vulnerability
- Continue engaging community and stakeholders

- Typical applicants: local governments, utilities, COGs, and nonprofits that already manage federal grants or infrastructure projects

- Depending on scope, typical applications will only have partners directly impacted by and/or contributing to the project

Who Can Apply?

Eligible applicants <u>include</u>:

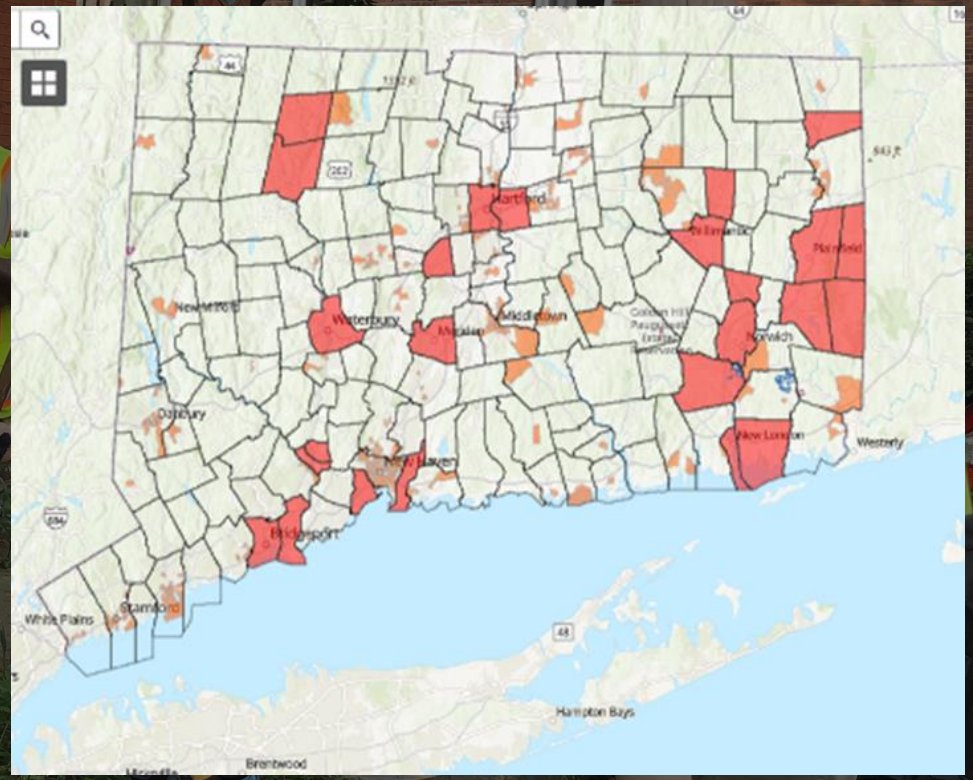
- Local government
- Councils of Government
- Nonprofit organizations
- Utilities
- Academic institutions
- Private sector

Note: All applications **must** demonstrate strong commitment and partnerships with local governments and community organizations.

Prioritizing Vulnerable Communities

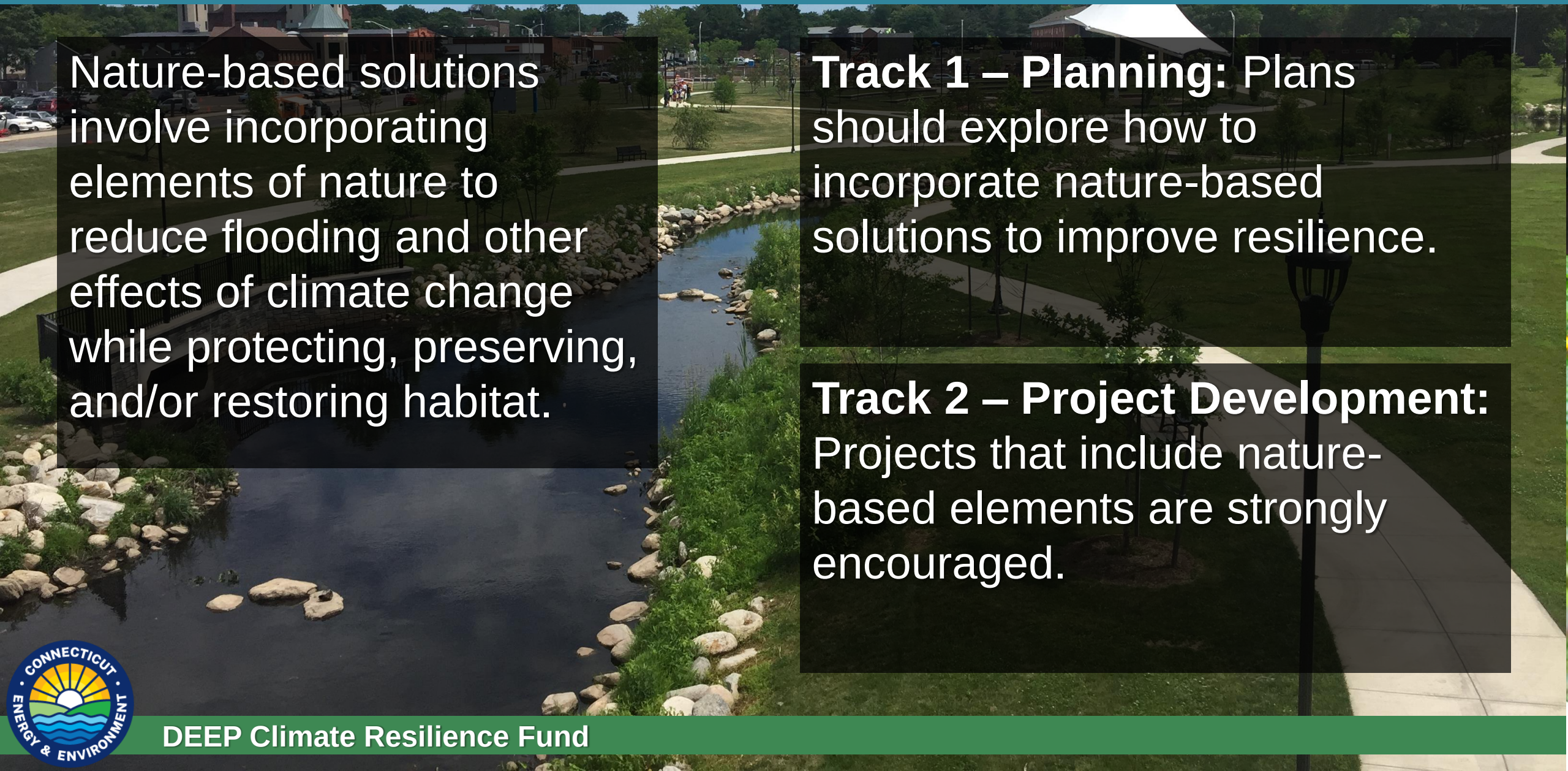
At least 40% of resources must go to municipalities where vulnerable people reside.

This means if DEEP awards $10 million in grants, at least $4 million must go to municipalities where vulnerable people reside.



CT Environmental Justice Communities

Nature-based Solutions



Nature-based solutions involve incorporating elements of nature to reduce flooding and other effects of climate change while protecting, preserving, and/or restoring habitat.

Track 1 – Planning: Plans should explore how to incorporate nature-based solutions to improve resilience.

Track 2 – Project Development: Projects that include nature-based elements are strongly encouraged.

Community Engagement

Track 1: Planning:
Minimum of 3 public meetings, including 1 to share results with community and one final feedback opportunity.

Strongly encourage more!

Track 2: Project Development
Minimum of 2 public meetings, including 1 to share results.

Engagement must be commensurate with proposed scope of work

Community Liaisons are eligible expenses for both tracks

Required Deliverables

Track 1: Planning:
Copy of the prioritized list of next steps (unless already in plan)

Track 2: Project Development
Copy of draft project narrative for federal grant application

- Copy of funded activity (plan, design, study, etc.)
- Executive summary highlighting the process and lessons learned
- Funding assessment exercise
- Presentation slide communicating accomplishments and lessons

Local Match Funding Strategy

All grantees (Tracks 1 and 2) are required to develop a local match funding strategy to meet the non-federal match requirements of federal funding opportunities.

The local match strategy may include using the stormwater authority and climate resilience board expansions authorized under Governor Lamont's **Public Act 21-115**

Questions?

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Legal “Minute” Updates

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