

FY22 MS4 Municipal Assistance Grant
Continued Phosphorous Control Planning and Initiation of Implementation

Workshop #3: Public BMPs – Maximizing the
Cost/Benefit Equation



May 10, 2022

1:00 PM to 3:00 PM



1:00 PM Welcome & Introductions

1:10 PM Technical Presentation

- Cost/Benefit Data Presentation
- Integrating PCP compliance with other community initiatives

2:00 PM Panel Discussion and Open Forum

- Catherine Woodbury, Cambridge
- Brutus Cantoreggi, Franklin
- Wayne Chouinard, Arlington
- Kerry Reed, Framingham / Central Mass Stormwater Coalition

2:55 PM Next Steps

3:00 PM Adjourn



Feel free to use the chat during the Technical Presentation



During the open discussion and Q&A please use the **“Raise Hand”** Feature and you will be called on

Project Team



Julie Wood
DEPUTY DIRECTOR



Julia Hopkins
COMMUNICATIONS &
OUTREACH MANAGER



Matt Davis, PE
TECHNICAL LEAD
mdavis@brwnald.com



Stephanie Alimena, PE,
WATER RESOURCES ENGINEER
salimena@brwnald.com



Andrew Goldberg,
WATER RESOURCES PLANNER
agoldberg@brwnald.com

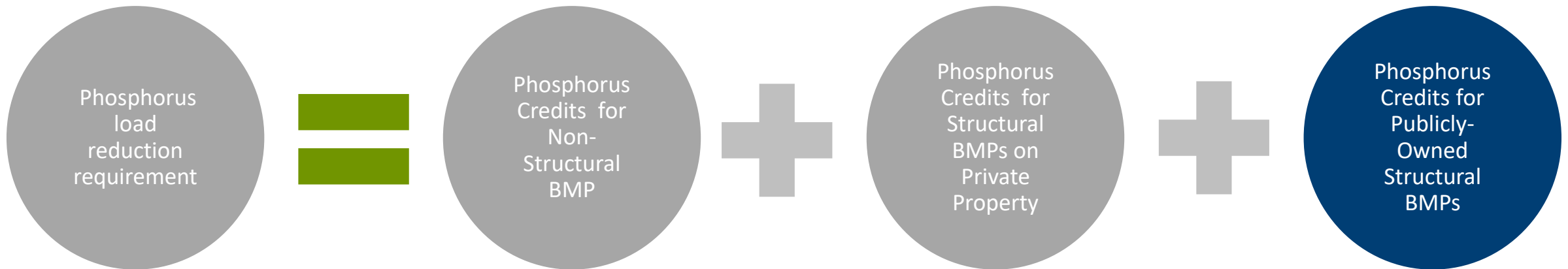
Workshop Title	Date & Time	Key Goals
Workshop 1: All About the Loads – Baseline Loads, Impact from EPA’s RDA	3/8 1-3pm	<ul style="list-style-type: none">✓ Provide baseline load methodology✓ Update and discuss RDA
Workshop 2: Non-structural Controls and Private BMPs – How to Get Credits	4/5 1-3pm	<ul style="list-style-type: none">✓ Provide methodology for tracking non-structural BMPs✓ Review data requirements for private BMP tracking✓ Regulatory guidance✓ Best-practices open forum
Workshop 3: Public BMPs – Maximizing the Cost-Benefit Equation	5/10 1-3pm	<ul style="list-style-type: none">✓ Present updated BMP cost data✓ Panel discussion on public BMP wins
Q&A	5/24 1-3pm	<ul style="list-style-type: none">✓ Ask regulators questions about the Permit and Phosphorus Control Planning



Workshop 1

Workshop 2

Workshop 3



<https://www.crwa.org/phosphorus-control-planning-support.html>

Goals of Today's Presentation

- Discuss structural BMP phosphorus credit calculations
- Review structural BMP survey data
- Discuss potential overall phosphorus control costs for communities
- Panel discussion
 - What is working?
 - What is not?
 - What approaches are municipalities taking?



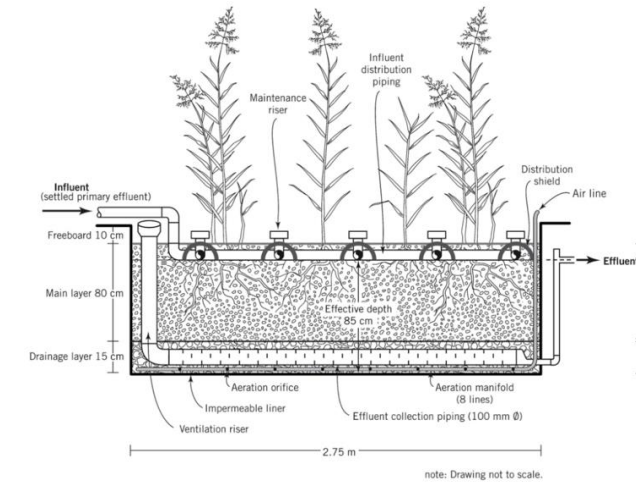
Image Credit: CRWA. Edenfield Avenue Green Street – Watertown, MA

What Types of Structural BMPs are Eligible for Credits?

MS4 Permit, Appendix F, Attachment 3 provides credit system for following BMP types:

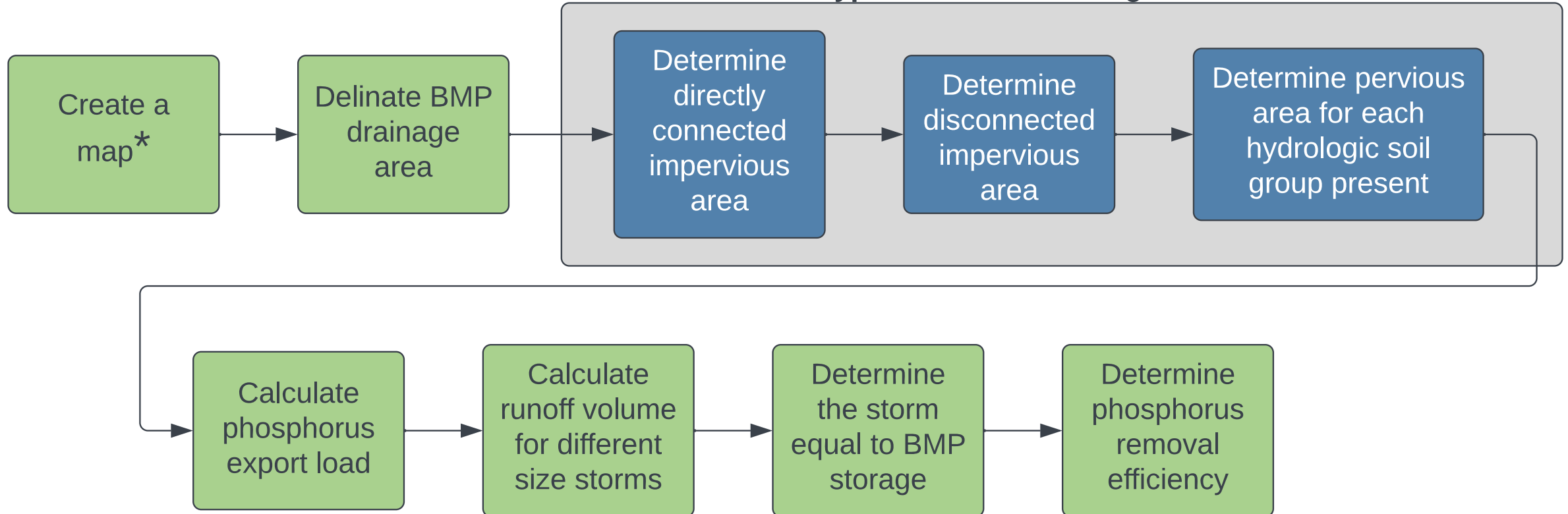
- Subsurface infiltration
- Infiltration or water quality swales
- Rain gardens
- Bioretention
- Biofiltration - filter media, tree box filters, etc.
- Gravel wetland
- Enhanced biofiltration with internal storage reservoir
- Sand filter
- Porous pavement
- Wet pond
- Dry pond
- Impervious area disconnection using storage - rain barrels, cisterns, etc.

Credits for other type of BMPs may be allowed with adequate supporting documentation



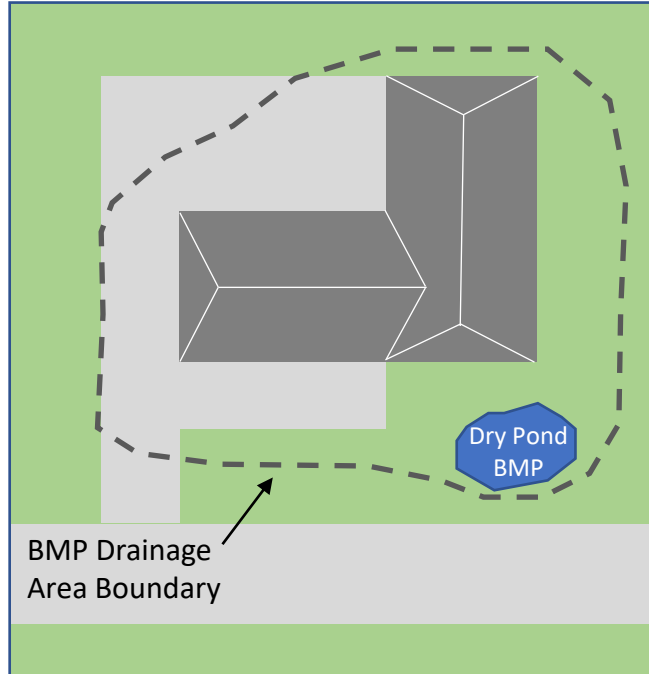
To learn more about individual types of BMPs see:
[Massachusetts Stormwater Handbook and Stormwater Standards](#)

For each land use type within the drainage area...



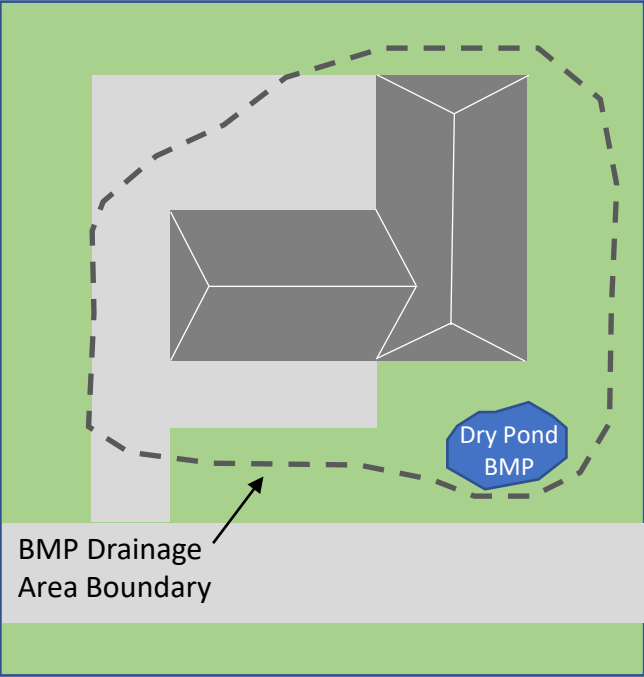
* Helpful layers to include in your map:

- Topo lines
- Land use
- Site plan/orthophoto
- Hydrologic soil types



- BMP type: Dry Pond
- Storage volume: 3,700 cf
- Treats runoff from commercial property
- Hydrologic Soil Groups A and B present

Calculate Phosphorus Export Load

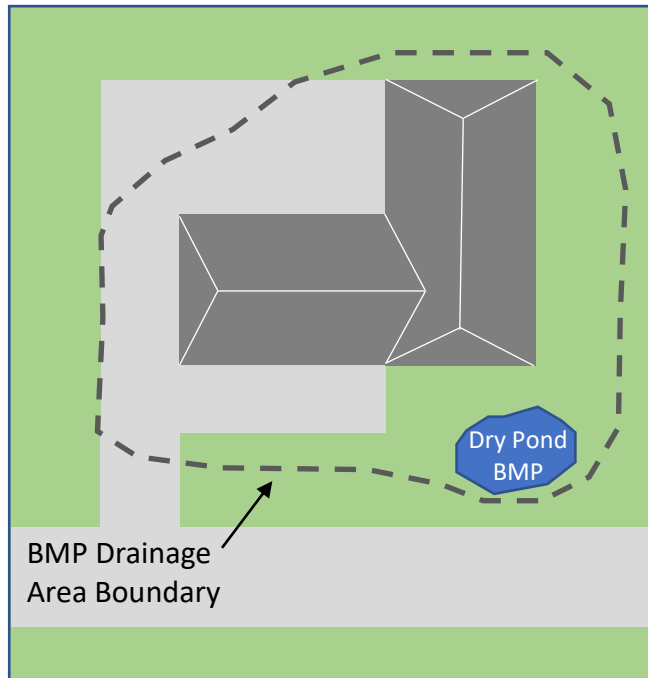


Land Category	BMP Drainage Area after Redevelopment		
	Land Area (ac)	Phosphorus Loading Export Rate (lb/ac/yr)	Annual P Export (lb/yr)
Directly Connected Impervious Area			
Commercial	1.00	1.78	1.78
Pervious Area			
Commercial			
HSG A	0.40	0.03	0.01
HSG B	0.20	0.12	0.02

Total 1.82

Measured values ↑
 Rates from Table 3-1, Appendix F, Attachment 3 ↑
 Annual amount of phosphorus exported (without BMP) ↑

Calculate Runoff Volume



Measured values

Impervious Area (ac)	1.00
Pervious Area (ac)	
HSG A	0.4
HSG B	0.2

Rain (in)	Runoff Depth (in)			Runoff Volume (cf)			
	Impervious	Pervious HSG A	Pervious HSG B	Impervious	Pervious HSG A	Pervious HSG B	Total
0.1	0.1	0	0	363	-	-	363
0.2	0.2	0	0	726	-	-	726
0.4	0.4	0	0	1,452	-	-	1,452
0.5	0.5	0	0.01	1,815	-	7	1,822
0.6	0.6	0.01	0.02	2,178	15	15	2,207
0.8	0.8	0.02	0.03	2,904	29	22	2,955
1.0	1.0	0.03	0.04	3,630	44	29	3,703
1.2	1.2	0.04	0.05	4,356	58	36	4,450
1.5	1.5	0.08	0.11	5,445	116	80	5,641
2.0	2.0	0.14	0.22	7,260	203	160	7,623

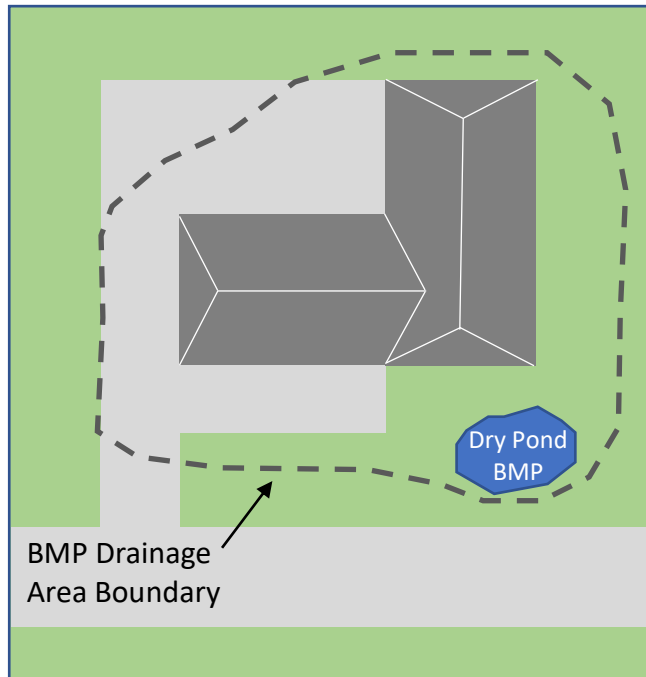
Rates from Table 3-1, Appendix F, Attachment 3

Runoff Depth x Area

Determine BMP Treatment Capacity

The dry pond has a volume of 3,700 cf. It can retain runoff from the 1-inch storm.

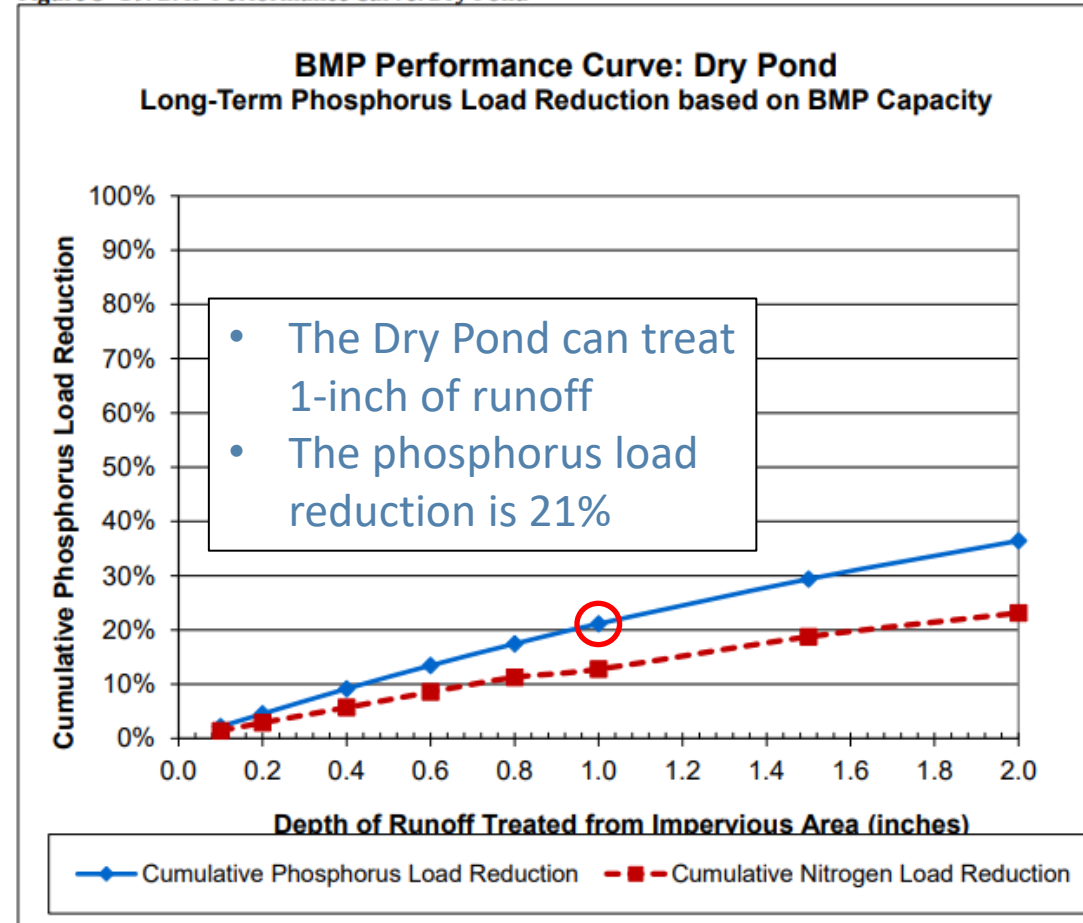
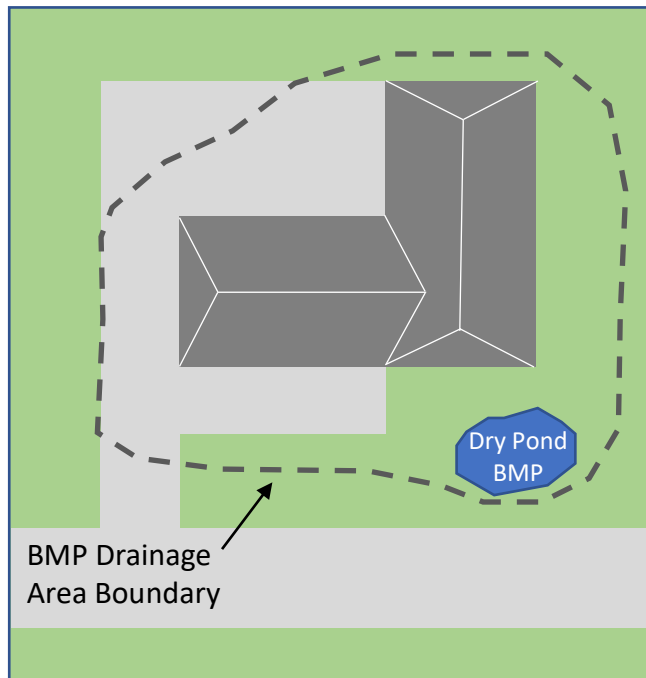
Impervious Area (ac)	1.00
Pervious Area (ac)	
HSG A	0.4
HSG B	0.2



Rain (in)	Runoff Depth (in)			Runoff Volume (cf)			
	Impervious	Pervious HSG A	Pervious HSG B	Impervious	Pervious HSG A	Pervious HSG B	Total
0.1	0.1	0	0	363	-	-	363
0.2	0.2	0	0	726	-	-	726
0.4	0.4	0	0	1,452	-	-	1,452
0.5	0.5	0	0.01	1,815	-	7	1,822
0.6	0.6	0.01	0.02	2,178	15	15	2,207
0.8	0.8	0.02	0.03	2,904	29	22	2,955
1.0	1.0	0.03	0.04	3,630	44	29	3,703
1.2	1.2	0.04	0.05	4,356	58	36	4,450
1.5	1.5	0.08	0.11	5,445	116	80	5,641
2.0	2.0	0.14	0.22	7,260	203	160	7,623

Calculate BMP Treatment Efficiency

Figure 3- 19: BMP Performance Curve: Dry Pond



Structural BMP Costs from Charles River Communities

Recall Call for Cost Data:

Hi Folks,

You may receive this in a few different emails, apologies for cross posting but we are trying to be thorough. If you are not the MS4 contact for your community, can you please pass this request on to them?

As part of our [MassDEP MS4 Assistance Grant funded project](#) we are compiling cost information on BMP construction locally. We plan to compile all the information received and present it back to you all in a useful format. The more data and examples we get the more useful this will be! Some additional details on this process from Brown & Caldwell are provided below.

Here are the steps to sharing your data:

1. Decide how you want to share the data with us, you have three options:
 - complete the attached Excel sheet
 - send us files which include cost information
 - do a phone interview with our team (skip to #3)
2. Complete the attached Excel sheet or compile the documents you plan to provide
3. Use this [Google form](#) to submit the Excel sheet and/or files OR to request a phone interview
4. For those that request a phone interview, we will be in touch to schedule.

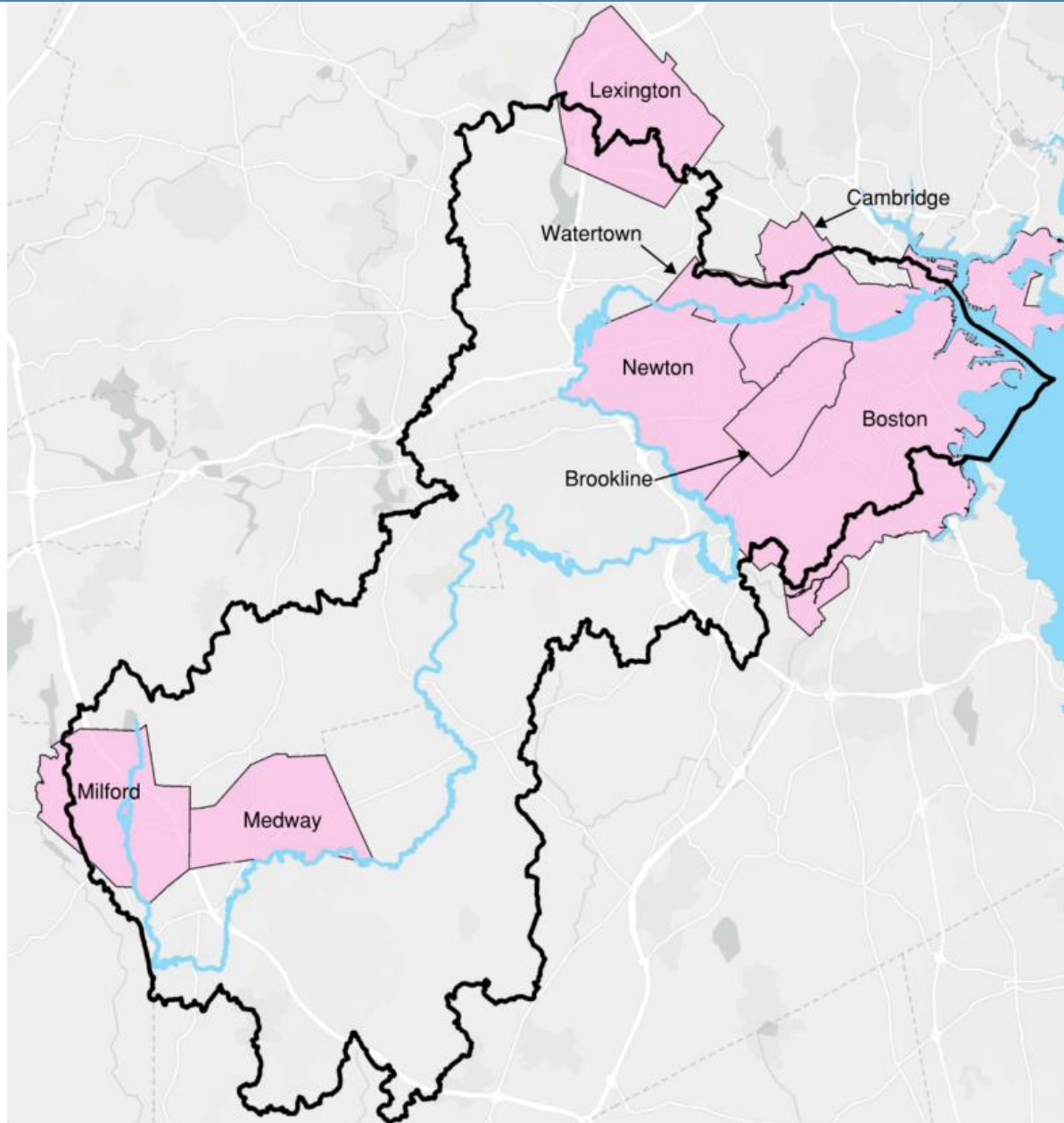
Finally, don't forget to sign up for all the [great workshops](#) we are providing through this project. The first one is on Tuesday.

Additional details from Brown & Caldwell on data collection & use:

Information about the costs and benefits of stormwater BMPs that Permittees provide through this data request will be aggregated and shared to inform the development of phosphorus control plans and public decision-making about implementing cost-effective stormwater BMPs. Findings will be shared on the project website and through Workshop #3, which is scheduled for May 10. Respondents may revisit the survey more than once.

Question? Please reach out to me at jwood@crwa.org or Iris Seto at iset@crwa.org.

Communities that Provided BMP Data

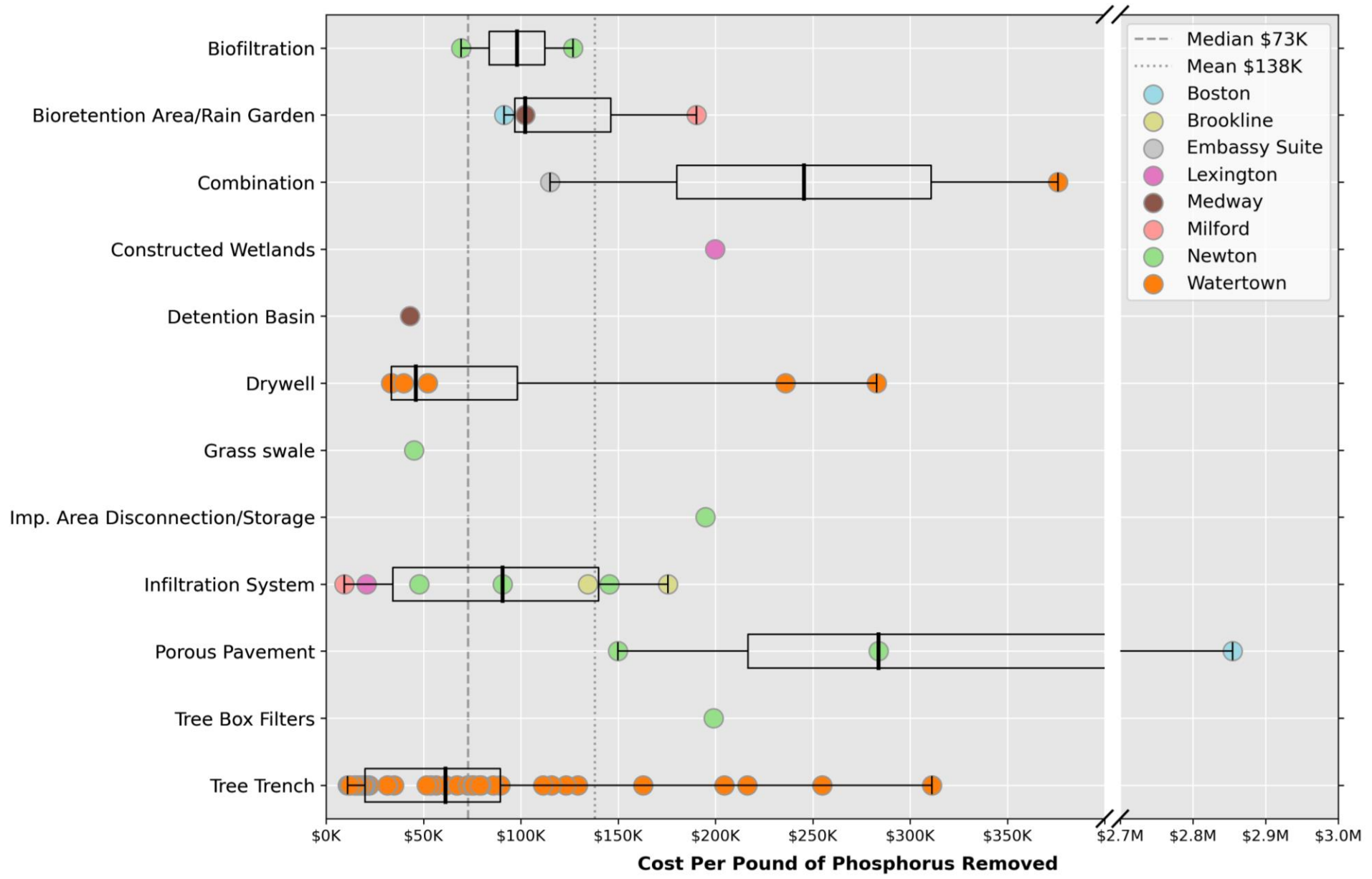


Types of BMP Data Received

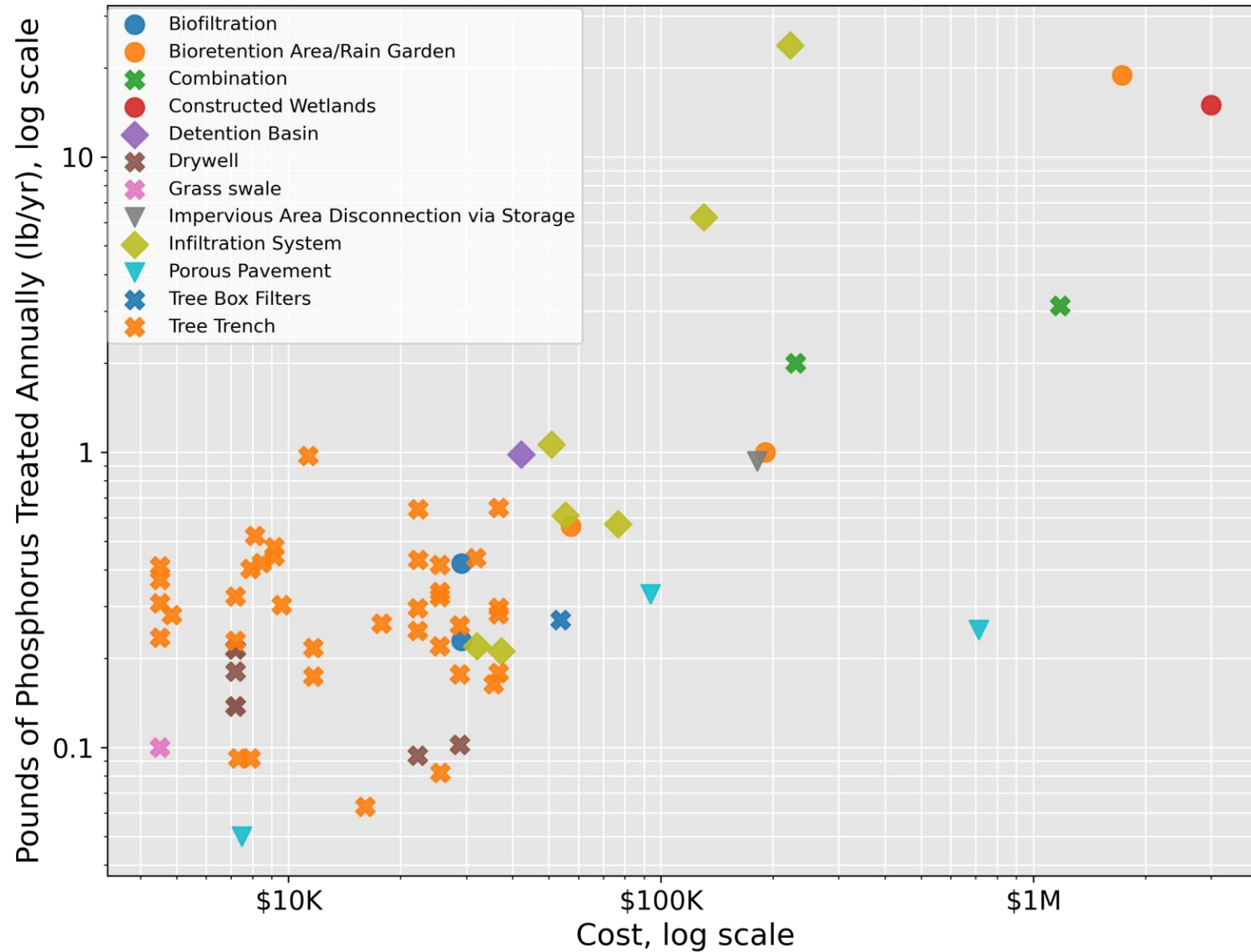


BMP Types - Individuals	Boston	Brookline	Cambridge	Lexington	Medway	Milford	Newton	Watertown
Biofiltration							X	
Bioswale								X
Detention Basin					X			
Drywell								X
Impervious Area Disconnection via Storage							X	
Infiltration Systems		X		X		X	X	X
Porous Pavement	X		X				X	
Rain Garden					X	X		
Swale							X	
Tree Trench & Tree Box Filters							X	X
Constructed Wetland				X				

Cost per Pound Phosphorus Removed

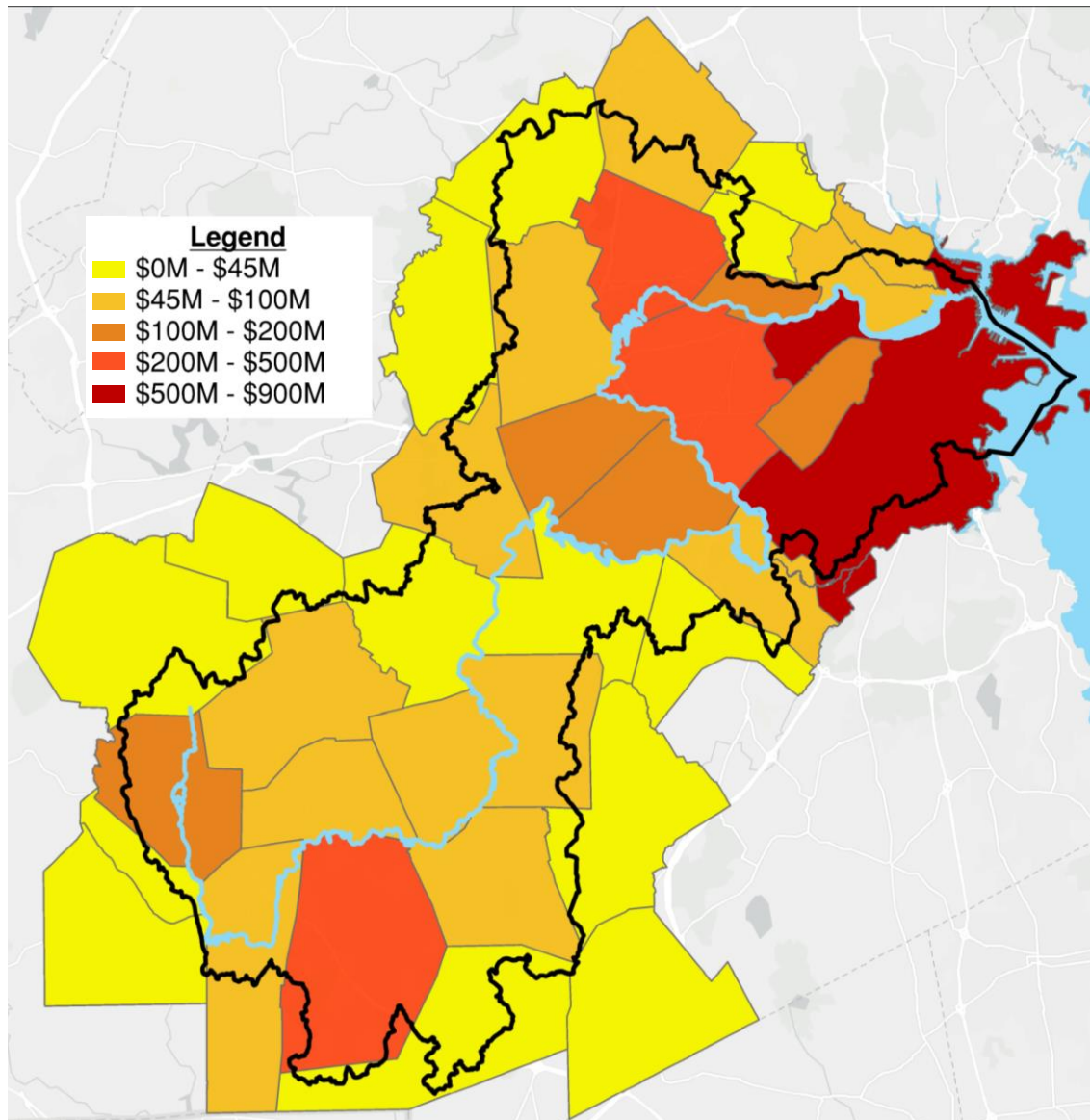


Variable BMP Types and Project Sizes



Cost Implications on Overall PCP

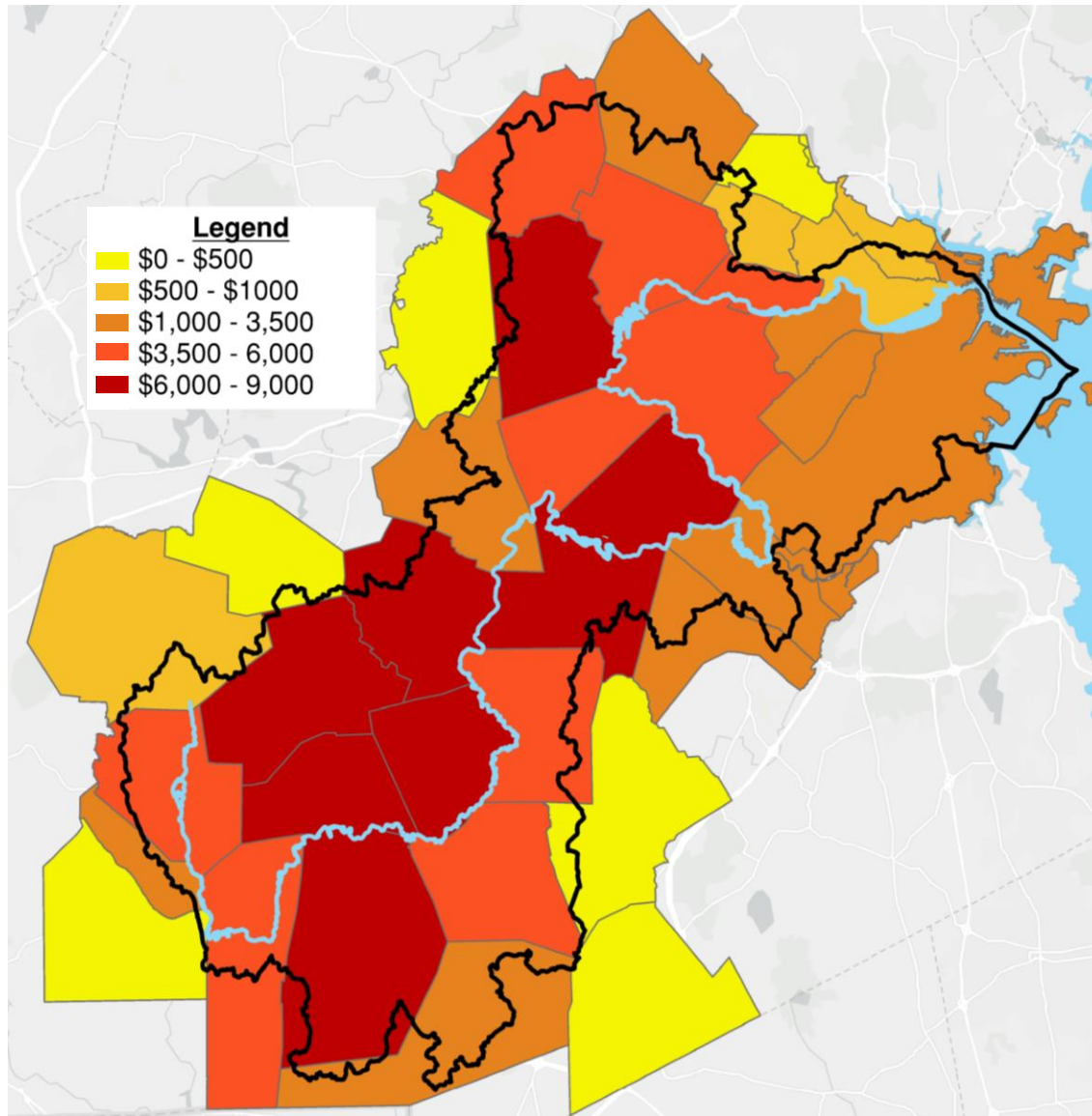
Potential Community Costs of Structural BMPs Assuming \$100K Per Pound of Phosphorus Removed



**Potential cost of structural BMPs to
Charles River communities is \$3.8B.**

Notes

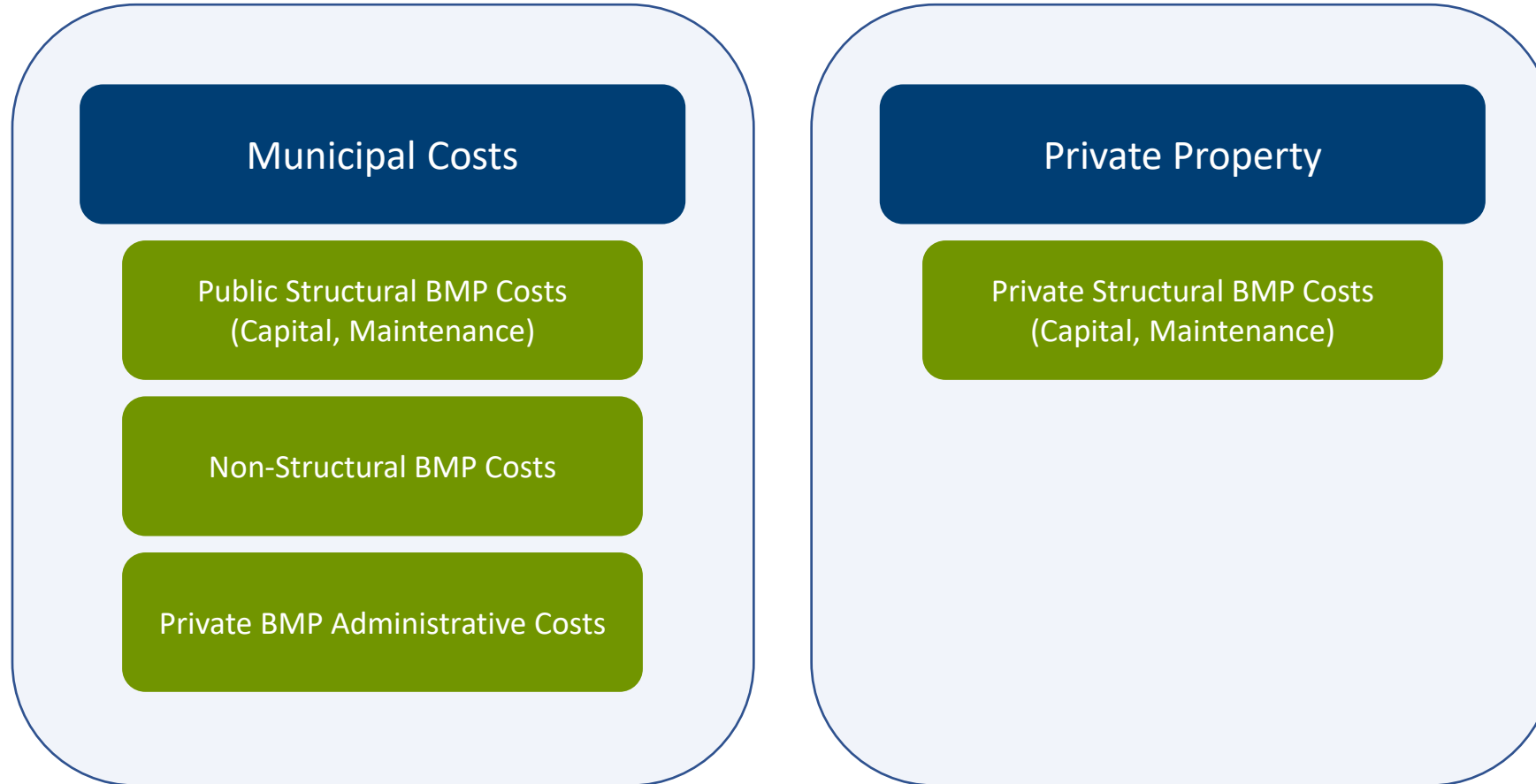
- Phosphorus reduction values are taken from Table F-2 of Appendix F to the 2016 MS4 Permit (assumed phosphorus reduction requirements for the entire municipal jurisdiction).
- Assumes 10% of phosphorus reduction target is met through non-structural BMPs. Cost of non-structural BMPs is not included in the figure.
- Assumed \$100k per pound phosphorus removed.
- Community costs include costs to municipality, developers, private property owners, etc.



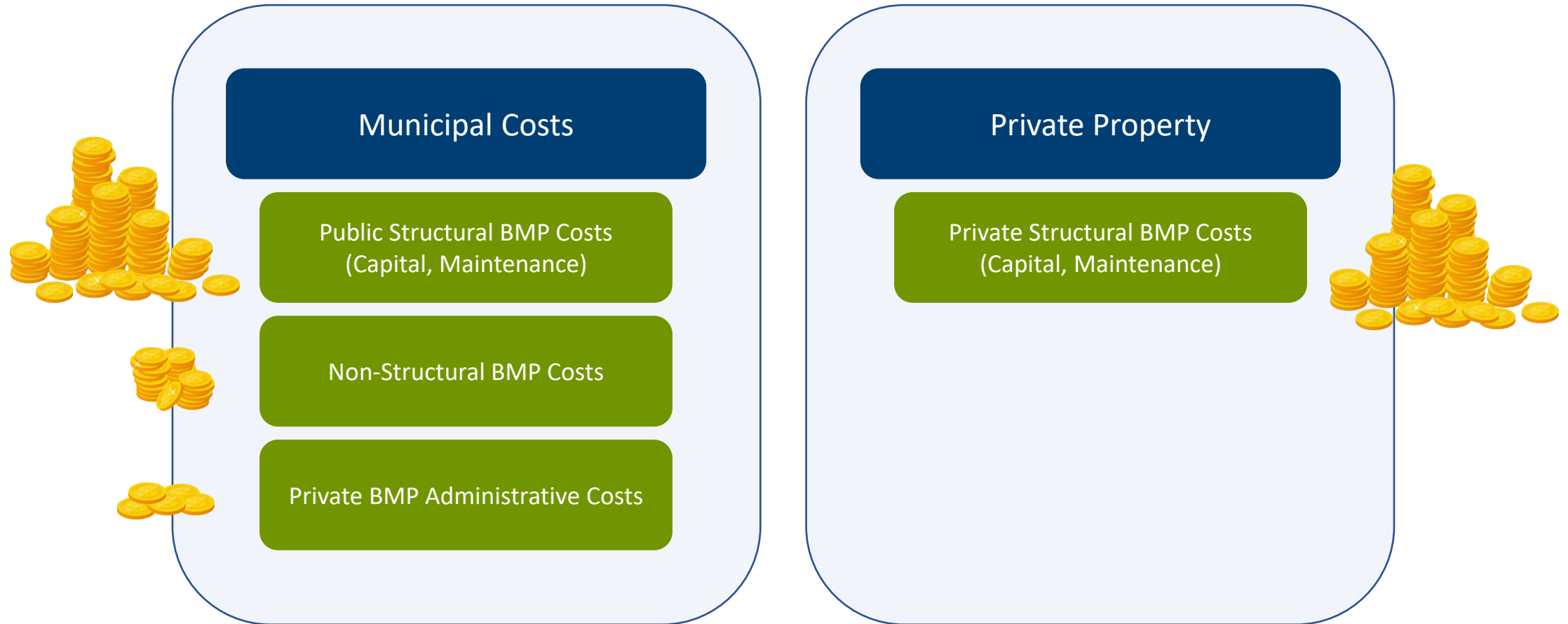
Notes

- Estimated phosphorus reduction costs were divided by 2020 Census population data.
- Assumes 10% of phosphorus reduction target is met through non-structural BMPs. Cost of non-structural BMPs is not included in the figure.
- Assumed \$100k per pound of phosphorus removed.
- This purpose of this figure is to provide some context of the anticipated phosphorus removal costs relative to population. It is for illustrative purposes only. It is not indicative of costs that will be incurred directly by residents. Costs will be paid by the municipal government, developers, private property owners, etc.

How are these costs distributed?



How are these costs distributed?



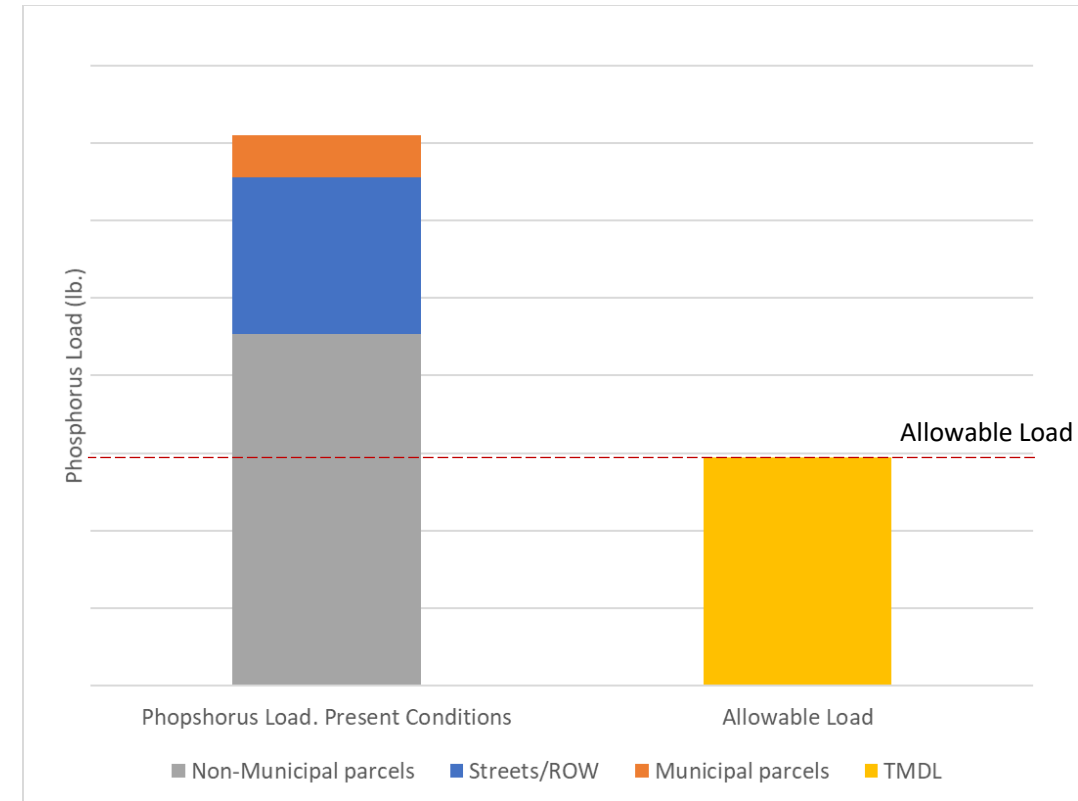
Acres of Private Land Treated by New BMPs each Year (acres/yr)	Phosphorus Removal ¹ (lb/yr)	Avoided Public Structural BMP Cost ²
0.5	0.6	\$60,000
1	1.1	\$110,000
2	2.3	\$230,000
10	3.4	\$3,400,000

¹ Assumed composite phosphorus loading rate of 1.5 lb/acre and a phosphorus removal efficiency of 75%.

² Assumed cost of structural BMP is \$100,000/lb of phosphorus removed.

The cost of Private Property BMP administration is small compared to the cost of constructing structural BMPs on public property

- Even if all public loads are removed, may still require private BMPs to reach goal (allowable load)
- Likely need reductions from all phosphorus sources to meet PCP goals





Break for Questions

Panel Discussion followed by Open Discussion

Panelists:

- Catherine Woodbury, Cambridge
- Brutus Cantoreggi, Franklin
- Wayne Chouinard, Arlington
- Kerry Reed, Framingham / Central Mass Stormwater Coalition

Upcoming Workshop – Tuesday from 1:00 to 3:00 PM

- May 24 Question & Answer Session EPA, MassDEP, and Project Team

Please submit your questions!

- Our team will work to address them in the remaining workshops & at the Q&A session



Scan QR code to get to website,
register, and submit questions

Website Resources

- <https://www.crwa.org/phosphorus-control-planning-support.html>
- More detail on each workshop
- Links to register
- PCP Templates & resources from FY21

Connect with Us!

**Brown AND
Caldwell**



Charles River Watershed Association



email: charles@crwa.org

newsletter: <https://www.crwa.org/river-current.html>

 @charlesriverwatershed

 @charlesriverwatershed

 @charlesriver



BrownandCaldwell.com