
Permit Year 5

Phosphorus Control Plan for Lakes & Ponds Watersheds

For compliance with the National Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts

PREPARED FOR

dcr
Massachusetts



251 Causeway Street
9th Floor
Boston, MA 02114

PREPARED BY



101 Walnut Street
PO Box 9151
Watertown, MA 02471

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1

Introduction

This document has been developed to satisfy the Massachusetts Department of Conservation and Recreation's (DCR's) Lake and Ponds Phosphorus Control Plan (PCP) requirements for Permit Year (PY) 5, which are outlined in the National Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (MS4 Permit). These requirements are included in Appendix F, Section A.II of the MS4 Permit, entitled "Lake and Pond Phosphorus TMDL Requirements." Specific lakes are listed in this section of the MS4 Permit along with percent load reduction requirements for each lake. Permittees that discharge to these lakes must develop Lake and Ponds Phosphorus Control Plans (LPCPs) designed to reduce the amount of phosphorus discharged by the permittee to the impaired lake or its tributaries.

DCR discharges directly or indirectly to five of the lakes listed in Appendix F Section A.II. Therefore, this report constitutes DCR's LPCP for these five lakes, which are listed below:

- Auburn Pond
- Leesville Pond
- Bents Pond
- Ramsdall Pond
- Flint Pond & Lake Quinsigamond¹

The methods used to develop this PCP are explained in a document entitled "Methods for Phosphorus Control Plan & Nutrient Source Identification Report Development," and referred to in this report as the DCR PCP & NSIR Methods. This document, which will be submitted separately to the Environmental Protection Agency (EPA), includes methods for determining which portions of DCR facilities are regulated, delineating drainage catchments within facilities, calculating pollutant loading, prioritizing catchments for treatment, crediting non-structural and structural control measures, and more.

¹ The MS4 Permit treats Flint Pond and Lake Quinsigamond as one waterbody. It is listed in the MS4 Permit's Table F-6 as "Flint Pond/ Lake Quinsigamond."

The PCP sections below follow the requirements in the MS4 Permit's Appendix F Section A.II. In lieu of figures and tables, results of this PCP are largely presented in an ArcGIS web application referred to as the DCR PCP Web Application. Features of the DCR PCP Web Application will be introduced throughout this report. In addition, Appendix A includes metadata for each layer presented in the DCR PCP Web Application. The DCR PCP Web Application can be found at the following link:

<https://www.arcgis.com/apps/dashboards/4df45895b7e94dc69f4459faa660063c>

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Legal Analysis & Funding Source Assessment

The legal analysis and funding source assessment were submitted previously to EPA and are included as Appendix B and Appendix C. These documents were required in PY 2 and 3, respectively, and were exercises required by the MS4 permit to help ensure implementation of the PCP would not be impeded by legal or financial hurdles.

3

PCP Scope and Load Calculations

Appendix F Section A.II.1.i.c requires that by PY 4, permittees within the Lakes and Ponds watersheds define the:

- Scope of LPCP Area
- Baseline Phosphorus Load
- Phosphorus Reduction Requirement
- Allowable Phosphorus Load

Because DCR had to meet these requirements previously, in PY 4 DCR documented compliance with these requirements in a report entitled, "Phosphorus Control Plan- Permit Year 4 (Charles River/ Lake and Ponds)." This PY 4 report, which is included in Appendix D, outlines each of the above requirements and DCR's corresponding compliance approach. These are also summarized below.

1. **Requirement: Define scope of PCP.** *The permittee shall choose to implement its LPCP 1) in the entire area within its jurisdiction discharging to the impaired waterbody or 2) in only the urbanized portion of its jurisdiction discharging to the impaired waterbody.*

DCR chose to implement the LPCPs within the urbanized portion of its jurisdiction. In addition, DCR has reviewed its properties within the Lakes and Ponds watersheds to determine which portions constitute an MS4-regulated area. DCR chose to implement the LPCPs only within designated MS4-regulated areas. (The DCR PCP & NSIR Methods includes details about what is considered regulated.) This results in the following Lakes and Ponds watersheds containing DCR MS4-regulated areas:

- Auburn Pond / Leesville Pond²
- Bents Pond / Ramsdall Pond³
- Lake Quinsigamond & Flint Pond

2 The DCR MS4-regulated area within the Leesville Pond Watershed is the same as the DCR MS4-regulated area within the Auburn Pond Watershed (the Leesville Pond Watershed includes the Auburn Pond Watershed).

3 The DCR regulated MS4 area within the Ramsdall Pond Watershed is the same as the DCR MS4-regulated area within the Bents Pond Watershed (the Ramsdall Pond Watershed includes the Bents Pond Watershed).

The DCR PCP Web Application shows these watersheds and the DCR property within their bounds. DCR property is displayed via the “Catchment” layer. Catchments are solid green if they are part of the MS4-regulated area and hatched if not. Metadata for each layer is included in Appendix A and explains more about how catchments were delineated.

For the purposes of this report, four of the watersheds have been grouped into two groups of two (the Auburn Pond and Leesville Pond Watersheds have been grouped, as have the Bents Pond and Ramsdall Pond Watersheds). This is because in both cases, one watershed is nested within the other, and the DCR property within both watersheds is identical. It is worth noting that Lake Quinsigamond & Flint Pond, despite seeming like a group, are simply treated as one waterbody by the MS4 Permit.

2. **Requirement: Define the baseline phosphorus load, the phosphorus reduction requirement, and the allowable phosphorus load.** *Permittees shall calculate these values in mass per year consistent with methodology in Attachment 1 to Appendix F of the MS4 Permit.*

Table 1 provides DCR’s baseline phosphorus load, phosphorus reduction requirement, and allowable phosphorus load for each LPCP watershed containing DCR MS4-regulated area. DCR calculated these estimates following the guidance in the MS4 Permit’s Appendix F Attachment 1, as outlined in the DCR PCP & NSIR Methods Section 3.2 (baseline loads) and Section 3.4 (target reductions).

Table 1 Baseline Phosphorus Load and Required Phosphorus Reduction Summary

Water Body	Baseline Load (lb/yr)	Percent Reduction Required (per Appendix F)	Total Required Reduction (lb/yr)	Total Allowable Load (lb/yr)
Auburn Pond / Leesville Pond ⁴	3.8	31%	1.2	2.6
Bents Pond / Ramsdall Pond ⁵	1.5	52%	0.8	0.7
Lake Quinsigamond & Flint Pond	17.0	49%	8.3	8.7

The required phosphorus reductions in Table 1 must be met by PY 15. However, the LPCP also has several interim load reduction deadlines. Table 1 summarizes these deadlines, displaying percent of the total phosphorus reduction requirement that must be achieved at each interim deadline.

⁴ The Leesville Pond Watershed’s phosphorus reduction requirement is included in this table and used for calculations because it is higher than Auburn Pond’s and therefore used as the governing target.

⁵ The Bents Pond Watershed’s phosphorus reduction requirement is included in this table and used for calculations because it is higher than Ramsdall Pond’s and therefore used as the governing target.

Table 1 Phosphorus Load Reduction Requirements at LPCP Interim Deadlines

	PY 8 (2026)	PY 10 (2028)	PY 13 (2031)	PY 15 (2033)
Percent to Final Reduction Requirement	20%	40%	70%	100%
Auburn Pond / Leesville Pond (lb/yr)	0.2	0.5	0.8	1.2
Bents Pond / Ramsdall Pond (lb/yr)	0.2	0.3	0.6	0.8
Lake Quinsigamond & Flint Pond (lb/yr)	1.7	3.3	5.8	8.3

4

Existing Stormwater Control Measures

For many years, DCR has been implementing non-structural and structural controls to improve water quality throughout the state and reduce nutrient load in runoff from its properties. DCR began these practices before the MS4 Permit and Phosphorus Control Plan requirements became effective, but has more recently begun tracking phosphorus load reductions from these existing control measures per the requirements of the MS4 Permit Appendix F. This section provides a summary of DCR's existing phosphorus load reduction and presents this information in the form of phosphorus "credits," which are the load reduction values (in pounds of phosphorus reduced per year) calculated per the methodology in the MS4 Permit's Appendix F Attachment 2 (for non-structural controls) and Attachment 3 (for structural controls). These phosphorus reduction credits are based on DCR's best understanding of current data and may change in the future as new data becomes available and estimates are refined.

4.1 Non-structural Control Measures

4.1.1 Street Sweeping

Within the Auburn Pond/ Leesville Pond Watersheds and Lake Quinsigamond & Flint Pond Watershed, twice per year DCR uses a mechanical broom street sweeper followed by a high efficiency regenerative air-vacuum sweeper to remove pollutants from 3.7 and 9.2 acres of impervious parking lots, respectively (Table 3). DCR does not sweep in the Bents Pond/ Ramsdall Pond Watersheds. At this time, DCR has no plans to change current sweeping operations.

DCR's phosphorus reduction credit for street sweeping practices is provided in Table 3 and was calculated as a function of the sweeping technology, sweeping frequency, and impervious area swept, per the methodology included in Appendix F Attachment 2 of the MS4 Permit and further described in the DCR PCP & NSIR Methods. The DCR PCP Web Application displays all LPCP parking lots that are swept, symbolized by sweeping frequency, as well as the phosphorus reduction credit for each area.

Table 3 Existing Phosphorus Load Reduction from Parking Lot Sweeping

Watershed	Area Swept (ac)	Sweeping Frequency	P Load Reduction (lb/yr)
Auburn Pond / Leesville Pond	3.7	Semi-annually	0.01
Bents Pond / Ramsdall Pond	0.0	None	0.00
Lake Quinsigamond & Flint Pond	9.2	Semi-annually	0.03

4.1.2 Catch Basin Cleaning & Leaf Litter Collection

DCR conducts catch basin cleaning and leaf litter collection in the LPCP watersheds, but currently does not have enough data available on the implementation of these control measures to calculate a phosphorus reduction credit per the methodology included in Appendix F Attachment 2 of the MS4 Permit. However, data collection practices are being evaluated and improved so DCR may qualify for this credit in future permit years.

4.2 Structural Control Measures

DCR currently has several structural best management practices, also referred to here as best management practices (BMPs), in the LPCP watersheds, including three BMPs within the Bents Pond/Ramsdall Pond Watersheds and three BMPs within the Lake Quinsigamond & Flint Pond Watershed. However not all of these BMPs are considered “creditable” by the MS4 Permit, that is, Appendix F Attachment 3 does not contain methods to calculate phosphorus load reductions for these BMP types (e.g., water quality units, porous pavement with less than 12-inches of filter depth). Thus, at this time, DCR has one creditable BMP within the Bents Pond/ Ramsdall Pond Watersheds, and two creditable BMPs within the Lake Quinsigamond & Flint Pond Watershed (Table 4).

Phosphorus reduction of these creditable BMPs was estimated using methodology from Appendix F Attachment 3. Methodology is further described in the DCR PCP & NSIR Methods, but includes delineating catchments as accurately as possible using desktop-level analysis, and conservatively assuming a 0.5-inch runoff depth over the contributing impervious area to calculate design storage volume for all BMPs because design storage volumes of most BMPs are not readily available. Table 4 summarizes DCR’s phosphorus reduction credit for structural BMPs in each LPCP watershed. Note that as tracking and accounting of BMPs continues, and DCR refines data (e.g., catchment area, design storage volume, BMP type, etc.), estimates of load reduction may change slightly.

The DCR PCP Web Application displays each identified BMP in the LPCP watersheds, its estimated catchment area, and the associated phosphorus load reduction achieved. All BMPs are shown in purple. Creditable BMPs also have a star.

Table 4 Existing Phosphorus Load Reduction from Structural BMPs

Watershed	Credited BMPs (#)	P Load Reduction (lb/yr)
Auburn Pond / Leesville Pond	0	0.0
Bents Pond / Ramsdall Pond	1	0.5
Lake Quinsigamond & Flint Pond	2	4.5

4.3 Load Reduction Progress

The combined phosphorus load reduction achieved by DCR's existing non-structural and structural stormwater control measures moves DCR closer to the final PY 15 phosphorus load reduction requirements for each LPCP watershed. In fact, DCR has surpassed the PY 8 and PY 10 phosphorus load reduction requirements in the Bents Pond/ Ramsdall Pond Watersheds and the Lake Quinsigamond & Flint Pond Watershed. Table 5 provides a summary of DCR's progress towards meeting the required phosphorus load reduction requirements.

Table 5 Existing versus Required Phosphorus Load Reduction in LPCP Watersheds

Watershed	Existing P Load Reduction (lb/yr)			Required P Load Reduction (lb/yr)				Remaining Required P Load Reduction (lb/yr)
	Sweeping*	Structural BMPs	Total	PY8	PY10	PY13	PY15 (Final)	
Auburn Pond / Leesville Pond	0.01	0.0	0.0	<0.2>	<0.5>	<0.8>	< 1.2 >	1.2
Bents Pond / Ramsdall Pond	0.00	0.5	0.5	[0.2]	[0.3]	<0.6>	< 0.8 >	0.3
Lake Quinsigamond & Flint Pond	0.03	4.5	4.5	[1.7]	[3.3]	<5.8>	< 8.3 >	3.8

*Street sweeping phosphorus load reduction values are rounded to the nearest hundredth rather than tenth due to their small magnitude.

[Green] cells indicate permit milestones have been met
 <Red> cells indicate permit milestones have yet to be met

5

Planned Stormwater Control Measures

In order to achieve the remaining required phosphorus load reduction by the PY 15 deadline, DCR plans to implement additional control measures. This section summarizes DCR's proposed non-structural and structural controls. Proposed controls may change as implementation of this plan evolves. This will be reflected in future updates of this LPCP.

5.1 Non-structural Control Measures

DCR's plan for non-structural control measures in LPCP watersheds is to continue implementing current street sweeping practices. However, DCR will evaluate street sweeping practices on an annual basis to validate current phosphorus reduction credits and to consider adding areas and/or increasing frequencies. During development of this LPCP, DCR evaluated the potential to begin street sweeping at the Dunn State Park parking area, within the Bents Pond/ Ramsdall Ponds Watersheds. However, DCR found the available phosphorus reduction credit for this added measure is not worth the cost. Similarly, although DCR performs catch basin cleaning and leaf litter collection in LPCP watersheds, DCR decided not to credit these measures as part of the LPCP because the available credit for these measures is not worth the cost of data collection.

5.2 Structural Control Measures

DCR's approach for planning structural control measures, or BMPs, falls into two categories: stand-alone stormwater retrofit projects and opportunistic incorporation of BMPs into planned site development or redevelopment projects. For stand-alone retrofits, DCR targets catchments that are determined (via MS4 Appendix F methodology) to have high load, as these are areas where implementing stormwater treatment could result in the largest impact. Within these catchments, DCR prioritizes opportunities for impervious cover (IC) disconnection or removal, retrofits of existing BMPs, and construction of surface infiltration or filtration practices (infiltration being preferable). DCR also takes an opportunistic approach to stormwater retrofits and has developed the DCR Stormwater Handbook, which encourages designers to incorporate BMPs into all projects, even those that do not trigger the MS4 Permit's post-construction requirement threshold of one acre disturbed. DCR's approach for planning structural BMPs is further described in the DCR PCP & NSIR Methods.

5.2.1 Auburn Pond / Leesville Pond

DCR owns only one MS4-regulated property within the Auburn Pond/ Leesville Pond Watersheds: the Daniel S. Horgan Memorial Skating Rink (Horgan Rink). Therefore, a priority ranking of permittee owned areas was not needed for BMP planning within these watersheds, and the Horgan Rink was identified as the planned location for implementation of structural phosphorus controls. The DCR PCP Web Application shows the existing Horgan Rink catchment area and drainage infrastructure.

In summer 2022, DCR began planning a stormwater retrofit project at the Horgan Rink to meet the Auburn Pond/ Leesville Pond Watersheds' 1.2 lb/yr phosphorus reduction target. As part of the planning effort, a desktop assessment of site suitability factors was first completed. This assessment included a review of the site's existing drainage infrastructure, soil types, topography, adjacent property uses, and wetlands information. The results of this review were then used to identify potential treatment opportunities on site, with a focus on locations suitable for surface infiltration.

Ultimately, DCR developed a conceptual design for the site that included several new infiltration BMPs, including an infiltration basin at the northeastern corner of the site to treat roof and parking lot drainage, and leaching catch basins to treat parking lot drainage. Test pits were completed on March 10, 2023 to assess existing soil conditions and found that soil types in the areas of the proposed BMPs consist primarily of sand, loamy sand, and sand/gravel, and are expected to be very well suited for infiltration. Full design is currently underway. The proposed BMPs are expected to achieve at least the 1.2 lb/yr final phosphorus reduction requirement.

5.2.2 Bents Pond / Ramsdall Pond

DCR owns only one MS4-regulated property within the Bents Pond/ Ramsdall Pond Watersheds: Dunn State Park. Therefore, the MS4-regulated area within Dunn State Park, which is comprised mostly of the parking area and visitor center, was identified as the planned location for implementation of structural phosphorus controls to achieve the remaining 0.3 lb/yr of phosphorus load reduction required in this watershed.

DCR has delineated three catchments within the MS4-regulated area of Dunn State Park. These catchments can be viewed on the DCR PCP Web Application, which provides additional information about each catchment in the catchment pop-up, such as Catchment ID, Treatment Status, and BMP Structure ID, the latter of which is populated if the catchment is treated by a credited BMP. (These fields are defined in the DCR PCP Web Application metadata in Appendix A). After delineating these three MS4-regulated catchments, DCR completed a priority ranking of areas for phosphorus control practices based on a detailed assessment of site suitability factors. These factors included phosphorus load priority (a categorization scheme that corresponds to magnitude of load per area and which is defined further in the PCP & NSIR Methods), presence of existing treatment, ability to collect drainage for treatment, available space for treatment, and hydrologic soil group (HSG). Table 6 displays this priority ranking and the factors it was based on, as well as concepts for potential structural BMPs within each catchment. These initial rankings represent a rough prioritization. Treatment credits for each potential structural BMP were not evaluated at this time due to the potential BMPs' preliminary nature. However, over the next ten years, DCR plans to evaluate these potential BMPs and implement one or more of these measures so that at least 0.3 lb/yr of phosphorus is removed from Dunn State Park's load, meeting the final phosphorus reduction requirement.

Table 6 Bents Pond / Ramsdall Pond Priority Ranking of Planned BMPs

Catchment ID*	Location	P Load Priority	Existing Treatment	Ability to Collect Drainage for Treatment	Available Space	Soil Type (HSG)	Priority Ranking	Treatment Opportunities
2263	Dunn State Park parking area	Medium	None	High	Sufficient	C	1	<ul style="list-style-type: none"> Facilitate IC disconnection if opportunities arise for removing curbing and/or regrading Leaching basins or subsurface infiltration systems possible if IC disconnection not practical
2262	Dunn State Park picnic pavilion area with paved walking path and driveway	Low	Infiltration Basin/Swale	High	Sufficient	C	2	<ul style="list-style-type: none"> Retrofit existing conveyance swales with check dams to increase infiltration and pollutant removal Retrofit existing BMP to increase storage volume
2264	Dunn State Park visitor center, adjacent to beach	Low	None	Moderate	Limited	C	3	Limited

*The DCR PCP Web Application shows catchment locations and identifies each with a Catchment ID in the catchment pop-up.

5.2.3 Lake Quinsigamond & Flint Pond

DCR owns four MS4-regulated properties within the Lake Quinsigamond & Flint Pond Watershed. These properties include the Honorable Charles J. Buffone Skating Rink, Quinsigamond State Park – Lake Park, Quinsigamond State Park – Regatta Point, and the Oak Island Boat Ramp. Therefore, implementation of structural phosphorus controls must take place within one or more of these four facilities to achieve the remaining 3.8 lb/yr of phosphorus load reduction required in this watershed.

Within these four facilities, DCR has delineated 14 MS4-regulated catchments. These catchments can be viewed on the DCR PCP Web Application, which provides additional information about each catchment in the catchment pop-up, such as Catchment ID, Treatment Status, and BMP Structure ID, the latter of which is populated if the catchment is treated by a credited BMP. (These fields are defined in the DCR PCP Web Application metadata in Appendix A). After catchment delineation, DCR completed a priority ranking of areas for phosphorus control practices based on a detailed assessment of site suitability factors. These factors included phosphorus load priority (a categorization scheme that corresponds to magnitude of load per area and which is defined further in the PCP & NSIR Methods), presence of existing treatment, ability to collect drainage for treatment, available space for treatment and hydrologic soil type. Table 7 displays this priority ranking and the factors it was based on, as well as concepts for potential structural BMPs within each catchment. These initial rankings represent a rough prioritization. Treatment credits for each potential structural BMP were not evaluated at this time due to the potential BMPs' preliminary nature. However, over the next ten years, DCR plans to evaluate these potential BMPs and implement several of these measures so that at least 3.8 lb/yr of phosphorus is removed from DCR property load within the watershed, meeting the final phosphorus reduction requirement.

In addition to the traditional BMPs that have been identified as potential treatment opportunities within this watershed (Table 7), DCR is in the process of applying for an EPA Southern New England Program (SNEP) Implementation Grant to pilot the design and installation of an "embankment filter" at Quinsigamond State Park- Regatta Point. An embankment filter is a filtration practice set on sites with steeper slopes. If funded, this pilot embankment filter would likely treat the northern half of the Regatta Point parking lot, which has a phosphorus load of 0.64 lb/yr (Catchment #22; priority ranking #7 in Table 7).

Table 7 Lake Quinsigamond & Flint Pond Priority Ranking of Planned BMPs

Catchment ID*	Location	P Load Priority	Existing Treatment	Ability to Collect Drainage for Treatment	Available Space	Soil Type (HSG)**	Priority Ranking	Treatment Opportunities
56	Oak Island Boat Ramp-southern half of parking area	High	None	High	Sufficient	No data	1	<ul style="list-style-type: none"> • IC disconnection
57	Oak Island Boat Ramp-northwestern quadrant of parking area	Medium	None	High	Sufficient	No data	2	<ul style="list-style-type: none"> • IC disconnection
58	Oak Island Boat Ramp-northeastern quadrant of parking area	High	None	High	Sufficient	No data	3	<ul style="list-style-type: none"> • IC disconnection
19	Quinsigamond State Park- Regatta Point - south of boathouse	Low	None	Low	Sufficient	No data	4	<ul style="list-style-type: none"> • IC disconnection
26	Quinsigamond State Park- Lake Park – parking area, south of football field	Low	None	High	Sufficient	No data	5	<ul style="list-style-type: none"> • Surface infiltration • Leaching basins
28	Quinsigamond State Park- Lake Park - tennis courts and parking area north of visitor building	Medium	None	High	Sufficient	No data	6	<ul style="list-style-type: none"> • Surface infiltration • Leaching basins
12	Quinsigamond State Park- Regatta Point - boathouse, picnicking area, boardwalk	Medium	None	Moderate	Sufficient	No data	7	<ul style="list-style-type: none"> • Surface infiltration • Leaching basins
22	Quinsigamond State Park- Regatta Point - northern section of parking lot	Medium	None	High	Moderate	No data	8	<ul style="list-style-type: none"> • Pilot "embankment filter" (contingent on receiving SNEP grant)

Catchment ID*	Location	P Load Priority	Existing Treatment	Ability to Collect Drainage for Treatment	Available Space	Soil Type (HSG)**	Priority Ranking	Treatment Opportunities
10	Honorable Charles J. Buffone Skating Rink – rink and parking lot	Medium	None	High	Moderate	No data	9	<ul style="list-style-type: none"> Leaching basins Partner with City of Worcester for surface infiltration in roadway median
24	Quinsigamond State Park- Regatta Point – southern section of parking lot	Medium	Oil/Grit Separator (not creditable)	High	Moderate	No data	10	<ul style="list-style-type: none"> Replace oil/grit separator with creditable BMP
13	Quinsigamond State Park- Lake Park – area surrounding football field	Low	None	Low	Sufficient	No data	11	Limited
17	Quinsigamond State Park – Regatta Point - middle section of parking lot	High	Bioretention Infiltration Basin/Swale	High	Sufficient	No data	12	Limited
29	Quinsigamond State Park - Lake Park - southernmost section, includes tennis courts and parking area	Low	Infiltration Basin/Swale	Moderate	Sufficient	A	13	Limited
5555	Quinsigamond State Park - Lake Park - football field	Low	Porous Pavement / Turf Filtration (not creditable)	Low	Low	No data	14	Limited

*The DCR PCP Web Application shows catchment locations and identifies each with a Catchment ID in the catchment pop-up.

**As explained in the DCR PCP & NSIR Methods, soils data was obtained from the United States Department of Agriculture Natural Resources Conservation Services data layer for Massachusetts. However, this data layer's survey area does not cover some DCR catchments. If some or all of a catchment was not covered, "No data" is listed for Soil Type.

6

Operation & Maintenance Program

The MS4 permit requires an operation and maintenance (O&M) program for all existing structural BMPs being claimed for phosphorus reduction credit and all planned structural BMPs that will, once constructed, be claimed for credit. The MS4 permit dictates that this O&M Plan shall include:

- 1) Inspection and maintenance schedule for each BMP according to BMP design or manufacturer specification
- 2) Program or department responsible for BMP maintenance

DCR's plan for inspection, operation, and maintenance of BMPs is included in Section 7 of DCR's overall O&M Plan (included in this document as Appendix E) and satisfies the above requirements. It should be noted that DCR organizes inspection and maintenance activities by BMP component, rather than by BMP type. This list of BMP components is used to inspect or maintain all of DCR's BMP types. This organization helps ensure that all BMP components are adequately inspected and maintained. DCR's O&M Plan is reviewed regularly and updated as needed.

7

Implementation Plan

7.1 Non-structural Control Measures

7.1.1 Schedule

DCR will continue to implement current street sweeping practices at a rate of twice per year within the Auburn Pond/ Leesville Pond Watersheds and the Lake Quinsigamond & Flint Pond Watershed. No street sweeping will be implemented in the Bents Pond/ Ramsdall Pond Watersheds at this time. The MS4 Permit requires that all non-structural controls are implemented by PY 6, and DCR has already met this requirement.

7.1.2 Cost Estimate

DCR plans to continue current street sweeping operations at facilities in the Auburn Pond/ Leesville Pond Watersheds and the Lake Quinsigamond & Flint Pond Watershed. Costs of street sweeping efforts in these watersheds alone are difficult to estimate because sweeping contracts are managed statewide and supplemented by DCR Operations support from individual DCR labor yards, which cover many activities including supplemental sweeping. However, DCR has already implemented the annual street sweeping operations described in Section 4.1.1. Therefore, DCR is confident that funding sources are secure to continue these operations annually and in doing so, to complete non-structural control implementation. This satisfies the MS4 Permit's intent for cost estimating, Appendix F Section A.I.1.a.3, which states: "This cost estimate can be used to assess the validity of the funding source assessment... and to update funding sources as necessary to complete Phase 1."

As DCR's street sweeping program continues and the tracking and accounting system matures, DCR will develop better estimates of street sweeping costs specifically for the Auburn Pond/ Leesville Pond Watersheds and Lake Quinsigamond & Flint Pond Watershed. Currently, DCR's Stormwater Program spends an average of \$1.2 million statewide on an annual street sweeping contract while DCR Operations staff are also dispatched from individual labor yards to supplement these efforts. Therefore, over the remainder of the LPCP implementation timeline (i.e., over the next 10 years), DCR's Stormwater Program estimates spending at least \$12 million on a statewide street sweeping contract plus the cost of internal DCR efforts, including the cost of DCR Operations staff sweeping and DCR Stormwater staff coordination time.

7.2 Structural Control Measures

7.2.1 Schedule

The MS4 Permit requires that implementation of planned BMPs must begin upon completion of the LPCP and that BMPs are implemented to meet interim and final (PY 15) targets. Implementation of structural controls has already begun. Two of the three LPCP watersheds have existing BMPs, and DCR is in the midst of implementing BMPs in the third LPCP watershed. DCR's schedule for implementing BMPs includes meeting load reduction requirements for all watersheds by PY 15 and also meeting the interim load reduction deadlines presented in Table 2.

More specifically, DCR's schedule is to first utilize an opportunistic approach followed by a planning approach. DCR's opportunistic approach will first involve the DCR Stormwater team coordinating with DCR planners and facilities managers to see if any site maintenance or redevelopment is planned at facilities within LPCP watersheds. If it is, the Stormwater team will then attempt to incorporate stormwater treatment into those projects. If the DCR Stormwater team learns that redevelopment is not planned in any potential BMP locations within the next ten years, stand-alone stormwater retrofit projects will be executed to achieve LPCP milestones. Stand-alone stormwater retrofit projects will be chosen by evaluating catchments and potential BMPs in order of their priority assigned during the priority ranking process (Section 5.2.2 and 5.2.3). The sections below describe each watershed's schedule in more detail.

7.2.1.1 Auburn Pond / Leesville Pond Watersheds

Preliminary design, soils assessment (test pits), and survey have already been completed for the proposed Horgan Rink retrofits described in Section 5.2.1. Detailed design for the proposed retrofits is underway and is expected to be completed in spring 2023. Construction will be completed through in-house maintenance contracts by PY 8. With this timeline, the PY 8 deadline of 0.2 lb/yr removed will be met. This construction will also fulfill DCR's total load reduction obligations in the Auburn Pond/Leesville Pond Watersheds.

7.2.1.2 Bents Pond / Ramsdall Pond Watersheds

Existing BMPs in the Bents Pond/ Ramsdall Pond Watersheds have allowed DCR to meet PY 8 and PY 10 deadlines ahead of schedule. Over the next few years, DCR will evaluate the high priority catchments and potential BMPs in Table 6 (Section 5.2.2) to decide on the best retrofit opportunities. As only 0.3 lb/yr is required to be removed from DCR's load, it is likely only one construction project will be needed to meet requirements. DCR plans to complete this project before PY 13, which is the soonest unmet permit deadline in this watershed. However, the plan is that this one project would achieve the 0.3 lb/yr remaining phosphorus reduction required by PY 15. DCR will continue to inspect and provide maintenance for existing BMPs on an annual basis.

7.2.1.3 Lake Quinsigamond & Flint Pond Watershed

Existing BMPs in the Lake Quinsigamond & Flint Pond Watershed have allowed DCR to meet PY 8 and PY 10 deadlines ahead of schedule. Over the next few years, DCR will evaluate the high priority catchments and potential BMPs in Table 7 (Section 5.2.3) to select the best retrofit opportunities. It is likely that DCR will install multiple BMPs through multiple projects in order to meet the 3.8 lb/yr of

phosphorus load reduction remaining in this watershed by PY 15. BY PY 13, DCR plans to have at least completed projects that provide 1.3 lb/yr of phosphorus load reduction, as this will allow DCR to meet the PY 13 deadline of 5.8 lb/yr total phosphorus reduction. If DCR is awarded an EPA SNEP Implementation Grant in summer 2023, design of a pilot embankment filter in Quinsigamond State Park could begin as early as October 2023. DCR will continue to inspect and provide maintenance for existing BMPs on an annual basis.

7.2.2 Cost Estimate

7.2.2.1 Design and Construction

DCR estimates that the design and construction of new BMPs to meet LPCP load reduction requirements will cost approximately \$650,000. Costs were estimated using the assumption that design and construction of structural BMPs costs approximately \$100,000 per pound of phosphorus removed. This assumption was based on BMP cost data collected and analyzed by Brown and Caldwell and the Charles River Watershed Association (CRWA) and summarized in the Cost Benefit Resource Toolkit for Phosphorus Control BMPs⁶. Table 8 summarizes the estimated costs associated with implementation of new structural BMPs in each LPCP watershed.

Table 8 Cost Estimate for Proposed Structural BMPs

Watershed	Required Phosphorus Reduction (lb/yr)	Planned Phosphorus Reduction (lb/yr)	Estimated Cost per Pound of Phosphorus (\$/lb/yr)	Total Estimated Cost (\$)
Auburn Pond / Leesville Pond	1.2	2.4	\$100,000	\$240,000
Bents Pond / Ramsdall Pond	0.3	0.3	\$100,000	\$30,000
Lake Quinsigamond & Flint Pond	3.8	3.8	\$100,000	\$380,000

7.2.2.2 O&M

DCR plans to continue current operations for inspection, operation and maintenance of existing structural BMPs. For several years DCR has implemented O&M for existing BMPs, although costs of O&M implementation are difficult to estimate because costs for these activities alone have not historically been tracked.

Currently, DCR inspects all BMPs in LPCP watersheds annually. After inspection, DCR maintains these BMPs on an as-needed basis. Costs of inspection and maintenance include costs for DCR staff time, DCR vehicle and equipment use, contractors to perform maintenance and consultant time to assist with database management. In future years, DCR will not only track inspection and maintenance activities but will also track their costs so that in the future, the agency will have more specific cost data to support PCP planning. It is worth noting that DCR anticipates inspection and maintenance

⁶ "Cost Benefit Resource Toolkit for Phosphorus Control BMPs." Brown and Caldwell. (2022).

costs will increase in LPCP watersheds as new BMPs are constructed. DCR will factor this into its plan for LPCP funding.

DCR is confident that funding sources are secure to continue current O&M practices annually. This satisfies the MS4 Permit's intent for cost estimating in Appendix F Section A.1.1.a.3, which states: "This cost estimate can be used to assess the validity of the funding source assessment... and to update funding sources as necessary to complete Phase 1."

8

Conclusion

DCR has already begun both non-structural and structural implementation of the LPCP and anticipates meeting MS4 Permit requirements by PY 15 at the latest. More specifically, DCR is more than half of the way towards achieving the final PY 15 (2033) phosphorus reduction requirements in the Bents Pond/ Ramsdall Pond Watersheds and Lake Quinsigamond & Flint Pond Watershed, and design is underway for BMPs that will achieve the phosphorus reduction requirement in the Auburn Pond/ Leesville Pond Watersheds.

DCR estimates implementation of the LPCP will cost between \$500,000 and \$1 million, with approximately \$650,000 in design and construction of structural BMPs and thousands in structural BMP O&M and street sweeping costs.

DCR plans to continue reducing annual phosphorus load via existing controls, specifically by continuing to implement current street sweeping practices and by inspecting and maintaining existing structural BMPs. DCR also plans to reduce annual phosphorus load via new structural controls, which will help DCR achieve interim and final load reduction deadlines associated with the PCP.

The geospatial information supplementing this report can be viewed in the DCR PCP Web Application at the following link:

<https://www.arcgis.com/apps/dashboards/4df45895b7e94dc69f4459faa660063c>



A

DCR PCP Web Application Metadata

Table A1 below provides reference metadata for the DCR PCP Web Application, which is meant to supplement this LPCP as well as a second PCP for the Charles River Watershed. The DCR PCP Web Application is accessible at the URL below.

<https://www.arcgis.com/apps/dashboards/4df45895b7e94dc69f4459faa660063c>

Table A1 DCR PCP Web Application Metadata

Layer Name	Description	Source	Feature Class
DCR Drainage Infrastructure			
Outlet	Outlets mapped in DCR's drainage geodatabase	DCR	Point
Inlet	Inlets (e.g., catch basins) mapped in DCR's drainage geodatabase	DCR	Point
Manhole	Manholes mapped in DCR's drainage geodatabase	DCR	Point
Miscellaneous Structure - Point	Miscellaneous structures mapped as a point in DCR's drainage geodatabase	DCR	Point
Miscellaneous Structure - Polygon	Miscellaneous structures mapped as a polygon in DCR's drainage geodatabase	DCR	Polygon
Linear Feature	Linear features, such as pipes and other conveyances, mapped in DCR's drainage geodatabase	DCR	Line
Surface BMP	Aboveground structural stormwater control measures (BMPs) mapped in DCR's drainage geodatabase. Surface BMPs are colored light purple. They have a star if they were given phosphorus load reduction credit in the PCP. Pop-ups show phosphorus load reduction credit and several other parameters, including those used to calculate credit.	DCR	Polygon
Subsurface BMP	Belowground structural stormwater control measures (BMPs) mapped in DCR's drainage geodatabase. Subsurface BMPs are colored dark purple. They have a star if they were given phosphorus load reduction credit in the PCP. Pop-ups show phosphorus load reduction credit and several other parameters, including those used to calculate credit.	DCR	Polygon
DCR Street Sweeping Area			
Road	DCR roadways that are swept. Color of the road indicates annual frequency swept. Pop-ups show street name and phosphorus load reduction, among other parameters.	DCR	Line
Parking Lot	DCR parking lots that are swept. Color of the parking lot indicates annual frequency swept. Pop-ups show facility name and phosphorus load reduction, among other parameters.	DCR	Polygon

Layer Name	Description	Source	Feature Class
Catchment			
Catchment	Subdivided DCR property based MS4-regulation status, gross drainage patterns and potential for treatment. Catchments are solid green if they are part of the MS4-regulated area (the DCR PCP & NSIR Methods includes details about what is considered regulated) and are hatched if not. MS4-regulated catchments that are treated with a creditable BMP are also outlined in dark green. Pop-ups show catchment ID, the facility that the catchment is a part of, and each catchment's assigned "treatment status." Catchments can have a treatment status of "existing" if the catchment is treated by an existing, creditable BMP, "high potential" or "low potential" if the catchment is not treated by a BMP, or "non-discharge" if the catchment does not include any channelized discharge and is therefore not considered regulated under the MS4 Permit. Catchment pop-ups also show BMP structure ID if the catchment is treated by a creditable BMP.	DCR	Polygon
Impaired Waters Reference Layers			
Pond requiring DCR PCP	"MassDEP 2016 Impaired Waters – Water Body AUs – Lakes, Estuaries (polygons)" data layer filtered for ponds that receive DCR discharges and are listed in the MS4 Permit's Appendix F as requiring a PCP, i.e. ponds that require DCR to create a PCP	MassDEP	Polygon
River requiring DCR PCP	"MassDEP 2016 Impaired Waters – Water Body AUs – Rivers (arcs)" data layer filtered for rivers segments that receive DCR discharges and are listed in the MS4 Permit's Appendix F as requiring a PCP, i.e. river segments that require DCR to create a PCP	MassDEP	Line
PCP Watershed	Watershed of each waterbody requiring a DCR PCP	DCR	Polygon



B

Legal Analysis



To: DCR

Date: June 30, 2020
Revised September 2, 2020

Memorandum

From:
Theresa McGovern, PE
Caroline Hampton, PE

Project #: 14371.00
Re: PCP Legal Analysis

Appendix F of the MS4 permit requires DCR to complete a legal analysis as part of both the Charles River and the Lakes and Pond Phosphorus TMDL requirements. The requirement as described by the permit:

“The permittee shall develop and implement an analysis that identifies existing regulatory mechanisms available to the MS4 such as by-laws and ordinances and describes any changes to regulatory mechanisms that may be necessary to effectively implement the entire PCP. This may include the creation or amendment of financial and regulatory authorities. The permittee shall adopt necessary regulatory changes by the end of the permit term.”

The MS4 Fact Sheet provides additional explanation as follows:

“Legal Analysis: The Draft Permit requires that permittees conduct a legal analysis to assess the use and/or hindrance of existing and potential local by-laws/ordinances for carrying out the PCP. Because PCP implementation activities will likely take place throughout the communities’ CRW areas, local by-laws will likely be triggered during the process. Local by-laws/ordinances may present both opportunities and hindrances to success in carrying out the PCP.

Examples of opportunities include adopting more stringent re-development standards that would result in decreased stormwater phosphorus loads over time as redevelopment occurs; and modifying planning standards that would allow for less or smaller parking spaces for commercial and industrial operations, and thus, allowing for less impervious area and the associated stormwater phosphorus load. One of the most cost effective BMPs will be the elimination of un-needed impervious cover in the watershed.

An example of a hindrance could be by-laws that require the use of certain BMPs that are not necessarily the best performers for removing stormwater phosphorus load. By-laws that inhibit the use of LID practices, many of which have been estimated to be among the most effective BMPs for removing stormwater phosphorus load, may have unintended consequences of blocking local use of highly effective BMPs. Another potential hindrance is local requirements, such as mandating specific BMP design capacities, may prevent the development and implementation of an optimized PCP that calls for wide-scale implementation of varied sized BMPs including many small sized BMPs. EPA envisions that the most useful and cost-effective PCPs will require flexibility in applying the most effective controls (based on type and sizing) in the best locations throughout the CRW as part of a master strategy. Ultimately, it will be important that local bylaws are able to accommodate the needed flexibility and even encourage use of the best practices as part of an overall master strategy. The legal analysis can be updated in each phase of the PCP as needed.”

This memorandum includes the legal analysis prepared by VHB for DCR to address this requirement including the following sections:

- › Introduction and DCR Context

From: Theresa McGovern, PE
Ref: 14371.00
June 30, 2020, Revised September 2, 2020
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- › Existing Regulatory Mechanisms and Suggested Changes and Actions
- › Other PCP Implementation Challenges
- › Conclusions

Introduction and DCR Context

DCR is a non-traditional transportation MS4. Their properties include parks, green spaces and facilities, in addition to parkways. Their regulated area is non-contiguous and is located in several different municipalities and watersheds across the state. DCR is a state agency that does not have the regulatory authority to control their property through ordinances and bylaws, as towns do, although they do have the ability to develop regulations provided it follows a prescribed process including public review.

Their regulated area discharging to waterbodies requiring Phosphorus Control Plans (PCP areas) is all owned by DCR and they do not have private entities within their regulated areas. Therefore, DCR has more direct control of stormwater management and thus do not have the same need for mechanisms like ordinances and bylaws to require treatment.

DCR can regulate access or utility tie-in from abutters. DCR can comment on projects that occur through the MEPA process especially when those project impact DCR facilities including water resources. In addition, many DCR properties serve as facilities for the public and therefore provide a unique opportunity for public education and engagement.

DCR primarily performs its own design work in-house with limited use of consultants, therefore implementing stormwater management policies and strategies for its properties is relatively straight-forward and within their direct control.

Existing Regulatory Mechanisms and Suggested Changes and Actions

DCR's existing regulatory mechanisms related to the PCP areas include memorandum of agreements, use agreements and leases, internal policies and regulations regarding drainage tie-ins and illicit connections, as described below. This section includes changes DCR should make to align DCR on a path for meeting the PCP requirement for each category. Identifying these updates is the permit's purpose of this legal analysis. In addition, the section includes suggested actions that are not required but may support the PCP process.

Memorandum of Agreement with the City of Boston

DCR has a memorandum of agreement (MOA) with the Boston Water and Sewer Commission (BWSC) which is the entity that controls the stormwater and MS4 system for the City of Boston. From the 2013 MOA:

"The Commission and DCR enter into this agreement to enumerate their respective responsibilities and coordinate reporting on pollution prevention from maintenance of roadways, use of pesticides, herbicides and



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fertilizers, and public education and cooperation in sharing information with respect to improving storm water quality in the City of Boston.”

The MOA includes coordination between DCR and BWSC on stormwater/ MS4-related activities and construction projects that may affect MS4 facilities and sharing of drainage data and mapping. It specifies that each respective agency will perform source controls and maintenance on their own properties. It does not discuss stormwater treatment facilities or provisions to use or share land for stormwater treatment.

Change:

No changes needed.

Suggested Action:

DCR should consider expanding the MOA to include further collaboration and potential sharing of land for stormwater treatment facilities to assist both agencies in meeting their treatment targets.

DCR could consider creating similar agreements with other communities if needed to facilitate coordination and meet PCP requirements in the watersheds with more challenging target goals.

Use Agreements and Leases

For certain types of DCR properties, such as skating rinks and boat ramps, all or a portion of the property may be used by another entity (private or non-profit). This use is managed in the form of use agreements and leases which can be either short term (e.g. 5 to 10 years) or long-term (e.g. 100 years). Short term agreements present more opportunity to revisit the agreement and make changes as necessary.

Change:

No changes are identified at this time without a detailed review of the use agreements/ leases.

Suggested Action:

DCR should review all current use agreements and leases for facilities within PCP areas. Often the agreements do not prohibit DCR from addressing stormwater needs but should be reviewed on a case-by-case basis in conjunction with the watershed-specific targets to determine when the next opportunity for revisions to the agreement can be made and if revisions are needed. The language of the agreements should be reviewed to identify any specific language that either currently constrains DCR from providing stormwater treatment at the facility or would need to be added to better clarify DCR's ability to include treatment at the facility.

Internal Policies

DCR has recently initiated Project Management Standard Operating Procedures (SOPs) which are a new approach to project review and comment that allows DCR stormwater staff to review projects at early phases of development and provide comments and guidance for inclusion of stormwater practices. In this way, stormwater treatment



Memorandum

opportunities through DCR new and redevelopment projects will be identified early on and included when possible. In addition, the DCR stormwater staff is in frequent communication with other departments including Lakes and Ponds, Landscape, and Operations about specific sites and projects.

Finally, DCR facilities often have a specific role in the community and/or landscape that dictates the look and use of the facility. DCR must consider things like historic preservation, public access and safety when making decisions about their property. These considerations and goals may be in conflict at times with the goals and requirements of the PCPs.

Change:

Revise and update Stormwater Handbook as part of compliance with Minimum Control Measure 6 as a non-traditional permittee, DCR will be updating their current stormwater handbook in lieu of new/redevelopment ordinance by Permit Year 3. The handbook will formalize policies on when to include stormwater treatment practices to satisfy MS4 and MassDEP Wetland Protection Act obligations. This handbook should include specific guidance on treatment requirements for PCP areas to be clear about DCR's overall stormwater treatment responsibilities, which may include retrofits in addition to treatment included in new and redevelopment. The handbook will include treatment strategies for common DCR properties and can be referenced and use for implementation in PCP areas.

Suggested Action:

DCR stormwater staff should continue to be engaged in the development of the Project Management SOPs to ensure there are enough meaningful triggers and opportunities for projects to be reviewed for stormwater improvement potential and to ensure recommendations are followed.

DCR should develop training materials and/or fact sheets or "cheat sheets" as companion materials to the handbook for DCR staff geared towards their role in the stormwater treatment process (e.g. design or operations).

Facility Plans

Several of DCR facilities have plans in progress or in place that guide the elements of the facility. The general categories of plans include Master Plans and Vegetation Management Plans. Master Plans typically comprehensively address the goals for a facility and involve extensive stakeholder and community involvement. They are ongoing plans that do not necessarily have all of the suggested elements realized in an immediate fashion. Master plans are being developed for some key DCR facilities that dictate the goals and use of the property, how the public interacts with it, and many of the environmental considerations for the property.

Vegetation Management Plans are more specific documents that dictate the land use and vegetation at a facility. They are living documents that can be easily adapted and modified to accommodate current needs.



In regard to this legal analysis, Master Plans and Vegetation Management Plans are not regulations or legal documents so, while important guidance for DCR to use, they would not restrict DCR's ability to implement necessary stormwater treatment. Both may provide opportunity to guide how facilities generate and treat runoff.

Change:

No changes.

Suggested Action:

DCR should identify and review all of the existing facility plans for PCP-area properties and consider elements that would dictate land use and land cover, especially impervious area, and the ability to include surface stormwater treatment facilities on the properties. DCR should identify when these plans can/will be revisited and include updated plans that reflect the PCP goals and needs. Similarly, if any new plans are slated to be developed or can proactively be initiated, DCR should ensure that PCP goals and needs are reflected in them.

Drainage Tie-in and Illicit Connection Policy and Regulations

DCR has a draft Illicit Drainage Disconnection Policy that prohibits the connection of illicit and unauthorized discharges to DCR Parks & Parkways drainage system and requires the disconnection of all such existing connections. The policy identifies the exempt non-stormwater discharges and sets a procedure for when an illicit connection is found. DCR currently follows this policy if a illicit connection is identified.

To provide further clarification and set internal protocols, DCR is developing regulations (302 CMR 20.00) to provide additional clarity for discharges to the DCR stormwater system. The current draft includes requiring the applicant to apply for a construction and access permit for drainage connections meeting the MS4 definition of allowable discharges and will require treatment prior to discharge, prohibit illegal discharges, and authorize DCR to take action when these requirements are not met.

Change:

No change needed. The current policy in use and draft regulation address illicit connections and tie-ins but are not directly relevant to the PCP because discharges from non-DCR property are not part of DCR's responsibility for pollutant loading and reductions.

Suggested Action:

As DCR finalizes this regulation, they should make municipalities aware that they do not take responsibility for the waste load allocations of properties outside of their jurisdiction. Per EPA guidance, the waste load allocation of property of separate MS4 permittees within a municipality is the responsibility of that permittee. And therefore, the remaining municipal area is the responsibility of the municipal MS4. The municipality must include that load and treatment in their calculations and regulate those properties through their new ordinances even if the discharge is interconnected to DCR's system.



Other PCP Implementation Challenges

This section includes additional challenges identified at this early stage of PCP planning which DCR will need to take into account in meeting PCP goals.

Article 97

Article 97 of the Amendments to the Massachusetts Constitution protects the public's right to clean air and water and quality environment. It states that '[l]ands and easements taken or acquired' for conservation purposes 'shall not be used for other purposes or disposed of' without the approval of two thirds roll call vote of each branch of the legislature.' Article 97 is intended to be a legislative 'check' to ensure that lands acquired by state entities and municipalities for conservation purposes are not converted to other inconsistent uses.¹ DCR land is protected under Article 97 and therefore its use cannot be converted to stormwater treatment facilities without having a public use component. To date, DCR has navigated this rule by including a public education component to their above-ground stormwater facilities. DCR should be prepared and potentially develop standards for how to interpret Article 97 and include a public component in their stormwater treatment facilities.

Treatment within Lakes and Ponds Areas

DCR's properties within the Lakes and Ponds PCP watersheds are often state parks and forests that contain minimal, if any, connected impervious cover. They generate minimal load per area, but their overall size results in a non-negligible load. MS4 permittees in these watersheds are all subject to the same percent load reductions. Therefore, these areas have a load reduction target that may be difficult to meet due to their lack of impervious cover and lack of formal drainage. Based on the flow path of runoff from these areas, it could be argued that some of these areas do not create discharge to the TMDL receiving water. DCR should work with EPA to develop and implement a definition of non-discharging areas to identify these areas separate from the ones that generate runoff to the waterbody and therefore warrant treatment.

Additional Water Quality Treatment Credits

Several stormwater treatment practices that are most effective for DCR do not currently receive credit under Appendix F of the MS4. These include practices like vegetation management, erosion control, and stream and bank restoration. DCR can work with EPA to identify and quantify these practices for inclusion in the PCPs and the permit allows for submittal of additional credit practices for review by EPA.

¹ <https://www.jdsupra.com/legalnews/recent-case-law-on-article-97-limits-91869/#:~:text=Article%2097%20of%20the%20Articles,the%20approval%20of%20two%20thirds>

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Permitting

For certain situations, the permitting of stormwater improvements is costly and time-consuming effort. In addition, due to DCR's state-wide nature, DCR must work with a range of municipalities and Conservation Commissions which makes it more difficult to create established practices and streamline permitting. Enhancements to water resources themselves such as stream restoration practices can be difficult to permit despite their known benefit for enhancing the natural systems and mitigating stormwater impacts. DCR may be able to work with MassDEP and select municipalities to create established permitting protocols for certain stormwater activities to streamline the process.

Space Limitations

Certain DCR properties such as roadways and parkways encompass linear corridors that do not provide extensive space for stormwater treatment or the DCR-owned space is a companion park that cannot easily be converted to stormwater treatment facilities. Often DCR's roadways and parkways are adjacent to waterbodies which further limits space due to resource areas and buffer zones and contains poorly infiltrating soils or high groundwater tables which does not allow for the most efficient infiltrating practices. Negotiating and executing right-of-way takings with municipalities can be costly and time-consuming and not always successful. These constraints must be considered realistically during the treatment planning phase of the PCP.

Conclusion

From a legal and regulatory perspective, although there are limited regulatory mechanisms available to DCR, there is no real need for those mechanisms for DCR to "effectively implement the entire PCP". DCR's ability to control the entirety of its PCP areas eliminates the need for additional regulation. The internal protocols for meeting the PCPs will be included in DCR's Stormwater Handbook. Although no unilateral legal changes are necessary, DCR may need to revisit the BWSC MOA and use/lease agreements to ensure they support the PCP goals. In addition, there are several strategic actions within DCR control that would facilitate the implementation of the PCP.



C

Funding Source Assessment



To: Massachusetts DCR
From: Sarah Nalven
Theresa McGovern, PE

Date: June 30, 2021
Project: 14371.00
Re: Funding Source Assessment

Memorandum

Appendix F of the MS4 permit requires the Department of Conservation and Recreation (DCR) to complete a funding source assessment as part of both the Charles River and the Lakes and Ponds Phosphorus TMDL requirements. The requirement as described by the permit:

“Funding source assessment – The permittee shall describe known and anticipated funding mechanisms (e.g. general funding, enterprise funding, stormwater utilities) that will be used to fund PCP implementation. The permittee shall describe the steps it will take to implement its funding plan. This may include but is not limited to conceptual development, outreach to affected parties, and development of legal authorities.”

The MS4 Fact Sheet provides additional explanation as follows:

“Funding Source Assessment: The permit requires permittees to describe known and anticipated funding mechanisms that will be used to implement the PCP. Developing and implementing a PCP likely goes beyond the resources currently available to most permittees’ current stormwater management program. Ultimately, each permittee will need funding at levels adequate to satisfy the PCP requirements in order to comply with the permit. This requirement is intended to have the permittee assess the overall long-term funding needs for completing the PCP and to evaluate options for generating sustainable funding sources that meet the needs. EPA encourages permittees to review the 2011 study, Sustainable Stormwater Funding Evaluation for the Upper Charles River Communities of Bellingham, Franklin, and Milford, MA, the Horsley Witten Group (Horsley Witten, 2011) for information on some potential options (<http://www.epa.gov/region1/npdes/charlesriver/pdfs/20110930-SWUtilityReport.pdf>).

The DCR receives annual appropriations of Commonwealth of Massachusetts capital and operating funds to finance stormwater management program activities which include development and implementation of a phosphorus control plan (PCP) in accordance with United States Environmental Protection Agency National Pollutant Discharge Elimination System Municipal Separate Storm Sewer System (NPDES MS4) permit requirements. Since 2005 through present day capital plans, Massachusetts Department of Administration and Finance has allocated DCR with dedicated annual funding of sufficient level to enable DCR to implement, and maintain compliance with, requirements of its US EPA NPDES MS4 permit.

DCR anticipates needing funding to support the following PCP activities:

- Develop and maintain water quality tracking and reporting tools
- Identify and quantify pollutant credits for existing non-structural, non-traditional, and traditional structural control measures
- Identify potential retrofit opportunities to meet PCP targets
- Perform inspection and maintenance of installed stormwater control measures (SCMs)
- Support tracking / accounting measures



- Coordinate with capital projects
- Design and permitting to develop retrofit plans for construction

DCR will estimate these funding needs and continue to refine estimates annually, working with the Massachusetts Executive Office of Energy and Environmental Affairs (EOEEA) to communicate funding requests to cover anticipated needs.

In addition to DCR direct funding, DCR may seek grant funding and work with partners to share the cost of projects that have shared benefits. Although grant funding is appealing, it is an unpredictable source of funding that often comes with constraints which may restrict use for regulatory compliance (e.g., MS4) and can also have restrictions on the types of entities that may receive the grants (e.g., grants restricted to municipalities or non-profits and therefore not available for an agency like DCR).

Partnerships with sister agencies like MassDOT and MBTA provide opportunities to achieve common water quality goals and regulatory needs and share costs. DCR will continue to work with these agencies to identify opportunities.

Partnerships with watershed associations such as the Charles River Watershed Association are another avenue for cost sharing especially when these associations are receiving grant and federal funding geared towards non-profit groups. Watershed groups can also assist with labor costs for installation, inspection and maintenance activities for structural controls. DCR has strong relationships with many of the watershed groups across the Commonwealth and will continue to work with them to identify opportunities.



D

Phosphorus Control Plan – Permit Year 4 (Charles River/Lakes and Ponds)

Phosphorus Control Plan - Permit Year 4

(Charles River/ Lakes and Ponds)

For compliance with the National Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts

PREPARED FOR



251 Causeway Street
9th Floor
Boston, MA 02114

PREPARED BY



101 Walnut Street
PO Box 9151
Watertown, MA 02471

JUNE 2022

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1

Introduction

This document has been developed to satisfy the Phosphorus Control Plan (PCP) related requirements for Permit Year (PY) 4 outlined in the National Pollutant Discharge Elimination System General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (MS4 permit). These requirements are included in the following sections of the MS4 permit:

- Appendix F, Section A.I Charles River Watershed Phosphorus TMDL Requirements
- Section 5.0 Non-Traditional MS4s, Subsection 5.1.5 Discharges Subject to Appendix F Part A.I
- Appendix F, Section A.II Lake and Pond Phosphorus TMDL Requirements

This document summarizes the requirements and the Massachusetts Department of Conservation and Recreation's (DCR's) compliance with these requirements. Section 2 addresses requirements pertaining to the Charles River Watershed (the first two bullets above) while Section 3 addresses requirements pertaining to the Lakes and Ponds Watersheds (the third bullet above).

2

Charles River Watershed

Appendix F Section A.I.1.a.3 requires that by PY 4 permittees define the:

- Scope of PCP (PCP Area)
- Baseline Phosphorus Load
- Phosphorus Reduction Requirement
- Allowable Phosphorus Load

Additionally, Section 5.1.5 of the MS4 permit requires that non-traditional permittees in the Charles River Watershed coordinate with the municipality that the MS4 permittee is located within. As a part of this coordination, the non-traditional permittee must report on the following in the PY 4 Annual Report:

- Estimated current impervious area of non-traditional permittee owned property
- Land use information for non-traditional permittee owned property
- Phosphorus removal in pounds per year for any structural BMP owned by the non-traditional permittee, calculated in accordance with Appendix F Attachment 3
- Date of last maintenance activity for all structural BMPs for which phosphorus removal is calculated

Each of these requirements are reviewed below in more detail followed by a section describing DCR's compliance approach.

1. **Requirement: Define scope of PCP.** The MS4 permit allows the permittee to choose to implement the PCP within its municipal/ agency jurisdiction or only within the urbanized portion of the permittee's jurisdiction within the Charles River Watershed.

DCR Response. DCR chooses to implement the Charles River PCP within the urbanized portion of its jurisdiction. In addition, DCR has reviewed its facilities within the Charles River Watershed to determine which portions constitute an MS4 system. The approach to this determination is

documented in Section 2.2.2 of DCR’s Methods for PCP & NSIR Development.¹ DCR has included a geodatabase as part of this submission which contains a layer named “DCR_PCP_Areas.” This layer contains DCR’s facilities within the Charles River Watershed and has attributes that distinguish which facility, or portion of a facility, constitutes DCR’s MS4. Specifically, the attribute table field “Regulated Status” indicates the locations of DCR’s MS4. DCR chooses to implement the Charles River PCP only within defined regulated MS4 areas.

- 2. Requirements: Define the baseline phosphorus load, the phosphorus reduction requirement, and the allowable phosphorus load.** Regarding the baseline phosphorus load, the MS4 permit’s Appendix F states, “The Permittee may submit more accurate land use data from 2005, which is the year chosen as the baseline land use for the purposes of permit compliance, for EPA to recalculate baseline phosphorus stormwater loads for use in future permit reissuances. Updated land use maps, land areas, characteristics, and MS4 area and catchment delineations shall be submitted to EPA along with the year 4 annual report in electronic GIS data layer form for consideration for future permit requirements.⁵ Until such a time as future permit requirements reflect information submitted in the year 4 annual report, the permittee shall use the Baseline Phosphorus Load, Stormwater Phosphorus Reduction Requirement and Allowable Phosphorus Load Table F-2 (if its PCP Area is the permittee’s entire jurisdiction) or Table F-3 (if its PCP Area is the regulated area only) to calculate compliance with milestones for Phase 1, 2, and 3 of the PCP.

[5] This submission is optional and needs only be done if the permittee has more accurate land use information from 2005 than information provided by MassGIS (<http://www.mass.gov/anf/research-and-tech/it-serv-and-support/application-serv/office-of-geographic-information-massgis/datalayers/lus2005.html>, retrieved 10/1/2013) or the permittee has updated MS4 drainage area characteristics and the permittee would like to update the Baseline Phosphorus Load.”

DCR Response. Table 1 provides DCR’s baseline phosphorus load, phosphorus reduction requirement, and allowable phosphorus load. Two estimates are presented for each parameter—one that is given in Appendix F and one that DCR has recalculated according to more accurate land use data, as Appendix F allows.

Table 1 Charles River Watershed Baseline Load Summary

Source	Total Area (ac)	Regulated Area (ac)	Baseline Load (kg/yr)	Required Reduction (kg/yr)	Allowable Load (kg/yr)	Percent Reduction (%)
MS4 Appendix F*	Not provided	Not provided	396	89	307	22
DCR Recalculation	5,368	1,266	93	47	46	51

* From Table F-3: Baseline Phosphorus Load, Phosphorus Reduction Requirement, Allowable Phosphorus Load, and Percent Reduction in Phosphorus Load from Charles River Watershed. For use when PCP Area is chosen to be only the urbanized area portion of a permittee’s jurisdiction within the Charles River Watershed.

¹ See Methods for PCP & NSIR Development at [DCR Stormwater Management | Mass.gov](https://www.mass.gov/info-details/dcr-stormwater-management)

DCR has reviewed its properties within the Charles River Watershed with the MassGIS Impervious Cover (2005) and Land Use (2005) layers.^{2,3} DCR reviewed the impervious cover and land use datasets for consistency by comparing them to MassGIS 2019 aerial imagery.⁴ If discrepancies were identified using the 2019 aerial imagery, Google Earth historic imagery was referenced to evaluate whether the discrepancy was due to changes in land use or impervious cover that had occurred since 2005, or if the discrepancy was due to an erroneous assessment of land use or impervious cover, in which case adjustment was warranted. All adjustments of the impervious cover and land use layers were relatively minor. This analysis provides an updated 2005 baseline for use in future permit nutrient load calculations.

DCR has included a geodatabase as part of this submission including layers named "DCR_PCP_LandUseEdits" and "DCR_PCP_ICEdits" which document the areas of adjusted baseline land use and impervious cover, respectively, when comparing aerial imagery to the MassGIS layers. For the land use changes, please see the attributes fields "Land Use Code (Original)" and "Land Use Code (Updated)" to see the revisions. For the impervious cover changes, please see the attribute field "Revision Type" to understand whether an area was added or removed to the impervious cover layer.

As mentioned, this geodatabase also includes a spatial layer named "DCR_PCP_Areas" which includes DCR's facilities within the Charles River Watershed and distinguishes (in the "Regulated Status" attribute field) which facility or portion of facility constitutes DCR's MS4.

This requirement asks for catchment delineations and DCR has defined catchments to support the Illicit Discharge Detection and Elimination (IDDE) requirements which can be found in DCR's IDDE webmap included in its annual report.⁵ These catchments were not used for this PCP analysis since they are based on an outfall scale which does not necessarily best support load calculations. However, larger-scale catchments were delineated to support PCP load calculations. These catchments are represented as polygons in the "DCR_PCP_Areas" layer that is included in the geodatabase submission mentioned previously.

Although the adjustments of IC and land use were relatively minor, the development of DCR's facility mapping and regulated MS4 status represents a larger update to the data likely used by EPA to calculate baseline pollutant loads and pollutant reduction targets. DCR developed a MS4 facilities layer in 2019 for the purposes of MS4 compliance, after the MS4 permit was released, and it is not clear how EPA defined DCR-owned properties during MS4 permit development. DCR recalculated the baseline loads using the developed MS4 facility layer and EPA methodology, which is based on DCR's land use, impervious cover, and hydrologic soil group of DCR's MS4 regulated area. DCR's target load and percent reductions were then calculated based on land use and watershed (Upper Charles vs. Lower Charles), consistent with EPA's approach and the Charles River TMDLs. DCR's calculation approach is outlined in the document, Methods for PCP & NSIR Development, Section 3.2 (baseline loads) and Section 3.4 (target reductions).

2 MassGIS. "Impervious Surfaces 2005." Commonwealth of Massachusetts. (February 2007). <https://www.mass.gov/info-details/massgis-data-impervious-surface-2005>

3 MassGIS. "Land Use (2005)." Commonwealth of Massachusetts. (June 2009). <https://www.mass.gov/info-details/massgis-data-land-use-2005>

4 MassGIS. "2019 Aerial Imagery." Commonwealth of Massachusetts. (Spring 2019). <https://www.mass.gov/info-details/massgis-data-2019-aerial-imagery>

5 <https://yhb.maps.arcgis.com/apps/webappviewer/index.html?id=87a35a2683aa4478a07ade7ffb7c1b2a>

Table 1 shows the baseline load values included in the MS4 Appendix F and the values recalculated by DCR using the updated DCR mapping and data. When comparing the recalculated regulated baseline load and required reductions to the MS4 Permit, the recalculated values show lower baseline load and required reduction but higher percent reduction. These differences are presumably due to the development of the DCR facility layer and evaluation of regulated status. Several DCR properties within the Charles River watershed that were determined to be unregulated MS4 areas are forested land use which has a 0% reduction target. These areas were not included in the DCR's load and target recalculation but may have been included in EPA's calculations, resulting in EPA's total baseline load higher and percent reduction lower. DCR understands that until future permit requirements reflect this information, DCR should use the MS4 permit values.

- 3. Requirement: Coordinate with municipalities on planned phosphorus reduction activities.** Section 5.1.5 of the permit requires that non-traditional permittees shall indicate planned phosphorus reduction activities on site and coordinate progress with the municipalities in each annual report.

DCR Response. DCR is in the process of planning its phosphorus reduction strategies, including non-structural activities, such as street sweeping, and structural activities, such as establishing impervious cover disconnection and infiltration BMPs. Structural BMPs will be implemented through both planned construction projects and potential stand-alone retrofits. These strategies will be developed further in Permit Year 5 and presented in the Permit Year 5 PCP submittal.

Unlike other non-traditional permittees in the Charles River Watershed, DCR has a baseline phosphorus load that is not included in municipal baseline loads, since the EPA calculated DCR's baseline load separately when calculating municipal loads for Appendix F. That said, DCR's PCP submittal will be shared with the Charles River municipalities that DCR facilities reside within.

- 4. Requirement: Report on the estimated current impervious area of non-traditional permittee owned property.**

DCR Response. DCR MS4 regulated property in the Charles River Watershed contains 592 acres of impervious area based on the MassGIS Impervious Cover layer (2005)⁶, adjusted per DCR review, as described previously. Additionally, impervious cover information for DCR's facilities within the Charles River Watershed is presented in the geodatabase included as part of this submission within the layer named "DCR_PCP_ICEdits."

- 5. Requirement: Report on the land use information for non-traditional permittee owned property.**

DCR Response. DCR's land use information for its varied facilities within the Charles River Watershed is presented in the geodatabase included as part of this submission within the layer named "DCR_PCP_LandUseEdits". This layer reflects the MassGIS Land Use layer (2005)⁷ for DCR facilities, adjusted as necessary based on DCR review, as described previously.

⁶ MassGIS. "Impervious Surfaces 2005." Commonwealth of Massachusetts. (February 2007).

<https://www.mass.gov/info-details/massgis-data-impervious-surface-2005>

⁷ MassGIS. "Land Use (2005)." Commonwealth of Massachusetts. (June 2009).

<https://www.mass.gov/info-details/massgis-data-land-use-2005>

6. Requirement: Report phosphorus removal in pounds per year for any structural BMP owned by the non-traditional permittee, calculated in accordance with Appendix F Attachment 3.

DCR Response. DCR has included a geodatabase as part of this submittal including two layers named "DCR_SubsurfaceBMP_Charles" and "DCR_SurfaceBMP_Charles," which document existing BMPs currently identified within DCR's facilities and included within DCR's tracking and accounting system. For the phosphorus removal for each BMP (in pounds per year), please see the attribute field "RED_P". These values represent preliminary estimates of the phosphorus removal of each BMP based on desktop delineations of contributing drainage areas and approximation of design storage volumes of each BMP, used with the baseline load calculation and BMP performance curves in Appendix F.

7. Requirement: Report date of last maintenance activity for all structural BMPs for which phosphorus removal is calculated.

DCR Response. DCR has included a geodatabase as part of this submission including two layers named "DCR_SubsurfaceBMP_Charles" and "DCR_SurfaceBMP_Charles," which document existing BMPs within DCR's facilities that have been currently identified and included within DCR's tracking and accounting system. For the date of last maintenance activity for each BMP, please see the attribute field "LAST_MAINTENANCE_DATE". There is also an attribute field called "MAINTENANCE_TYPE" that specifies the type of maintenance. Note that not all BMPs in the geodatabase have a last maintenance date populated. In some cases, this is because the BMPs were inspected and no maintenance was required, or they were inspected and are currently awaiting maintenance. DCR is working on improving the process for scheduling inspections and maintenance and is refining the geodatabase that tracks these activities. These improvements will allow DCR to report on BMP maintenance activities more accurately in future permit years.

3

Lakes and Ponds Watershed

Appendix F Section A.II.1.i.c requires permittees within the Lakes and Ponds watersheds to define the:

- Scope of Lakes PCP (LPCP Area)
 - Baseline Phosphorus Load
 - Phosphorus Reduction Requirement
 - Allowable Phosphorus Load
1. **Requirement: Define scope of PCP.** Appendix F Section A.II.1.i.c item 3 requires permittees to define the LPCP Scope by the end of Permit Year 4. Similar to the Charles River PCP requirements, this includes indicating whether the permittee chooses to implement the PCP within its entire jurisdiction or only within the urbanized portion of its jurisdiction within the respective Lakes and Ponds watersheds.

DCR Response: DCR chooses to implement the Lakes and Ponds PCPs within the urbanized portion of its jurisdiction. In addition, DCR has reviewed its facilities within the Lakes and Ponds watersheds to determine which portions constitute a MS4 system. The approach to this determination is documented in Section 2.2.2 of DCR's Methods for PCP & NSIR Development. DCR chooses to implement the LPCPs only within these defined regulated MS4 areas. This results in the following Lakes and Ponds watersheds containing DCR regulated MS4 systems:

- Auburn Pond / Leesville Pond
- Bents Pond / Ramsdall Pond
- Lake Quinsigamond / Flint Pond

The geodatabase included as part of this submission includes the layer, "DCR_PCP_Areas." This layer is comprised of DCR's facilities within the Lakes and Ponds watersheds and has attributes that distinguish which facility or portion of facility constitutes DCR's MS4. Specifically, the attribute table field "Regulated Status" indicates the locations of DCR's MS4.

The following Lakes and Ponds watersheds contain DCR facilities but do not contain areas that constitute DCR regulated MS4:

- Lake Boon
- Quaboag Pond
- Greenwood Pond 2
- Lake Denison
- Bourne-Hadley Pond
- Hilchey Pond
- Whitney Pond
- Shirley Street Pond
- Newton Pond
- Lake Warner
- Long Pond
- Sugden Reservoir
- Lowes Pond
- Robinson Pond
- Greenville Pond
- Cedar Meadow Pond
- Rochdale Pond
- Texas Pond
- Quacumquasit Pond

2. **Requirements: Define the baseline phosphorus load, the phosphorus reduction requirement, and the allowable phosphorus load.** Appendix F section A.II.1.c table item number 4 requires calculating the baseline phosphorus load, the phosphorus reduction requirement, and the allowable phosphorus load by PY 4. According to the permit, baseline phosphorus load and phosphorus reduction requirement calculations should be estimated using land use phosphorus export coefficients in Attachment 1 to Appendix F and percent phosphorus reductions required from urban stormwater consistent with the TMDL of each impaired waterbody presented in Table F-6.

DCR Response: Table 2 provides DCR’s baseline phosphorus load, phosphorus reduction requirement, and allowable phosphorus load for each LPCP watershed containing DCR MS4 regulated area. DCR calculated these estimates following the guidance in the MS4 permit Attachment 1 to Appendix F as outlined in DCR’s Methods for PCP & NSIR Development, specifically Section 3.2 (baseline loads) and Section 3.4 (target reductions).

Table 2 Lakes and Ponds Watershed Baseline Phosphorus Load Summary

Water Body	Baseline Load (lb/yr)	Percent Reduction (per Appendix F)	Required Reduction (lb/yr)	Allowable Load (lb/yr)
Bents Pond / Ramsdall Pond	1.5	52% / 49%	0.8 / 0.7	0.7 / 0.8
Auburn Pond / Leesville Pond	3.8	24% / 31%	0.9 / 1.2	2.9 / 2.6
Lake Quinsigamond & Flint Pond	17.0	49%	8.3	8.7



E

Section 7 of DCR's Operations and Maintenance Plan for MS4 Compliance

7. Structural Stormwater BMPs

7.1 Overview and Inventory

Structural stormwater Best Management Practices (BMPs) are structural controls that are designed, built, and maintained to treat stormwater prior to being discharged to the drainage system or waterbody. BMPs often retain or infiltrate stormwater, allowing natural processes like settling, vegetation uptake, and filtration to remove pollutants from runoff. Examples include infiltration structures or swales, bioretention systems (e.g., rain gardens), wet ponds, detention basins, and infiltration/leaching basins or chambers.

An inventory of structural stormwater BMPs owned and/or maintained by MassDCR are mapped and managed in DCR's Stormwater Collector Map. Contact DCR Stormwater & Environmental Section to obtain access to this application.

7.2 O+M Procedures

MassDCR understands that in order to function properly and provide associated stormwater benefits, structural stormwater BMPs must be kept in good working order.

8.2.1 Inspections

Structural stormwater BMPs will be inspected annually at a minimum by DCR Engineering or the Water Supply Protection Division.

During inspections, the following BMP components will be reviewed for signs of potential issues, as listed below.

- **Inlet and Outlet Structures**

- Blocked flow paths
- Inlet is functioning as expected and flow from the contributing area is reaching the BMP
- Outlet is performing as expected and flow is leaving the BMP appropriately
- Structural damage
- Vegetation is well established and there are no signs of erosion
- Evaluate level of sedimentation and trash accumulation

- **BMP Treatment Areas**

- Flow is dispersed evenly throughout the BMP
- Erosion and rutting on the side slopes
- Vegetation is well established, and invasive species are not present
- For infiltration-type BMPs, review to evaluate whether standing water exists 72 hours after a rain event

- Identify any signs of illicit discharges or vandalism
- Evaluate level of sedimentation and trash accumulation
- **Underground Components**
 - Evaluate level of sedimentation and trash accumulation
 - Structural damage
 - Access to components are not compromised
 - Inspect dry wells after every major storm for the first 3 months once construction is complete and annually thereafter

During inspection, MassDCR will assign a level of service to each item reviewed. Areas where follow up maintenance is warranted will be indicated. The following maintenance activities will occur at structural BMPs based on condition determined during annual inspections:

- Repair structural damage
- Remove excess sediment, trash, and debris
- Re-establish vegetation
- Remove invasive vegetation
- Re-grade areas, as necessary to ensure proper flow patterns
- Stabilize eroded areas via vegetation establishment, placement of stone, or other energy dissipation measures

MassDCR maintains records of annual inspections and maintenance actions performed for each structural BMP in their ArcGIS Collector application.

8.2.2 Maintenance

Regular maintenance is important to prevent against premature failure of BMPs. The table on the following page outlines maintenance schedule in general and for specific BMP types. It is important to note that BMP maintenance may not be the responsibility of regular maintenance crews. All maintenance for BMPs should be coordinated with the MassDCR Stormwater & Environmental Section or the Water Supply Protection Division for BMPs within the Water Supply watersheds.

Table 5 BMP Maintenance Schedule

Activity	Responsible Party ⁵	Time of Year	Frequency
General			
Mow	Operations or contracted services	Spring through Fall	As needed, Annually minimum
Remove dead vegetation	Operations	Fall and spring	Bi-annually
Remove invasive vegetation	Operations or contracted services	Spring or fall	Annually
Prune	Operations	Spring or fall	Annually
If identified during inspections as needed			
Replace dead vegetation	Engineering	Spring	As Needed
Stabilize eroded areas	Engineering	Spring through Fall	As Needed
Re-grade areas to ensure proper flow patterns	Engineering	Spring through Fall	As Needed
Remove excess sediment, trash, and debris	Engineering	Spring through Fall	As Needed
Repair structural damage	Engineering	Spring through Fall	As Needed
Bioretention Areas and Rain Gardens			
Mulch void areas	Operations or contracted services	Spring	Annually
Replace all media and vegetation and repair structural damage as needed	Engineering or contracted services	Late spring/early summer	As needed
Extended Dry Detention Basin and Wet Basin			
Mow upper stage, side slopes, embankment and emergency spillway	Operations or contracted services	Spring through Fall	Bi-annually
Remove sediment from basin	Engineering	Year round	As required, at least once every 5 years
Remove sediment, trash and debris	Engineering	Spring through Fall	Bi-annually (Minimum)
Subsurface BMPs			

⁵ For all BMPs within the Wachusett Reservoir, the Water Supply Protection Division is responsible for all BMP inspection and maintenance activities.



Activity	Responsible Party ⁵	Time of Year	Frequency
Inspect subsurface components, as feasible	Engineering	Spring through Fall	Annually
Infiltration Basin			
Mow/rake buffer area, side slopes, and basin bottom	Operations or contracted services	Spring and fall	Bi-annually
Remove trash, debris and organic matter	Engineering	Spring and fall	Bi-annually