

January 23, 2023

Stormwater Phosphorus Load and BMP Tracking in Brookline



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Agenda

- Regulatory Background
- BMP Tracking Data Requirements
- Brookline's Process
- Framework for an Online Portal

Regulatory Background

MS4 Permit BMP Tracking

- Appendix F phosphorus TMDL
 - Charles River, Lakes and Ponds
- Tracking phosphorus
 - BMPs
 - New development / redevelopment

MA MS4 General Permit

United States Environmental Protection Agency (EPA)
National Pollutant Discharge Elimination System (NPDES)

**GENERAL PERMITS FOR STORMWATER DISCHARGES FROM
SMALL MUNICIPAL SEPARATE STORM SEWER SYSTEMS
IN MASSACHUSETTS
(as modified)**

AUTHORIZATION TO DISCHARGE UNDER THE
NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of the Clean Water Act (CWA), as amended (33 U.S.C. §1251 *et seq.*), and the Massachusetts Clean Waters Act, as amended (M.G.L. Chap.21 §§ 26-53), any operator of a small municipal separate storm sewer system whose system:

- Is located in the areas described in part 1.1;
- Is eligible for coverage under part 1.2 and part 1.9; and
- Submits a complete and accurate Notice of Intent in accordance with part 1.7 of this permit and EPA issues a written authorization

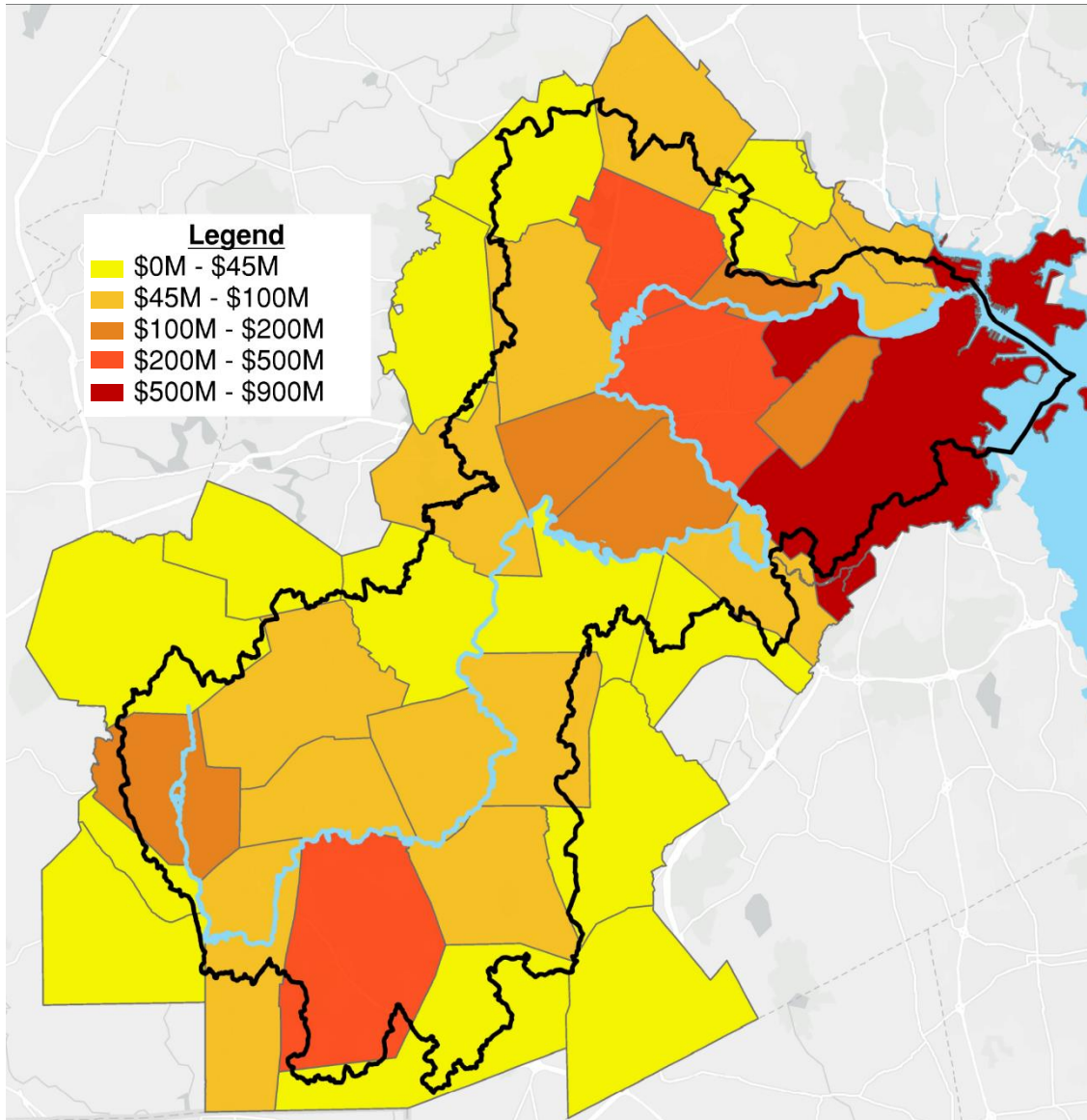
is authorized to discharge in accordance with the conditions and the requirements set forth herein.

The following appendices are also included as part of these permits:

- Appendix A – Definitions, Abbreviations, and Acronyms;
- Appendix B – Standard permit conditions applicable to all authorized discharges;
- Appendix C – Endangered Species Act Eligibility Guidance;
- Appendix D – National Historic Preservation Act Eligibility Guidance;
- Appendix E – Information required for the Notice of Intent (NOI);
- Appendix F – Requirements for MA Small MS4s Subject to Approved TMDLs; Meter Requirements;

1-5 years after permit effective date	5-10 years after permit effective date	10-15 years after permit effective date	15-20 years after permit effective date
Create Phase 1 Plan	Implement Phase 1 Plan		
	Create Phase 2 Plan	Implement Phase 2 Plan	
		Create Phase 3 Plan	Implement Phase 3 Plan

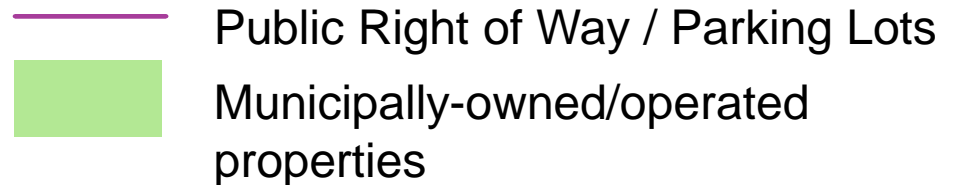
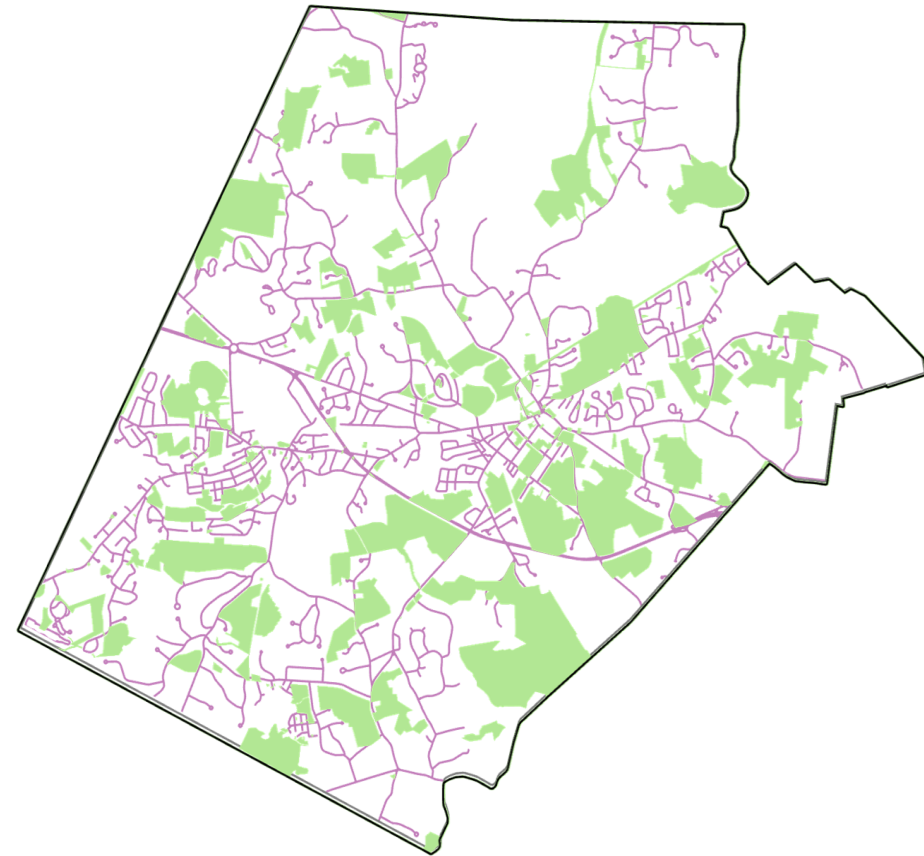
Costs to Comply with Appendix F



- Assumes \$100,000 per pound phosphorus removed
- Assumes 10% of phosphorus reduction target is met through non-structural BMPs
- Cost of non-structural BMPs is not included in the figure

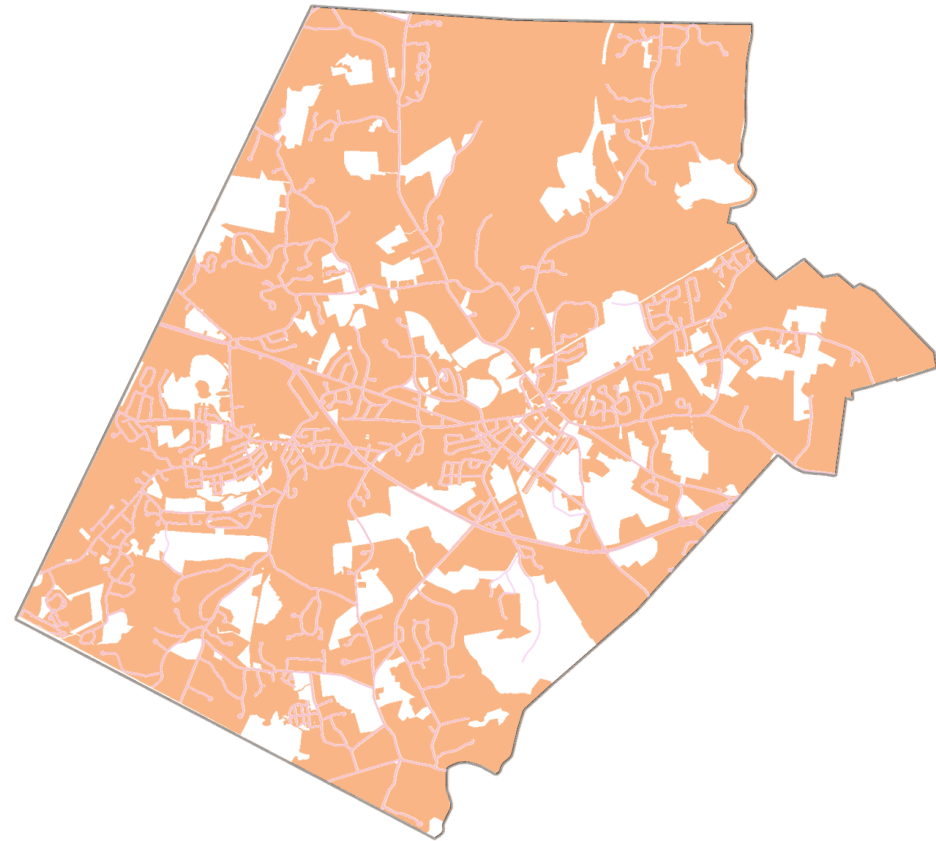
BMPs on Public Property

- Limited public land availability



Leveraging Private Property

- Availability of private land
- Data management needs



Privately-owned land

Land Redevelopment Tracking

Performance Evaluation –The permittee shall evaluate the effectiveness of the PCP by tracking the phosphorus reductions achieved through implementation of structural and non-structural BMPs⁶ and tracking increases resulting from development. Phosphorus reductions shall be calculated consistent with Attachment 2 to Appendix F (non-structural BMP performance) and Attachment 3 to Appendix F (structural BMP performance) for all BMPs implemented to date. Phosphorus export increases since 2005 due to development shall be calculated consistent with Attachment 1 to Appendix F. Phosphorus loading increases and reductions in unit of mass/yr shall be added or subtracted from the applicable Baseline Phosphorus Load given in Table F-2 or Table F-3 depending on the Scope of PCP chosen to estimate the yearly phosphorous export rate from the PCP Area. The permittee shall also include all information required in part I.2 of this Appendix in each performance evaluation. Performance evaluations will be included as part of each permittee’s annual report as required by part 4.4 of the Permit.

Land Redevelopment Tracking

Performance Evaluation. - The permittee shall evaluate the effectiveness of the PCP by tracking the phosphorus reductions achieved through

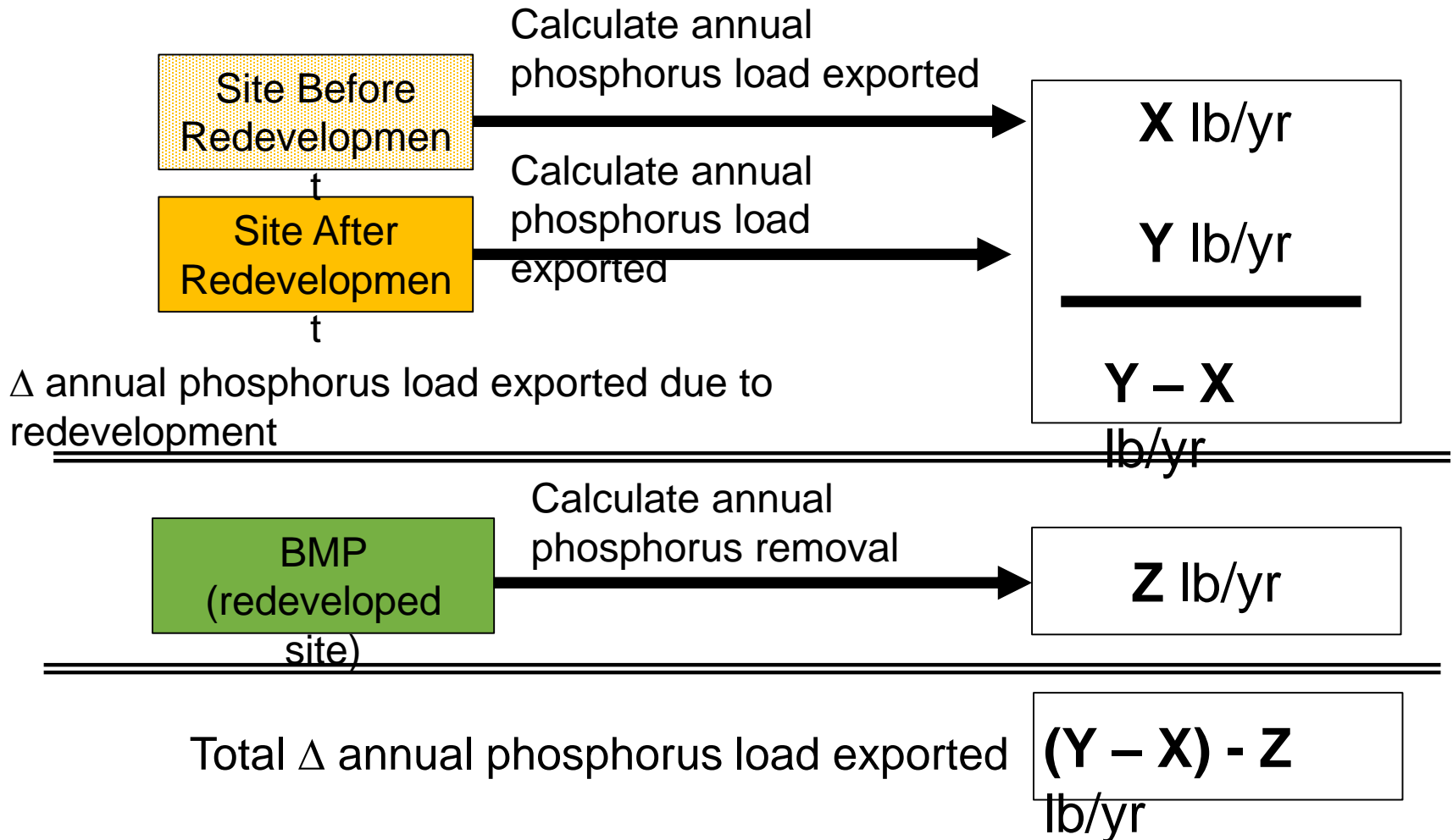
What increases phosphorus loads?

- Changes in **land use type**
- Changes in **impervious cover**

in units of mass/yr shall be added or subtracted from the applicable Baseline Phosphorus Load given in Table F-2 or Table F-3 depending on the Scope of PCP chosen to estimate the yearly phosphorus export rate from the PCP Area. The permittee shall also include all information required in part 1.2 of this Appendix in each performance evaluation. Performance evaluations will be included as part of each permittee's annual report as required by part 4.4 of the Permit.

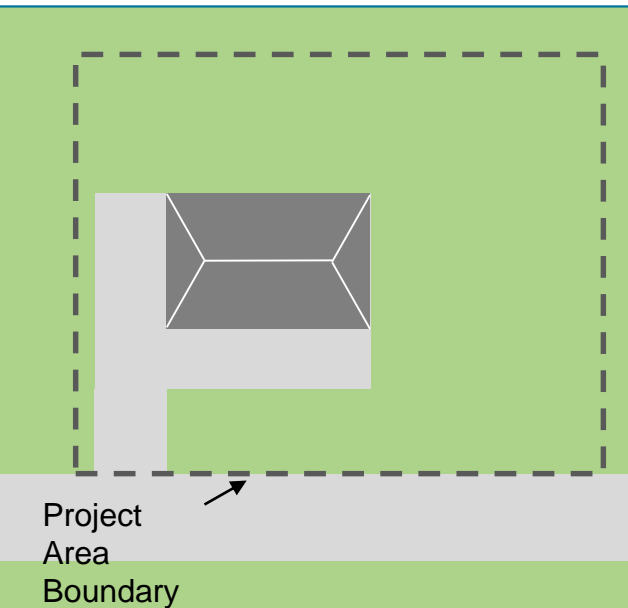
Data Requirements

Process Overview

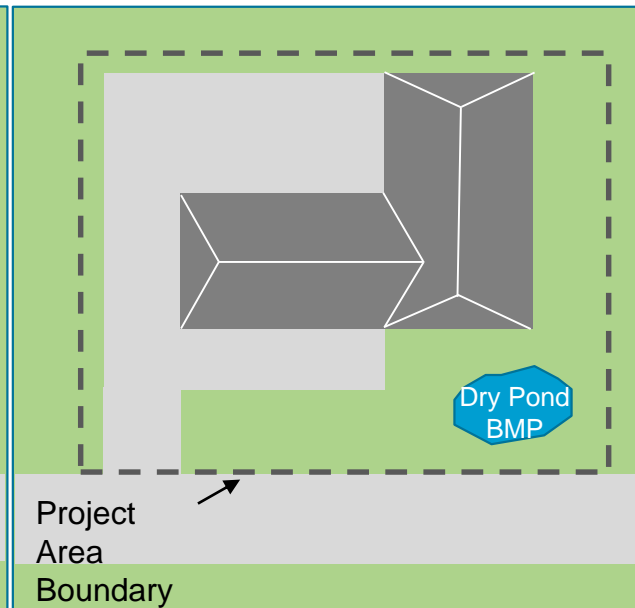


How to Perform Each of the Steps?

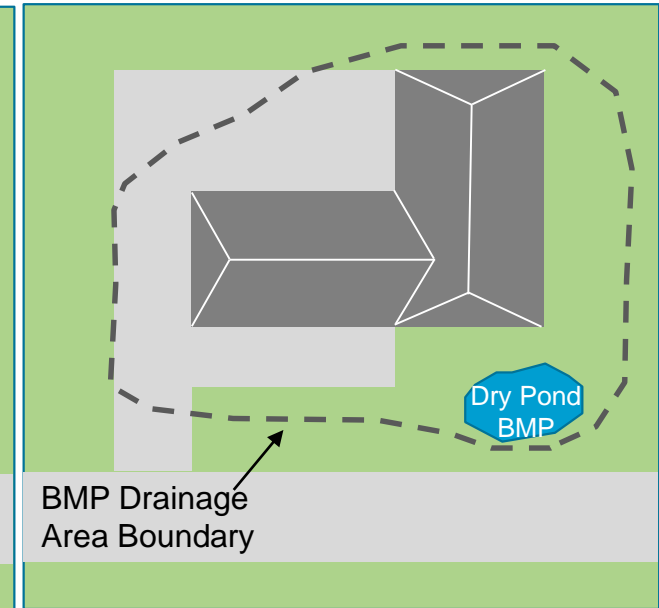
Before Redevelopment



After Redevelopment

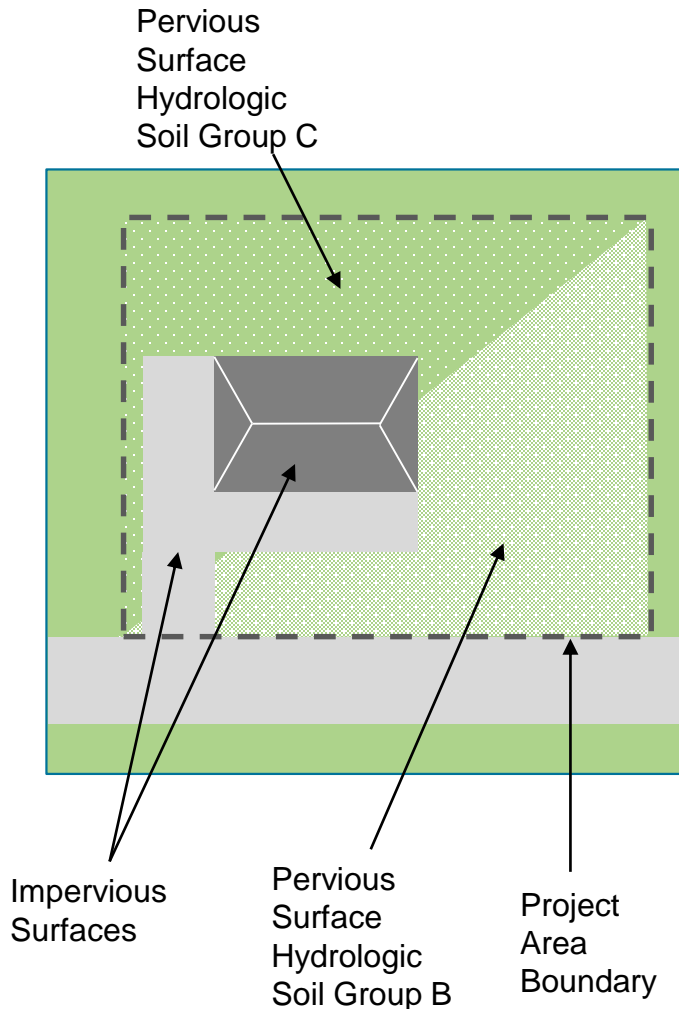


BMP



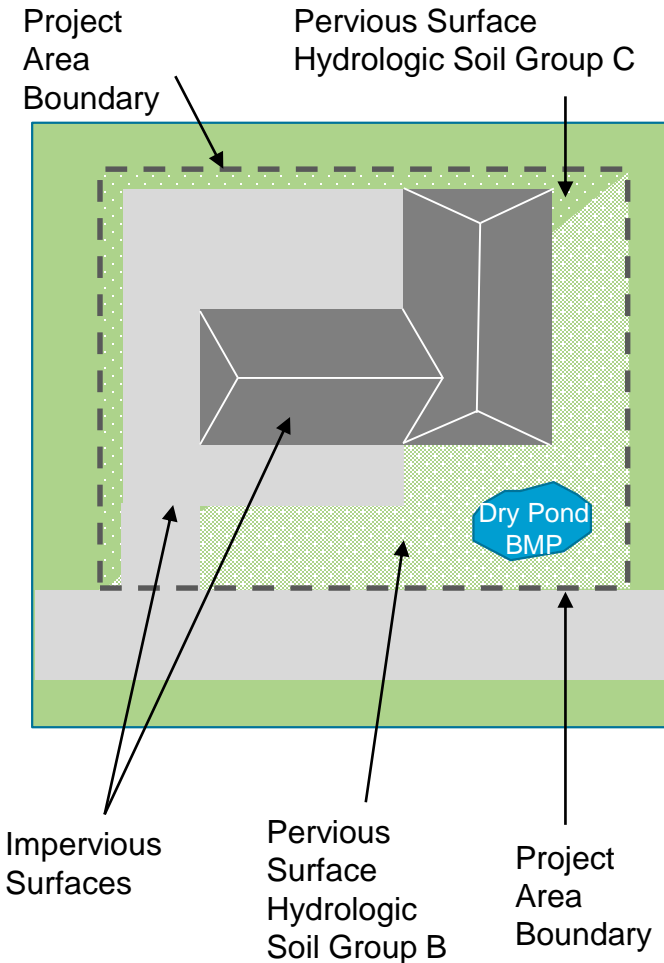
Calculate Annual Phosphorus Load Exported Before Redevelopment

Fill in this column using areas within Project Boundary



Category	Land Area (ac)	PLER (lb/ac/yr)	Annual P Export (lb/yr)
Directly Connected Impervious Area			
Commercial	0.2	1.78	0.36
Industrial	0	1.78	0.00
High-density residential	0	2.32	0.00
Medium-density residential	0	1.96	0.00
Low-density residential	0	1.52	0.00
Highway	0	1.34	0.00
Forest	0	1.52	0.00
Open land	0	1.52	0.00
Agriculture	0	1.52	0.00
Pervious Area			
HSG A	0	0.04	0.00
HSG B	0.4	0.18	0.07
HSG C	0.4	0.36	0.14
HSG C/D	0	0.46	0.00
HSG D	0	0.54	0.00
HSG Unknown	0	0.36	0.00
Total	1.0		0.57

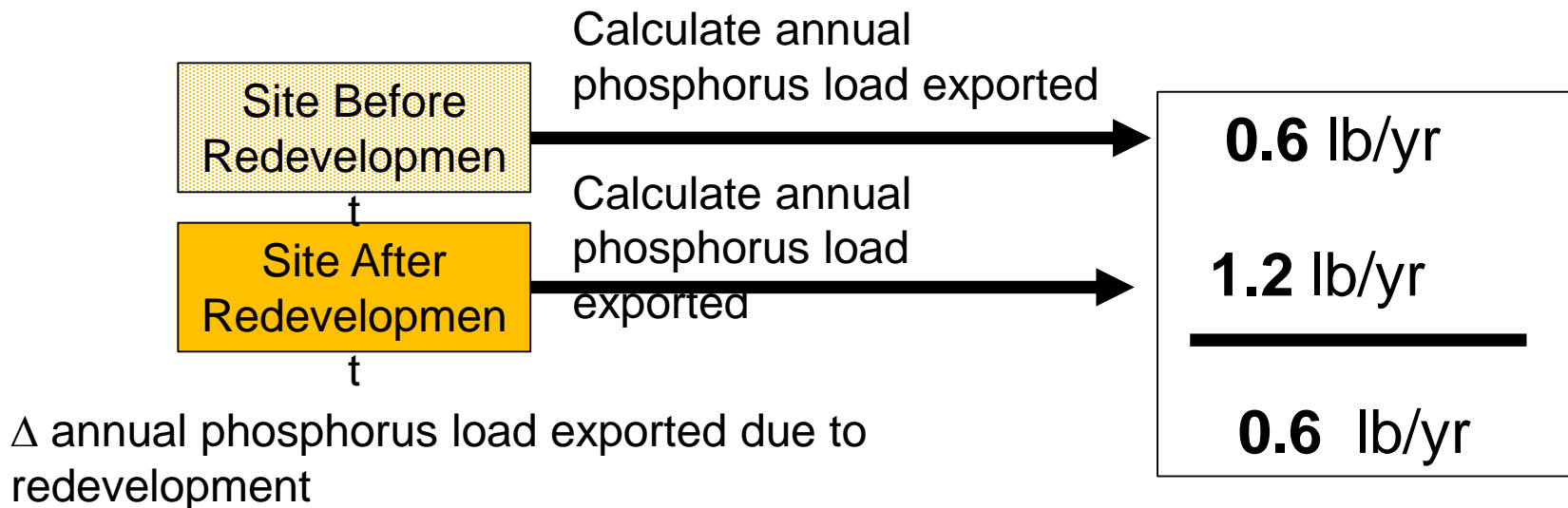
Calculate Annual Phosphorus Load Exported After Redevelopment



Fill in this column using areas within Project

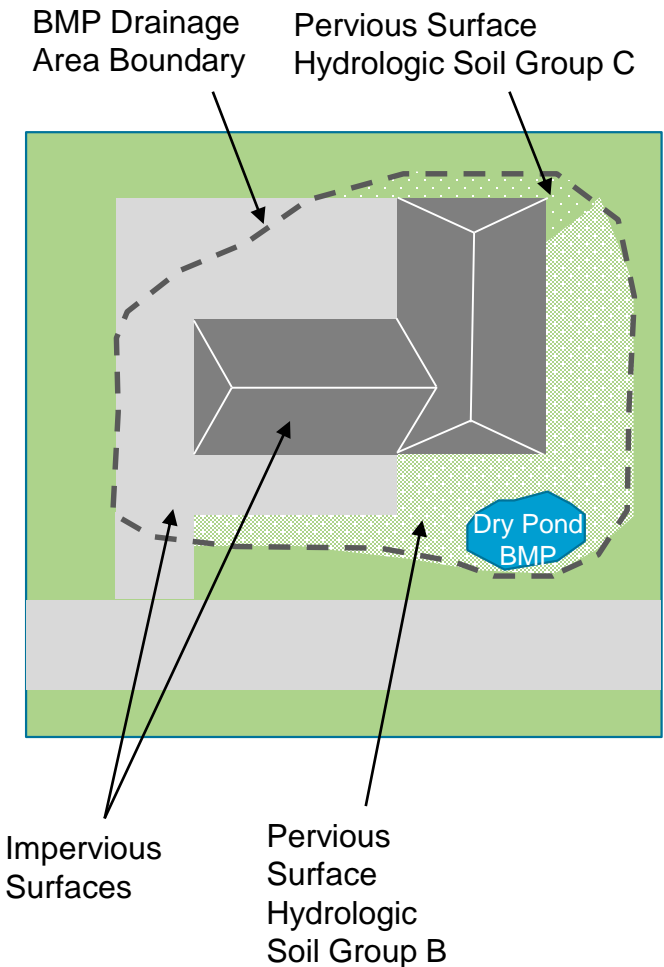
Boundary	Land Area (ac)	PLER (lb/ac/yr)	Annual P Export (lb/yr)
Category			
Directly Connected Impervious Area			
Commercial	0.6	1.78	1.07
Industrial	0	1.78	0.00
High-density residential	0	2.32	0.00
Medium-density residential	0	1.96	0.00
Low-density residential	0	1.52	0.00
Highway	0	1.34	0.00
Forest	0	1.52	0.00
Open land	0	1.52	0.00
Agriculture	0	1.52	0.00
Pervious Area			
HSG A	0	0.04	0.00
HSG B	0.35	0.18	0.06
HSG C	0.05	0.36	0.02
HSG C/D	0	0.46	0.00
HSG D	0	0.54	0.00
HSG Unknown	0	0.36	0.00
Total	1.0		1.15

Change in Annual Phosphorus Load due to Redevelopment



Calculate Annual Phosphorus to the BMP

Fill in this column
using areas
within BMP

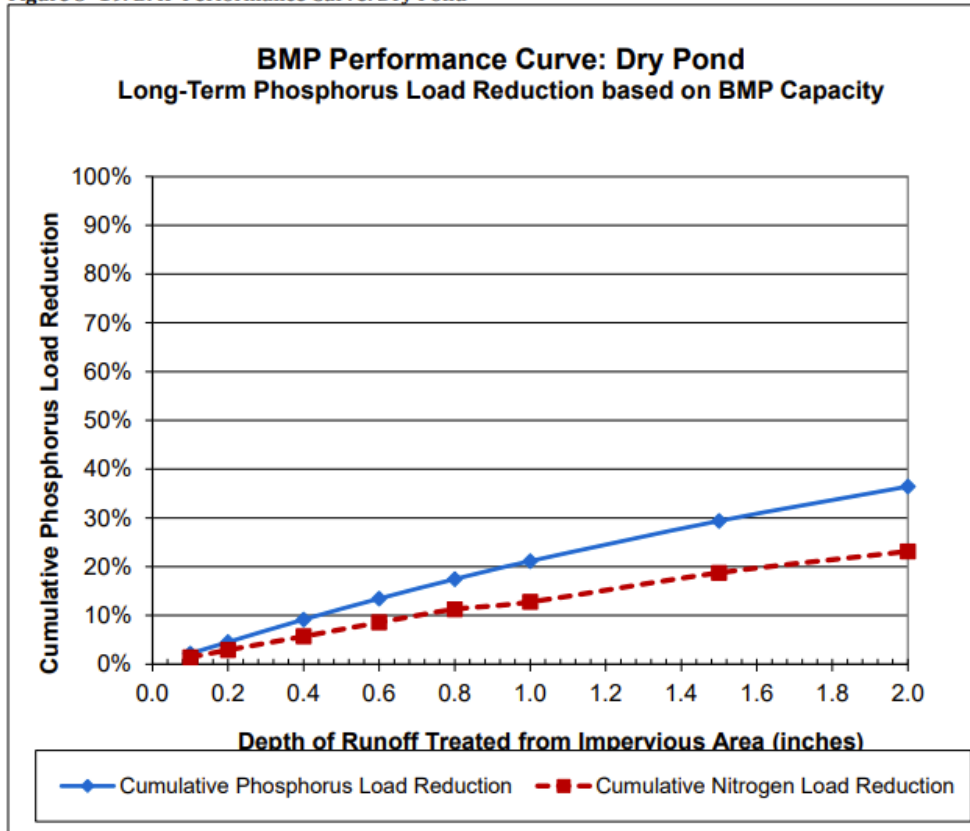


<u>Drainage Area</u>	Land Area (ac)	PLER (lb/ac/yr)	Annual P Export (lb/yr)
Directly Connected Impervious Area			
Commercial	0.5	1.78	0.89
Industrial	0	1.78	0.00
High-density residential	0	2.32	0.00
Medium-density residential	0	1.96	0.00
Low-density residential	0	1.52	0.00
Highway	0	1.34	0.00
Forest	0	1.52	0.00
Open land	0	1.52	0.00
Agriculture	0	1.52	0.00
Pervious Area			
HSG A	0	0.04	0.00
HSG B	0.2	0.18	0.04
HSG C	0.05	0.36	0.02
HSG C/D	0	0.46	0.00
HSG D	0	0.54	0.00
HSG Unknown	0	0.36	0.00
Total	0.8		0.94

Values from 2016 Massachusetts MS4 General Permit, Appendix F, Attachment 3, Table

Calculate Phosphorus Removal by BMP

Figure 3- 19: BMP Performance Curve: Dry Pond



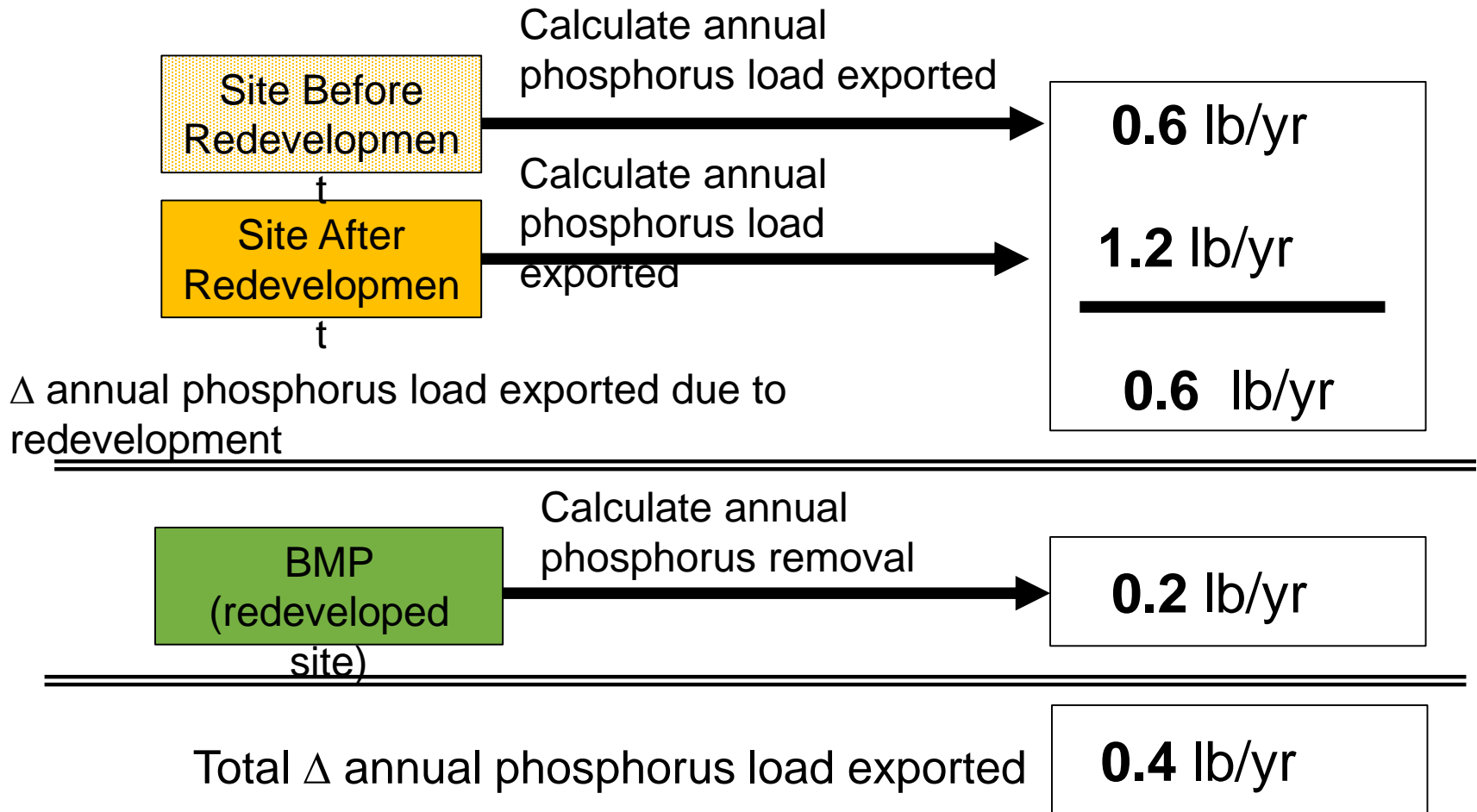
2016 Massachusetts MS4 Permit Appendix F, Attachment 3 Methodologies

- Calculate runoff
- Determine treatment volume of dry pond
- Calculate treatment efficiency
- Note: Data needed to estimate treatment efficiency depends upon BMP type

Treatment efficiency = 20%

Annual phosphorus removed = treatment efficiency x phosphorus load
= 0.2 x 0.94 lb/yr = 0.19 lb/yr

Example



Mechanisms to Receive Data

- Enforcement Authority
- Site Plan Review
 - Data calculated by Town
 - Data calculated by Developers
- Stormwater Utilities



SITE PLAN REVIEW CHECKLIST

Property located at: _____
 (Number) (Street) (Block & Lot)

Owner's Information: _____

Applicant's Information: _____

Engineer/Surveyors's Information: _____

Person(s) responsible for completing checklist: _____

Instructions: This Site Plan Review Checklist shall be completed and submitted with each new water, sewer, and drain permit application. Applicants shall provide all supporting documentation with each submittal. Please select all applicable items by checking "Yes" or "No". If item is "Not Required (NR)" or "Not Applicable (NA)" record in comment section with explanation. Explanations may be submitted on separate sheets if needed.

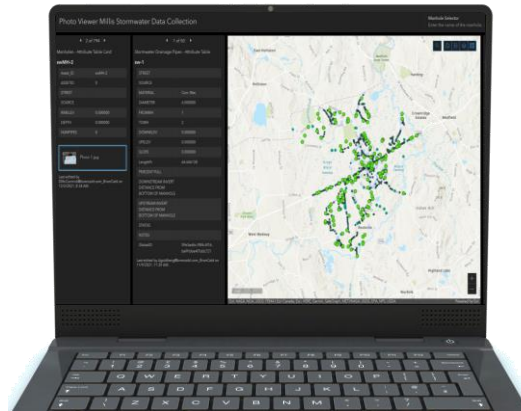
Item No.	Description of Site Plan Requirement	"Yes"	"No"	Comments
General:				
1	Original signed, dated, and stamped site plan by PE and PLS			
2	Use 24"x36" sheet at scale 1"=10' or 1"=20' with North Arrow			

What Tracking Tools are Available?

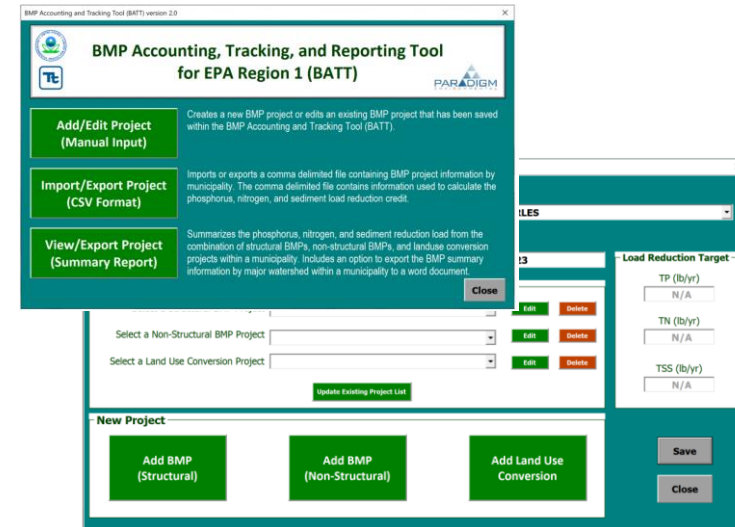
- File Management Systems/Databases
- GIS/System Mapping
- Asset Management Software
- Data management for calculations (BATT)



File Storage /
Document Linking



BMP Inventory: GIS /
Databases / Asset
Management Software



Logging and reporting
BMP Data: BATT

Brookline's Methodology

Case Study: Brookline's Site Plan Approval Process

- Magnitude of phosphorus removal for municipalities
 - Credit for public & private development/redevelopment
- Site plan checklist & approval process
 - Accela Portal and departments involvement
- Data management difficulties and challenges
 - Project timelines are long
 - Project closeout requirements and outstanding submissions
 - HydroCAD files, BATT tool
 - Demand on staff to follow project changes and make updates

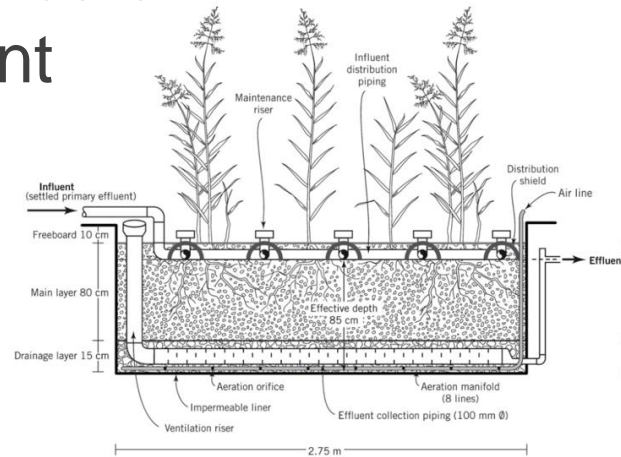
Case Study: Brookline's Site Plan Approval Process

Future strategies for phosphorus tracking

- Spreadsheet vs automation
 - Offload data input onto developers who already input data as part of the site plan review process
 - Create a singular location for all required documents and information to live
 - Tracks project process, transparency for both parties in terms of outstanding tasks, & permits updates as the project progresses

How is this Data Used?

- Permit compliance
 - Nutrient credits
 - Changes due to development
 - Operation and maintenance
- Municipality data management



Creating an Online Nutrient Tracking Portal

Nutrient Tracking Web Portal Initiative

- Working with MassDEP and others to secure funding
- Web portal would be central repository for phosphorus tracking
 - Communities
 - Developers
- Eliminate burden of GIS analysis and loading calculations
- Work with EPA to validate calculations and reporting formats
- Updates made to GIS data (impervious area, land use) by redevelopment projects would be available to communities

Nutrient Tracking Portal – Home Page



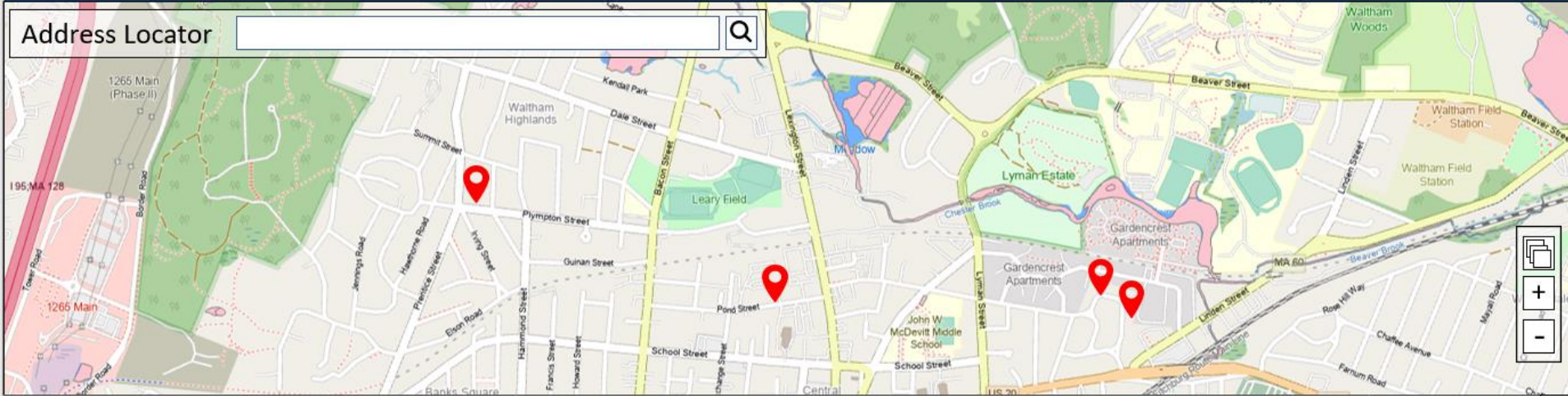
Stormwater Nutrient Tracking Portal

Projects in the City of Waltham, MA



Bob

Address Locator



	Name	Address	Author	Type	Submission Date	Project Completion Date	Δ Phosphorus (lb/yr)	Δ Nitrogen (lb/yr)
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								
<input type="checkbox"/>								

Only display projects authored by me

Create new project

View selected project

Removed selected project

Export table to Excel

Export GIS data

Export EPA Reports

Nutrient Tracking Portal - Wizard



Stormwater Nutrient Tracking Portal

Project Creation Wizard



Bob

Is this a development/redevelopment project?

Yes

No

Exit

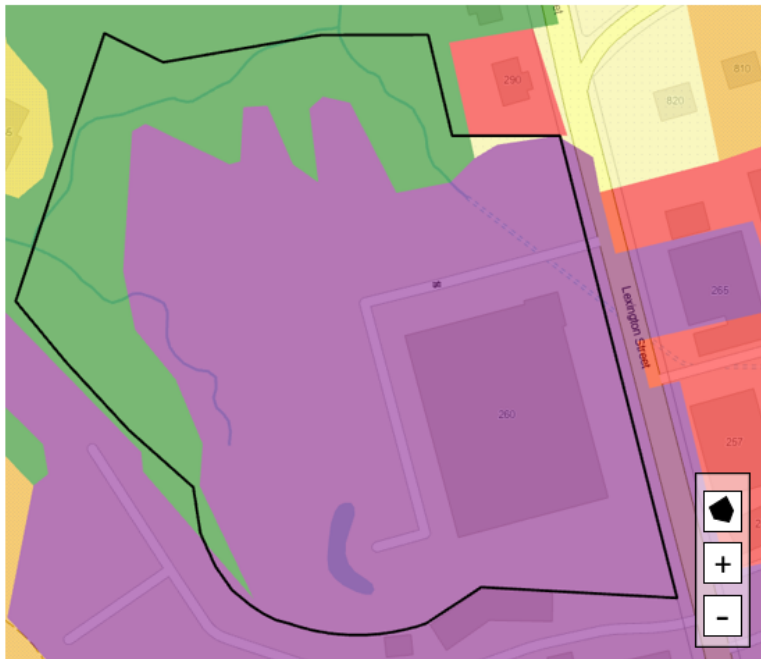
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Next ▶

Nutrient Tracking Portal - Wizard



The land use for the site is shown in the map for pre-project conditions. Is it correct?



If not, please update the map by drawing the correct land uses on the map.

Please select the type of land use you would like to add to the map

Commercial



Exit

◀ Back

Next ▶

Connecting Inputs to Regulatory and Other Needs

Site Plan Review – request data from developers

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graph TD; A[Site Plan Review – request data from developers] --> B[Developer inputs project information in guided process]; B --> C[Online portal for municipal tracking]; C --> D[Automated calculations for MS4 compliance];
```

Developer inputs project information in guided process

Online portal for municipal tracking

Automated calculations for MS4 compliance

How can you get involved?

- We want to hear from you!
 - How would this tool benefit your department?
 - What features would make this most useful?



Get in touch

- Stephanie Alimena,
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- Matt Davis,
mdavis@brwnald.com



Thank you.
Questions?

