

Fuller Brook Park Preservation Project – Phase 3  
Final Design & Permitting  
Wellesley, MA

Prepared for:

**TOWN OF WELLESLEY  
FULLER BROOK PARK COORDINATING COMMITTEE**

Sedimentation Investigation Report (SI)

Prepared by:



and



Horsley Witten Group

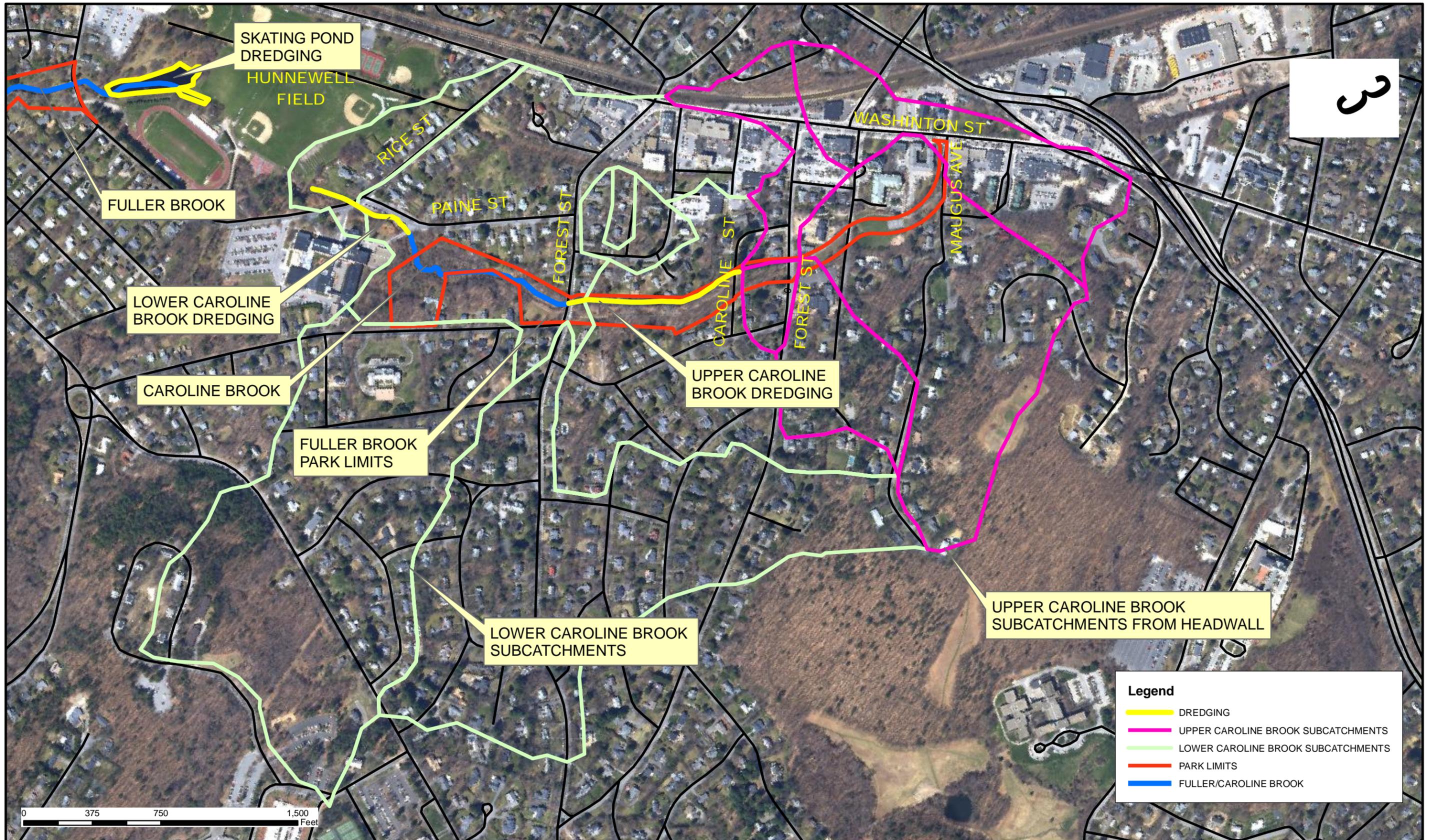
August 23, 2012



# Fuller Brook Park Preservation Project Sedimentation Investigation

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# Fuller Brook Park Preservation Project

## Sedimentation Investigation

### **Project Location**

The Fuller Brook Park Preservation Project extends from Dover Road to Hunnewell Field following Fuller Brook and from Hunnewell Field to Washington Street at Maugus Avenue following Caroline Brook. The sedimentation investigation was completed for Caroline Brook from Caroline Street to the culvert under the Hunnewell Field and Lower Fuller Brook from the Hunnewell Field culvert to Dover Road.

### **Purpose**

The purpose of this sedimentation investigation is to identify possible sources of sediment in Caroline Brook and lower Fuller Brook and recommend actions to avoid or minimize future deposition problems, including structural and non-structural best management practices (BMPs) for stormwater runoff practices.

### **Methodology**

Field observations of surface conditions in the watershed areas, GIS analysis, and review of maintenance practices were completed to provide recommendations.

### **Summary of Observations**

During the process of completing the special studies of Caroline and Fuller Brooks, the following four areas were identified as high sedimentation area sections:

1. Caroline Brook from Caroline Street (sta.130+78) to Forest Street (sta. 121+80) - 900± ft. ~ 11,460± sq. ft., approximately 12 inches deep = 424± cu. yds.
2. Caroline Brook from just up-gradient of a driveway off Paine Street (sta. 110+50) to the culvert at Wellesley High School (sta. 102+63) - 790± feet ~ 4,925± sq. ft., approximately 12 inches deep = 182± cu. yds.)
3. Fuller Brook from culvert at the Wellesley High School (sta. 81+97) to Abbott Brook (sta. 74+74) including Skating Pond - 723± feet ~ 55,135± sq. ft., approximately 18 inches deep = 3063± cu. yds.
4. Fuller Brook at locations of various drainage outfalls - say 25 cu. yds.

Sections 1-3 above are areas where the stream has little to no profile grade resulting in low velocity flow (see Hydraulic Analysis for additional information). Low velocities cause larger suspended particles in the flow to settle out, resulting in deposition of sediments in the stream, culverts, and wetland resources (see attached site photos). Preliminary total dredge volume is estimated at 4,000± cu. yds.

# Fuller Brook Park Preservation Project

## Sedimentation Investigation

### **Sources of Sedimentation and Debris**

1. **Stream Bank Erosion:** Caroline Brook through Section 1 has a high canopy of tree cover but little in terms of vegetated ground cover. Banks are steep and susceptible to erosion from stormwater runoff from adjacent land as well as from stream flow during significant storm events. The section of Caroline Brook below the Forest Street culvert is steeper in profile, causing higher velocity flow and erosion of the stream bed and banks. A section of bank has eroded, exposing a sewer pipe and manhole (see attached photo). Several areas of Fuller Brook down gradient of State Street are eroding as well. In general, channelization of the brooks for flood control and upland development has caused the brooks to become “flashy” stream systems. This means that stream flows rise and fall quicker and to higher elevations during and after storm events than in a natural system where runoff is infiltrated and attenuated within an undeveloped stream corridor and floodplain. The existing storm drain network carries runoff quickly to the brooks starting from rooftop to pavement, catchbasin to pipe outfall.
2. **Exposed Soil:** Caroline Street is a gravel road (approximately 500 feet in length) where it crosses the park (see attached photos). Stormwater runoff from the road is collected in catch basins, which discharge directly into the headwaters of Caroline Brook via a drain pipe and headwall. Exposed soils during construction periods can also be a problem if not maintained with proper erosion and sedimentation control (ESC) measures. The ongoing construction at the Wellesley High School, as well as any other site in the watershed, should be carefully monitored, and ESC measures should be installed and maintained as necessary.
3. **Stormwater Runoff:** As mentioned above and like many communities with older municipal drainage systems, stormwater runoff is directed to surface streams with little to no prior treatment. The brooks have essentially been used as part of the stormwater management system for a major portion of the Town streets. They have been modified several times over the last century to primarily provide better flood control for the center of town. Catch basins and pipe systems collect and discharge stormwater runoff from streets, yards, and parking lots to the brooks. Not only does this increase peak flows to the stream as discussed above, but it also has little to no capability to provide effective capture and removal of sediments and other stormwater pollutants.

### **Other Potential Sources**

1. **Landscape Materials:** Often, parks, wooded areas, and wetlands are a place where residential landscape debris (leaves, grass clippings, mulch and excess soil) are often disposed. Although not observed during the site visit conducted for this investigation, it is likely that some landscape debris is being improperly disposed in the watershed and is entering the brooks.

### **Issues with Sedimentation**

Sands and other debris are deposited where stream velocities are slow enough for them to settle out. This can be clearly seen at the headwall at Caroline Street. Once the sediment levels in the brook exceed the available storage capacity, sediment is then transported to the next settlement



## Fuller Brook Park Preservation Project Sedimentation Investigation

area, and the process repeats itself until equilibrium is established. Excessive sedimentation has reduced the brook's capacity to convey runoff and ability to attenuate stormwater during periods of high runoff, often resulting in property damage and/or dangerous flooding conditions. In addition, Fuller Brook is listed by Massachusetts Department of Environmental Protection (MADEP) as an impaired waterway for pollutants; organic enrichment/low dissolved oxygen and siltation, and has a total maximum daily load (TMDL) for pathogens.

Fuller Brook is tributary to the Charles River, which MADEP lists as impaired for bio-assessment, noxious aquatic plants, nutrients (specifically, phosphorus), PCBs, and pesticides. Other pollutants often attach themselves to sediment particles; therefore, capturing and removing solids will significantly reduce the pollutant load to the brook. In addition, as the areas identified above accumulate sediment, they become less effective at capturing particles/pollutants; thus, removing accumulated sediment will help to restore some natural treatment capability.

The Town is required to address sediment and other stormwater pollutants to comply with the existing National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems (MS4s). The Town currently performs street sweeping, catch basin cleaning, oil/water separator units cleaning, and has conducted outfall inspections and responded to stormwater hotline issues to meet the permit requirements, as well as several public outreach and involvement activities. Sand is no longer frequently used on the streets during the winter, and a rain garden demonstration project has recently been completed.

However, there is a new permit currently in draft form – the Draft NPDES General Permit for Stormwater Discharges from small MS4s in Massachusetts North Coastal Watersheds. This pending permit includes much more stringent requirements for stormwater management in the Town, including specific requirements for areas subject to TMDLs. For example, when this permit is final, the Town of Wellesley will be required to reduce phosphorus loads by 59% and pathogens by 94.5%. As a result, the Town will need to both reduce these pollutant loads from Town-owned lands (e.g., public streets and parking lots) and from contributing private lands as well. Since the park includes a great deal of open space adjacent to many untreated stormwater discharges, effort should be made to not only reduce sediment impact to the brooks but also consider opportunities to address these anticipated permit requirements on Town-owned land and in the contributing drainage area.

### **Recommendations**

- ❖ Dredge identified sections to restore natural sedimentation collection areas to avoid migration of sediment to more sensitive areas, such as the swamp up-gradient of Paine Street or the Charles River. Provide specific sediment trap areas to reduce need for future dredging of the entire brook length in this area and to enable more environmentally sensitive sediment removal.
- ❖ Stabilize stream banks and restore the stream bed along the brook, using both soft and hard stabilization techniques as appropriate, which is discussed in greater detail in the Hydraulic Analysis report.

## Fuller Brook Park Preservation Project Sedimentation Investigation

- ❖ Install stormwater retrofits in available open spaces in the section of park upstream from Caroline Street. While daylighting the stream in this area is not currently feasible, stormwater treatment can be provided for over 20% of the watershed currently draining untreated to the headwaters of Caroline Brook. A constructed wetland and two bioretention areas should be installed for treating runoff from small storm events from a portion of Caroline Street, Abbott Road, and Seaward Road. These retrofits are vegetated and can be designed to complement to park and path layout, while reducing sediment and other pollutant loading to the brook. They would also provide a great opportunity for educating the public about stormwater and its impacts.
- ❖ Design sediment traps and other BMPs at existing drainage outfalls as part of the park preservation project, where possible.
- ❖ Divert runoff from small storm events (first flush) from the storm drain that outfalls on the eastern bank just south of Forest Street into a treatment BMP in the large, adjacent open space within the park. This drainage area is 62 acres, with 24% impervious.
- ❖ Retrofit/install BMPs to treat runoff from street system, reducing the need for future dredging of the entire brook and limiting the overall environmental impact of the process. These BMPs should be designed to not only address sediment, but also phosphorus and bacteria. These are pollutants of concern in Wellesley and will need to be addressed when the pending National Pollutant Discharge Elimination System (NPDES) permit requirements go into effect. A full retrofit inventory/watershed assessment could help identify all the best opportunities. Effective BMPs could include:
  - Rain gardens, bioretention systems, water quality swales in strategic locations; for instance, at end of streets abutting park.
  - Remove catchbasins that connect directly to main drainage pipes and roadway culverts; this is referred to as “on-line” catchbasins. Provide off-line treatment practices to remove pollutants before discharge to the brooks.
  - Removing excess impervious cover where possible (see examples on the following page).
- ❖ Continued maintenance of roadways (street sweeping) and existing stormwater management systems. Avoid using sand on roads during the winter unless absolutely necessary.
- ❖ Adopt ESC regulations and carefully review and monitor ESC plans and/or stormwater pollution prevention plans (SWPPP) for all permitted construction sites.
- ❖ Continue providing on-going public education on the importance of stormwater management and how to properly dispose of landscape/yard wastes. For example, if every resident managed their rooftop runoff with dry wells, rain barrels, or rain gardens, the quantity (which can cause erosion) of runoff would be greatly reduced and the quality

## Fuller Brook Park Preservation Project Sedimentation Investigation

(sediment and other pollutant loads) would be improved. This is particularly important since the major land use in the Caroline Brook watershed is residential.



*Photo A* shows a cul-de-sac in the drainage area contributing to the headwaters of Caroline Brook (Maugus Hill Rd). This cul-de-sac is almost 100 ft in diameter and represents a great opportunity to reduce impervious cover draining to the brook, as well as retrofitting the center of the cul-de-sac as a bioretention area for stormwater treatment.



*Photo B* shows a commercial parking lot on Laurel Avenue that currently discharges directly into Caroline Brook. The drive aisles are very large (~32 feet; these aisles can be 24 feet or less depending on the parking layout) and provide an opportunity to reduce impervious cover and treat stormwater with bioretention islands.

*APPENDIX A*  
*SITE PHOTOS*

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Fuller Brook Park Preservation Project – Sedimentation Investigation

List of Photos

Photo 1: Catchbasin Direct Untreated flow from Caroline Street at Grave Road ..... 2

Photo 2: Headwall at Caroline Street (Station 130+78) Elevation 135.1± - Street Drainage Outfall..... 2

Photo 3: 60 inch RCP Culvert at Forest Street (Station 110+57) Elevation 133.5±..... 3

Photo 4: Caroline Brook Looking Upstream (Station 128+10±) -- Note Unstable Banks..... 3

Photo 5: Caroline Brook Looking Upstream (Station 123+05±) - Note High Sediment Deposits ..... 4

Photo 6: Caroline Brook Looking Upstream to Forest St. Culvert (Station 120+40±) -- High Velocity Flow..... 4

Photo 7: Caroline Brook Looking Downstream to Exposed Sewer (Station 120+00±) -- Bank/Stream Erosion..... 5

Photo 8: Caroline Brook at Driveway to Paine St. Upstream (Station 110+28±) -- 12 inches Sediment ..... 5

Photo 9: Caroline Brook at Driveway to Paine St. Downstream (Station 109+86±) -- 12+ inches Sediment ..... 6

Photo 10: Caroline Brook at Walkway to Paine St. Upstream (Station 108+60±) -- 20 inches Sediment ..... 6

Photo 11: Caroline Brook at Walkway to Paine St. Downstream (Station 108+38±) -- 20 inches Sediment..... 7

Photo 12: Caroline Brook at Rice St. Culvert Upstream (Station 107+07±) -- 17 inches Sediment ..... 7

Photo 13: Caroline Brook at Rice St. Culvert Downstream (Station 106+12±) -- 22 inches Sediment ..... 8

Photo 14: Caroline Brook at Smith St. Footpath Upstream (Station 104+14±) -- 12 inches Sediment ..... 8

Photo 15: Caroline Brook at Smith St. Footpath Downstream (Station 103+93±) -- 20 inches Sediment ..... 9

Photo 16: Caroline Brook at High School Culvert Upstream (Station 102+63±) -- No Sediment ..... 9

Photo 17: Skating Pond (Station 102+63±) -- Significant Sedimentation ..... 10

Photo 18: Skating Pond (Station 102+63±) -- Significant Sedimentation ..... 10

Fuller Brook Park Preservation Project – Sedimentation Investigation  
Site Photos



**Photo 1: Catchbasin Direct Untreated flow from Caroline Street at Grave Road**



**Photo 2: Headwall at Caroline Street (Station 130+78) Elevation 135.1± - Street Drainage Outfall**

Fuller Brook Park Preservation Project – Sedimentation Investigation  
Site Photos (cont.)



**Photo 3: 60 inch RCP Culvert at Forest Street (Station 110+57) Elevation 133.5±**



**Photo 4: Caroline Brook Looking Upstream (Station 128+10±) -- Note Unstable Banks**

Fuller Brook Park Preservation Project – Sedimentation Investigation  
Site Photos (cont.)



**Photo 5: Caroline Brook Looking Upstream (Station 123+05±) - Note High Sediment Deposits**



**Photo 6: Caroline Brook Looking Upstream to Forest St. Culvert (Station 120+40±) -- High Velocity Flow**

Fuller Brook Park Preservation Project – Sedimentation Investigation  
Site Photos (cont.)



**Photo 7: Caroline Brook Looking Downstream to Exposed Sewer (Station 120+00±) -- Bank/Stream Erosion**



**Photo 8: Caroline Brook at Driveway to Paine St. Upstream (Station 110+28±) -- 12 inches Sediment**

Fuller Brook Park Preservation Project – Sedimentation Investigation  
Site Photos (cont.)



**Photo 9: Caroline Brook at Driveway to Paine St. Downstream (Station 109+86±) -- 12+ inches Sediment**



**Photo 10: Caroline Brook at Walkway to Paine St. Upstream (Station 108+60±) -- 20 inches Sediment**

Fuller Brook Park Preservation Project – Sedimentation Investigation  
Site Photos (cont.)



**Photo 11: Caroline Brook at Walkway to Paine St. Downstream (Station 108+38±) -- 20 inches Sediment**



**Photo 12: Caroline Brook at Rice St. Culvert Upstream (Station 107+07±) -- 17 inches Sediment**

Fuller Brook Park Preservation Project – Sedimentation Investigation  
Site Photos (cont.)



**Photo 13: Caroline Brook at Rice St. Culvert Downstream (Station 106+12±) -- 22 inches Sediment**



**Photo 14: Caroline Brook at Smith St. Footpath Upstream (Station 104+14±) -- 12 inches Sediment**

Fuller Brook Park Preservation Project – Sedimentation Investigation  
Site Photos (cont.)



**Photo 15: Caroline Brook at Smith St. Footpath Downstream (Station 103+93±) -- 20 inches Sediment**



**Photo 16: Caroline Brook at High School Culvert Upstream (Station 102+63±) -- No Sediment**



Fuller Brook Park Preservation Project – Sedimentation Investigation  
Site Photos (cont.)



**Photo 17: Skating Pond (Station 102+63±) -- Significant Sedimentation**



**Photo 18: Skating Pond (Station 102+63±) -- Significant Sedimentation**

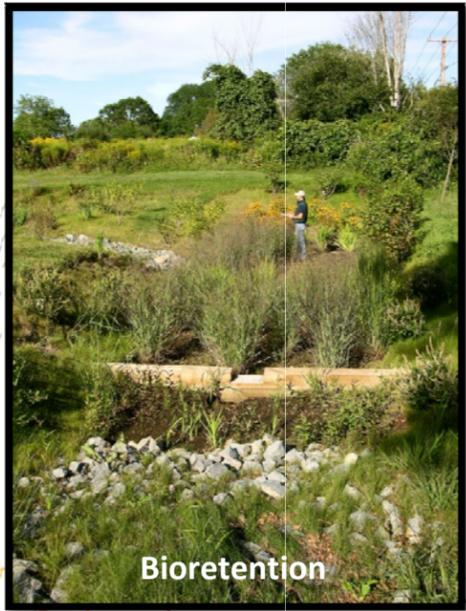
*APPENDIX B  
DAYLIGHTING/STORMWATER  
MANAGEMENT OPPORTUNITIES  
SKETCH*

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1

# Fuller Brook - Daylighting/Stormwater Management Opportunities



Bioretention

## Practice

1. Linear Constructed Wetland
2. Bioretention 1
3. Bioretention 2

Drainage Area/  
Impervious Area (acres)

8.2 / 2.2  
3.8 / 2.1  
4.8 / 0.8

Surface Area (sf)

5,500 sf  
1,100 sf  
1,500 sf

Prelim. Construction Cost Estimate

\$80,000  
\$40,000  
\$50,000

Prelim. Design Cost

\$170,000 + \$22,000 = \$192,000



Constructed Wetland



*APPENDIX C*  
*BACKUP DATA*

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## Phil Paradis

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**From:** Hickey, David <dhipkey@wellesleyma.gov>  
**Sent:** Monday, May 14, 2012 1:53 PM  
**To:** Phil Paradis  
**Cc:** Michelle West; Kien Ho; Randy Collins; Pakstis, Mike; Millett, Bill; Saraceno, George; Miller, Frank; Gildae, Beth  
**Subject:** RE: Fuller Brook Project - Town Stormwater Operation and Maintenance Plan

Phil,  
Attached is this year's NPDES annual report, previous reports should be available on the DEP web page. We have site specific SWPP's for certain facilities (DPW site and RDF) that we track as well as several schools (Sprague, Bates and the new High School) that we assist with and co-ordinate pumping of the oil/water separator units, about 25 twin wide. To meet the NPDES permit we must sweep all streets once time per year and 2 times in high use / commercial areas and clean CB's when they are 60% full. The actual metrics are a bit better as we sweep the entire Town at least once, often twice and the high use street get swept once monthly for 6-7 months. CB's are averaging about 1 time every 2-3 years, more frequent in areas of greater sensitivity. We have not used sand for several years except when conditions warrant it, such as very low temps / flash freeze or extremely steep locations. Let me know if you need further information.

David J Hickey, Jr. PE  
Town Engineer

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**From:** Phil Paradis [mailto:PParadis@BETA-Inc.com]  
**Sent:** Monday, May 14, 2012 11:45 AM  
**To:** Pakstis, Mike; Hickey, David  
**Cc:** Michelle West; Kien Ho; Randy Collins  
**Subject:** Fuller Brook Project - Town Stormwater Operation and Maintenance Plan

Mike & Dave,

We need some information for the Sedimentation Investigation for the Fuller Brook.

Does the Town have a Stormwater Operation and Maintenance Plan that they follow? If so can we get a copy? If not, do they have goals like street sweeping twice a year...catchbasin cleaning every two years...? And, what is the Town's sanding practice?

Thanks for your help,

Phil

**Philip Paradis, Jr., P.E., LEED AP, CPSWQ**  
Project Manager

BETA Group, Inc.  
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C: 617.699.1269  
PParadis@BETA-Inc.com  
[www.BETA-Inc.com](http://www.BETA-Inc.com)



**TOWN OF WELLESLEY**  
WELLESLEY, MASSACHUSETTS 02481

DAVID J. HICKEY, JR, PE  
TOWN ENGINEER

DOUGLAS R. STEWART, P.E.  
ASSISTANT TOWN ENGINEER



2 MUNICIPAL WAY  
781-235-7600  
FAX 781-237-0047

DEPARTMENT OF PUBLIC WORKS  
ENGINEERING DIVISION

April 13, 2012

Mrs. Glenda Velez  
US EPA – EOP06-1  
5 Post Office Square, Suite 100  
Boston, MA 02109

Mr. Fred Civian  
Massachusetts Dept. of Environmental Protection  
One Winter Street  
Boston, MA 02108

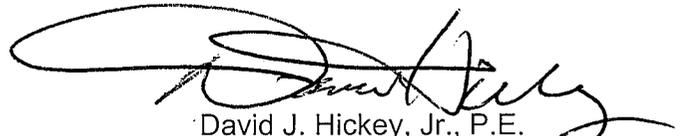
**RE: NPDES Phase II Small MS4 General Permit  
Annual Report  
Wellesley, Massachusetts  
EPA NPDES Permit Number: MA 041067  
MA DEPT Transmittal Number: W-036293**

Dear Mrs. Velez and Mr. Civian:

Please find enclosed herewith a copy of our annual report for the period April 2011 to March 2012 as required by our NPDES Phase II Small MS4 General Permit. The annual report highlights stormwater related activities and tasks performed during the past year.

Should you have any questions or if you require additional information, please feel free to contact me.

Very truly yours,



David J. Hickey, Jr., P.E.  
Town Engineer

Cc: M. Pakstis, Director  
J. Curby, Assistant Director  
H. Larsen, Executive Director  
J. Bowser, Natural Resources Commission  
R. Brown, Planning Board

**Municipality/Organization:** Town of Wellesley

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**EPA NPDES Permit Number:** MA041067

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**MassDEP Transmittal Number:** W-036293

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**Annual Report Number  
& Reporting Period:** No. 9 April 1, 2011 – March 31, 2012

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**NPDES PII Small MS4 General Permit  
Annual Report  
(Due: May 1, 2012)**

**Part I. General Information**

**Contact Person:** David J Hickey, P.E.

**Title:** Town Engineer

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**Telephone #:** (781) 235-7600 ex. 3310

**Email:** dhickey@wellesleyma.gov

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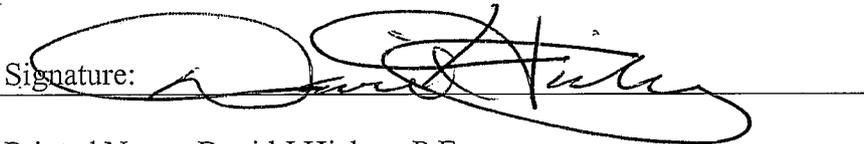
**Mailing Address:** 2 Municipal Way, Wellesley, MA 02481 (formerly 455 Worcester Street)

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Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

**Signature:**



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**Printed Name:** David J Hickey, P.E.

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**Title:** Town Engineer

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**Date:** April 13, 2012

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## **Part II. Self-Assessment**

The Town of Wellesley has completed the required self-assessment and has determined that our municipality is in compliance with all permit conditions with the following exceptions:

The Town has not yet established erosion and sedimentation control regulations. In the interim, the Town does notify builders, architects and engineers of their requirement to obtain coverage under the NPDES Construction General Permit. Erosion and sedimentation control requirements are a major part of many of the Town's regulatory and permitting processes and the Mass. DEP Stormwater Regulations for a majority of projects implemented publicly and privately. The major issue facing establishment of the Erosion and Sedimentation Control Regulations is the enforcement of said regulations and providing adequate funding for this purpose; including which Town department will have that authority.

This reporting period included Wellesley's first year with the implementation of a tree bylaw that included regulation against clear cutting open land.

Most importantly the Town initiated an inspection of the storm drain system including outfall inspections, the progress of which is included in section XX. We emphasize that the storm water hotline continues to be in operation and the Town continues to respond to all reports of possible illicit discharges.

**Part III. Summary of Minimum Control Measures**

**1. Public Education and Outreach**

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Future Permits
1.1	Inform the general public about their role in stormwater management.	Town Engineer/ DPW and Natural Resources Commission	Brochures mailed to every residence by fall 2006.	A stormwater brochure is available at Town held events and displayed in public buildings. Storm water education was included in the annual DPW newsletter, mailed to every residence, fall 2011. NRC conducted a resident survey gathering information on lawn care practices and completed the annual organic lawn care forum in October. Informational meetings on pesticide use and benefits of rain barrels were conducted.	NRC to continue to distribute healthy lawn care and stormwater brochures in public buildings. Continue to provide updates on stormwater management in future DPW newsletters.
1.2	Inform residents about catch basin stenciling.	Town Engineer/ DPW	Information published in at least one DPW newsletter during FY 07	Catch basin marking has become a part of 8 <sup>th</sup> grade community service day. Markers are being placed by students.	Continue program in future years, preferably on an annual basis.
1.3	Continue ongoing pesticide awareness campaign.	Natural Resources Commission	Reach as many residences as possible. Improve the condition of the Town's athletic field turf so that the use of pesticides is reduced or eliminated.	An athletic field natural turf management plan for Town owned playing fields was implemented in 2010. An integrated pest management program at Wellesley Country Club (golf course) is ongoing. The NRC distributes updates to the pesticide awareness campaign to landscapers and selected recipients.	Continue with outreach program and monitor results.
1.4	Continue annual household hazardous waste collection day.	DPW Recycling & Disposal Division	Significant amounts of materials collected and number of vehicles entering site.	Annual collection was held on the 1 <sup>st</sup> Saturday in May, more info is listed in Part V.	Annual collection to continue on or about the first Saturday in May every year.

1.5	Pond Restoration Program - Public Awareness	Town Engineer/DPW and Natural Resources Commission	Notable reduction of nutrient concentrations in ponds, particularly P and N.	A phosphorus inactivation system for Morse's Pond was installed in 2008 and continues operation.	Phosphorus inactivation system to continue operating in non-winter months. Feasibility studies for two more ponds to be conducted.
1.6	Brochures mailed to businesses to promote good housekeeping measures at commercial and industrial activities. Defer to next general permit.	Town Engineer/DPW	Brochures mailed to selected businesses by fall 2006.	Brochures were not distributed this year and activity deferred.	In the future, the town is planning to use web sites to disseminate this information and reduce the use of printed material.
1.7	Continue program to discourage feeding of waterfowl at Town Hall Duck Pond.	Natural Resources Commission and DPW	Reduction in duck population to 8 breeding pairs, reduction of fecal coliform measured in Fuller Brook.	Signs are posted at feeding areas. Due to public awareness, duck population has diminished and remained consistently low. Similar signs are now posted at Longfellow Pond.	Continue program and periodic monitoring of water quality in Fuller Brook.
1.8	Coordinate with local groups for assistance in outreach.	Natural Resources Commission and DPW	Participation by at least one local group in catch basin stenciling program.	Local citizen's group (Friends of Morse's Pond, Friend of Fuller Brook and Trails Committee) participating in programs to be aware of water quality issues, as well as citizen's group (Wellesley Cancer Prevention Project) participating in pesticide awareness.	Use newsletters, web pages and email blasts to encourage participation by neighborhood groups. Continue outreach.
1.9	Institute a program for pet waste management	Town Engineer/DPW	Notable Reduction in measured fecal coliform from previous samplings.	Pet waste containers have been placed at public locations and mentioned in annual DPW newsletter.	Continue program with period public coverage on web page, newspaper and DPW newsletter.

## 2. Public Involvement and Participation

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Future Permits
2.1	Hold public hearings for new regulations.	Town Engineer/DPW		BMP COMPLETED	
2.2	Hold public hearings for new site plan bylaw.	Planning Board/DPW		BMP COMPLETED	
2.3	Seek volunteers for catch basin stenciling program and stream clean up.	Town Engineer/DPW and NRC	Volunteer groups formed, stream clean up and stenciling in progress.	8 <sup>th</sup> grade students installing markers on an annual basis. Annual stream clean up day along Charles River and Fuller Brook held in April 16, 2011. About 40 participants.	Continue with catch basin marking program and clean up days. 2012 clean up day scheduled April 21. Middle School Public Service Day scheduled for May 2, 2012. 8 <sup>th</sup> graders to again install markers.
2.4	Establish hot line to report illegal dumping.	Department of Public Works.	Number of incidents of illegal dumping being reported.	Responded to 1 email for possible detergent in Fuller Brook near State Street.	Continue to publicize hotline.

## 3. Illicit Discharge Detection and Elimination

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Future Permits
3.1	Develop stormwater system layer on GIS.	Town Engineer/DPW	Map completed and showing 100% of outfalls.	BMP COMPLETED	Update as required.
3.2	Develop stormwater regulations.	Town Engineer/DPW	Regulations adopted and 100% permit compliance.	BMP COMPLETED	Use regulations to control discharges into the Town's stormwater collection system

3.3	Inspect outfalls, sample and test dry weather discharges.	Town Engineer/ DPW	All 330 outfalls visually inspected by summer 2012.	Initiated outfall observation, 12 outfalls inspected and 2 dry weather flows sampled indicating the source as groundwater.	Full implementation pending an assessment of resources, DPW is aiming to inspect and sample as many outfalls as possible, however completion will likely require several years or as required with the updated 5 year General Permit.
3.4	Use water quality modeling software to identify priority areas for testing.	Town Engineer/ DPW	Software experimented in 2004 and additional options investigated thereafter Delay any purchase until further information is published by the EPA and/or as outlined in the updated 5 year General Permit.	Experimented with available demo software and discussed interfacing with consulting engineers	Action delayed until updated 5 year General Permit.
3.5	Trace identified illicit discharges.	Town Engineer/ DPW	Most illicit discharges eliminated by summer 2007	1 resident report in December concerning suds in the Fuller Brook watershed, visual inspection and field tests could not confirm illicit discharge.	Continue implementation of IDDE in areas of suspected problems.
3.6	Establish catch basin stenciling program. Use plastic or cast iron markers instead of stencils.	Town Engineer/ DPW	At least one marker on every street and every 500' on major streets.	95 catch basin markers were placed during 8 <sup>th</sup> grade community service day.	Continue Program. Imbed cast iron curb markers in new concrete sidewalk during certain street reconstruction projects.
3.7	Training for public employees to report illicit discharges.	Town Engineer/ DPW	Public employees observing and reporting illegal dumping.	Refresher training conducted for DPW highway maintenance employees.	Continue ongoing program

#### 4. Construction Site Stormwater Runoff Control

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Future Permits
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4.1 Revised	Develop erosion and sedimentation control measures.	Town Engineer/ DPW	Regulations adopted and 95% permitting compliance. Adopt during 2012	DPW continues to monitor and respond to erosion and sedimentation issues, adoption of further regulation has been delayed.	Finalize and adopt regulations after public hearing / comment after issuance of updated 5 year General Permit.
4.2	Require erosion and sedimentation controls in site plan review.	Planning Board	Amendment to zoning bylaw adopted and 100% permitting compliance.	Review of drainage and erosion and sedimentation controls is required for residential projects disturbing 1 acre or more.	Compliance with BMP 4.1 will be incorporated into site plan review.
4.3	Establish procedures for inspections and enforcement of regulations.	Town Engineer/ DPW	Inspections being conducted, achieve 80% compliance rate.	Building inspector notifies contractors of erosion and sedimentation control requirements. Inspections are conducted by DPW.	SOP for inspections to be established after new Erosion and Sedimentation Control Regulations are adopted

### 5. Post-Construction Stormwater Management in New Development and Redevelopment

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Future Permits
5.1	Amend zoning bylaw (Site Plan Review) to address post construction runoff.	Planning Board Zoning Board of Appeals	Amendment to zoning bylaw adopted and 100% permitting compliance.	BMP COMPLETED	Implementation of regulations.
5.2	Monitor inspections and maintenance of privately owned BMP's.	Town Engineer/ DPW/Wetlands Protection Committee/ZBA	Inspection and maintenance of BMP's being performed, town receiving annual reports.	Inspections and maintenance of private BMP's are being performed. Inventory of privately owned BMP's is tracked.	Include private BMP's on GIS system.
5.3	Review and approve selected water quality BMP's and supervise installation.	Planning Board	Approved water quality BMP's installed and functioning.	Ongoing under site plan review and Project of Significant Impact review. LID techniques are being encouraged in proposed developments. The NRC obtained funding and permitting for an LID demonstration project consisting of rain barrels and other LID elements.	Ongoing. Construct demonstration project at Morses Pond beach in May 2012.

6. Pollution Prevention and Good Housekeeping in Municipal Operations

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Future Permits
6.1	Evaluate existing controls for preventing runoff from municipal operations.	Department of Public Works	Storage facilities constructed and employees trained in spill prevention.	BMP's are have been included in all re-development or new building projects including a new W/S building, a new High School and redevelopment at the transfer station, in all cases employees were educated about benefits and trained on function and maintenance several Town owned facilities.	Continue to implement recommendations from SWPPP and expand use of BMP's where appropriate.
6.2	Conduct employee training for hazardous materials, vehicle refueling and washing, and preventative maintenance.	Department of Public Works	100% attendance by DPW employees.	Right to Know training was conducted for DPW employees. Training for vehicle refueling, washing, and preventative maintenance for new highway division employees was conducted.	Schedule video training for vehicle refueling, washing, and preventative maintenance for highway division employees.
6.3	Remove aquatic weeds from Morses Pond.  Expand weed harvesting to other ponds	Department of Public Works and Natural Resources Commission	Visual observation of reduction in invasive and nuisance aquatic weeds.	Mechanical weed harvesting conducted at Morse's Pond, Longfellow Pond and Rockridge Pond. Two weed harvesters are operating. An aggressive weed harvesting plan and addition of a pond management consultant.	Continue program.
Revised					
6.4	Dredge and remove silt, organic sediments and aquatic weeds from selected ponds.	Department of Public Works and Natural Resources Commission	Reduction in nutrients and elimination of algal blooms and fish kills.	Design and permitting for dredging of Morse's Pond has been completed. The Town is currently pursuing additional funds required to complete the work.	Rebid dredging project in 2013 prior to obtaining funding. Feasibility studies for two more ponds to be conducted.

6.5	Conduct training in spill prevention procedures and conduct annual deployment exercise.	Department of Public Works and Fire Department.	All spill response personnel are trained and have participated in at least one deployment exercise.	Spill response training video presentations are conducted annually.	Continue annual training and schedule deployment exercise.
6.6	Construct vehicle washing facility at the DPW highway yard.	Department of Public Works	BMP COMPLETED		
6.7	Conduct training for Park & Tree workers on reduced pesticide use.	Department of Public Works and Pesticide Awareness Coordinator (NRC)	Workers are trained and toxic chemicals are not being detected in water bodies.	The Town has in place an Integrated Management Plan for all outdoor public spaces, the IMP prohibits the use of pesticides, excepting limited and specific applications such as winter moth or rodent control. The DPW employs 12 MA certified licensed pesticide applicators who have satisfied the annual training requirements of the state.	Continue compliance with MA license requirement and the Wellesley IMP.
6.8	Review procedures for handling and storage of hazardous materials.	Department of Public Works	Minimize exposure of hazardous materials to stormwater.	Right to Know, Hazardous Waste Handling, Asbestos Management and SPCC training was conducted for most DPW employees.	Continue training programs.
6.9	Conduct training for DPW employees on new construction and land disturbance.	Department of Public Works	Training is conducted every other year. 100% attendance by DPW employees.	Informal training conducted on use of erosion and sedimentation controls.	Ongoing as determined by supervisors.
6.10	Continue ongoing program to clean catch basins.	Department of Public Works	Clean critical catch basins annually, others when 60% full.	Ongoing program. Material is being transported to landfill to use as a cover.	Continue with catch basin cleaning program.
6.11	Continue ongoing program for street sweeping.	Department of Public Works	Sweep commercial areas weekly, residential streets annually.	Ongoing program.	Continue with street sweeping program.
6.12	Review and revise schedules for municipal maintenance activities.	Department of Public Works	Revised schedules have improved efficiency of operations.	Maintenance SOP's are completed and will be reviewed and revised as necessary.	Continue with program. Plan will be revised as needed.

6.13	Inventory, inspect and maintain town owned structural controls.	Department of Public Works	Volume of material being removed.	The Town cleaned the forebay at Reed's pond and 2 oil water separators.	Continue periodic inspection and cleaning.
6.14	Evaluate public sites for retrofitting of LID techniques.	NRC Pond manager	Improved quality of runoff in watershed. Design and install one facility per year.	The NRC obtained funding and selected 2 preferred sites for the installation of a bio-swale. However, proximity to a water supply prevented installation, additional sites are being considered. The new high school incorporated rainwater re-use and porous pavement.	Design and install bio-filtration swale or rain garden at additional sites, continue to promote LID technology.

**7. BMPs for Meeting Total Maximum Daily Load (TMDL) Waste Load Allocations (WLA) <<if applicable>>**

**A TMDL HAS BEEN ESTABLISHED FOR THE CHARLES RIVER WATERSHED FOR PATHOGENS**

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Future Permits
7.1	Monitor Mass. DEP web site for 303D list, draft TMDL's and final TMDL's.	Town Engineer	The Town is aware of its requirements under the TMDL report and has established BMP's for meeting the WLA.	Ongoing, Mass. DEP has established a TMDL for pathogens. Mass. DEP has established a TMDL for nutrients for upper/middle Charles River watershed. Mass. DEP has established a TMDL for phosphorus for the lower Charles River watershed	ongoing
7.2	Perform analytical testing for e-coli at various outfalls.	Town Engineer	WLA are not being exceeded.	No suspected locations were reported this year.	Program to be expanded during next general permit.
7.3	Continue T. V. inspection of sanitary sewer system.	DPW Water & Sewer Division	100% inspection of system by 2014, all leaks repaired.	65% of system now inspected.	Inspect 10% per year until completion.

**A TMDL HAS BEEN ESTABLISHED FOR THE LOWER CHARLES RIVER WATERSHED FOR PHOSPHORUS.  
A TMDL HAS BEEN ESTABLISHED FOR NUTRIENTS FOR THE UPPER/MIDDLE CHARLES RIVER WATERSHED.**

BMP ID #	BMP Description	Responsible Dept./Person Name	Measurable Goal(s)	Progress on Goal(s) – Permit Year 9 (Reliance on non-municipal partners indicated, if any)	Planned Activities – Future Permits
7.4	Install and operate phosphorus inactivation system in Morses Pond.	Town Engineer/ DPW and Natural Resources Commission	Notable reduction of nutrient concentrations in ponds, particularly P and N.	A phosphorus inactivation system for Morses Pond was installed in 2008 and continued operation in 2011. The first year results led to revisions of the program. The town has a professional pond manager for Morses Pond that has developed and implemented a management plan.	Phosphorus inactivation system to continue operating in May and June 2012.
7.5	Mail brochures alerting residents to the threat of phosphorus overload and pond eutrophication. Promote proper lawn and garden care to reduce the use of pesticides and fertilizers	Town Engineer/ DPW and Natural Resources Commission	Notable reduction of nutrient concentrations in ponds, particularly P and N.	Brochures were mailed to landscapers and interested parties. Information posted on CATV. NRC conducted a healthy lawn care workshop in April 2011. 80 people attended.	Defer to next general permit. NRC to continue to distribute healthy lawn care and stormwater brochures in public buildings. A website is under development to educate residents on their role in protecting water quality through desirable residential practices.
7.6	Evaluate public sites for retrofitting of LID techniques.	NRC Pond manager	Improved quality of runoff in watershed. Design and install one facility per year.	The NRC obtained funding and selected 2 preferred sites for the installation of a bio-swale. However, proximity to a water supply prevented installation, additional sites are being considered. The new high school incorporated rainwater re-use and porous pavement.	Design and install bio-filtration swale or rain garden at additional sites, continue to promote LID technology.

## 7b. WLA Assessment

### 1. Pathogens

The 2010 303(d) list identifies two waterbodies within the jurisdiction of the Town of Wellesley that are impaired by pathogens, specifically e-coli. Portions of a segment of the Charles River, MA 72-07, form the boundary between Wellesley and several other towns. Fuller Brook, MA72-18, has headwaters in Needham, but its confluence with Waban Brook is in Wellesley about 250' yards upstream from the Charles River at mile 40.

Based on the guidance provided in Section 5 of the TMDL, the town has focused on stormwater runoff, leaking sewer pipes, illicit sanitary sewer connections, pet waste and waterfowl contamination as potential sources of pathogens. Due to the urbanized nature of the Town, failing septic systems and agriculture are not considered to be significant sources of pathogens. There are no known CSOs in the Town. Nor are there any wastewater treatments plants operating within the Town. The Town has completed about 65% of a program to inspect its sanitary sewer system and repair leaking pipes and manholes. Pet waste is being addressed in BMP 1.9. It is suspected that pet waste is a significant cause of pathogens in storm water runoff. The Town will need to provide more pet waste containers and increase public awareness of the problem.

Waterfowl has been identified as the primary source of bacterial impairment in Fuller Brook. To this end, the town has taken steps to improve the water quality at the Town Hall Duck Pond by removing sediment, increasing flow through the stagnated basins of the pond and reducing the duck population. See BMP 1.7.

### 2. Nutrients and Phosphorus

The 2010 303(d) list identifies four waterbodies within the jurisdiction of the Town of Wellesley that are impaired by nutrients or phosphorus. Portions of two segments of the Charles River, MA 72-06 and MA 72-07, form the boundary between Wellesley and several other towns. Fuller Brook, MA72-18, has headwaters in Needham, but its confluence with Waban Brook is in Wellesley about 250' yards upstream from the Charles River at mile 40. Rosemary Brook, MA72-25, flows from Needham through Wellesley and empties into the Charles River at mile 60. Most of the portions of Rosemary Brook within Wellesley are within a water supply area and are protected by Town forest and water works land.

The TMDL for the Upper/Middle Charles River watershed recommends reducing phosphorus loadings by employing LID techniques, proper lawn and garden care, and proper disposal of pet waste. A program to retrofit LID techniques is underway at Town owned facilities (see BMP 6.14). The program will then be used to encourage private property owners to adopt similar techniques. The Town encourages reductions in the use of fertilizers and pesticides through various public awareness programs. An athletic field natural turf management plan was developed by a consultant in October 2009 and implemented in 2010. The purpose of the plan is to improve the condition of the Town's playing fields so that the use of fertilizers and pesticides is reduced or eliminated. As stated above, pet waste is being addressed in BMP 1.9.

A phosphorus inactivation system is in use at Morses Pond, beginning in 2008. Although the purpose of this system is to control the growth of algae within the pond itself, Morses Pond is a tributary of the Charles River through Waban Brook, MA72-17. In this manner, the phosphorus inactivation system also provides treatment to the stormwaters that discharge to the Charles River.

Progress will be closely tracked and modifications and improvements will be implemented as required.

#### **Part IV. Summary of Information Collected and Analyzed**

12 outfalls in Fuller Brook were inspected. Dry weather discharges were observed at two locations, FB3 and FB8. Analytical testing was conducted and both discharges were determined to be from natural sources.

One e-mail report of suds in Fuller Brook was investigated. Evidence of this observation could not be located in the field.

There was no additional activity under this program as there were no further observations or reports of pollutants in the Town's drainage system or waterbodies.

#### **Part V. Program Outputs & Accomplishments (OPTIONAL)**

(Since beginning of permit coverage unless specified otherwise by a \*\*, which indicates response is for period covering April 1, 2011 through March 31, 2012)

#### **Education, Involvement, and Training**

	(Preferred Units)	Response
Household Hazardous Waste Collection Days		

▪ days sponsored**	(#)	1
▪ community participation**	(# or %)	4%
▪ material collected**	(tons or gal)	10.86 tons
Waste oil collected FY12		15 tons
Hazardous material collected FY12		110 tons
School curricula implemented	(y/n)	no
Catch basin markers placed	(#)	95

**Legal/Regulatory**

	In Place Prior to Phase II	Under Review	Drafted	Adopted
<b>Regulatory Mechanism Status (indicate with "X")</b>				
▪ Illicit Discharge Detection & Elimination				x
▪ Erosion & Sediment Control			x	
▪ Post-Development Stormwater Management				x
<b>Accompanying Regulation Status (indicate with "X")</b>				
▪ Illicit Discharge Detection & Elimination				x
▪ Erosion & Sediment Control			x	
▪ Post-Development Stormwater Management				x

**Mapping and Illicit Discharges**

Outfall mapping complete	(Preferred Units)	Response
	(%)	100%

Estimated or actual number of outfalls	(#)	330
System-Wide mapping complete (complete storm sewer infrastructure)	(%)	100%
Mapping method(s)		
▪ Paper/Mylar	(%)	100
▪ CADD	(%)	0
▪ GIS	(%)	100
Outfalls inspected/screened ** (including in waterways)	(# or %)	12
Outfalls inspected/screened (Since beginning of permit coverage) (includes waterways and retesting)	(# or %)	154
Illicit discharges identified **	(#)	0
Illicit discharges identified (Since beginning of permit coverage)	(#)	3
Illicit connections removed **	(%); est.gpd	0
Illicit connections removed (Since beginning of permit coverage)	(%); est.gpd	0; 25 gpd
% of population on sewer	(%)	97%
% of population on septic systems	(%)	3%

#### Post-Development Stormwater Management

Estimated percentage of development/redevelopment projects adequately regulated for post-construction stormwater control	(%)	90%
Site inspections (for proper BMP installation & operation) completed **	(# or %)	100%
BMP maintenance required through covenants, escrow, deed restrictions, etc.	(y/n)	yes
Low-impact development (LID) practices permitted and encouraged	(y/n)	yes

#### Operations and Maintenance

Average frequency of catch basin cleaning (non-commercial/non-arterial streets) **	(times/yr)	Every 2 years
Average frequency of catch basin cleaning (commercial/arterial or other critical streets) **	(times/yr)	Every year
Qty of structures cleaned **	(#)	146
Qty. of storm drain cleaned **	(l.f.)	7161 l.f.
Qty. of screenings/debris removed from storm sewer infrastructure **	(lbs. or tons)	352 c.y.
Disposal or use of screenings (landfill, POTW, compost, beneficial use, etc.) **	(location)	Crapo Hill Landfill

Basin Cleaning Costs			
• Annual budget/expenditure (labor & equipment)**	(\$)		\$35,192.00
• Hourly or per basin contract rate **	(\$/hr or \$ per basin)		\$24.95 per basin
• Disposal cost**	(\$)		\$8.00/ton
Cleaning Equipment			
• Clam shell truck(s) owned/leased	(#)		1 owned
• Vacuum truck(s) owned/leased	(#)		1 owned
• Vacuum trucks specified in contracts	(y/n)		n/a
• % Structures cleaned with clam shells **	(%)		75%
• % Structures cleaned with vacor **	(%)		25%
	(Preferred Units)	Response	
Average frequency of street sweeping (non-commercial/non-arterial streets) **	(times/yr)		Every year
Average frequency of street sweeping (commercial/arterial or other critical streets) **	(times/yr)		2 per week
Qty. of sand/debris collected by sweeping **	(lbs. or tons)		1641 c.y.
Disposal of sweepings (landfill, POTW, compost, beneficial use, etc.) **	(location)		Landfill
Annual Sweeping Costs			
• Annual budget/expenditure (labor & equipment)**	(\$)		\$79,384.00
• Hourly or lane mile contract rate **	(\$/hr. or in mi.)		In house – not contracted
• Disposal cost**	(\$)		\$8.00/ton
Sweeping Equipment			
• Rotary brush street sweepers owned/leased	(#)		2 owned
• Vacuum street sweepers owned/leased	(#)		none
• Vacuum street sweepers specified in contracts	(y/n)		n/a
• % Roads swept with rotary brush sweepers **	%		100%
• % Roads swept with vacuum sweepers **	%		0%
Number of municipal oil-water separators cleaned.			2
Tons of sludge and sediment removed			0.17
Gallons of oily water removed			453

Reduction (since beginning of permit coverage) in application on public land of: ("N/A" = never used; "100%" = elimination)	
▪ Fertilizers	(lbs. or %) 10%
▪ Herbicides	(lbs. or %) 0
▪ Pesticides	(lbs. or %) 0
Integrated Pest Management (IPM) Practices Implemented	(y/n) yes

Average Ratio of Anti-/De-Icing products used **	
(also identify chemicals and ratios used in specific areas, e.g., water supply protection areas)	
Calcium Chloride 37% - 39% CaCl <sub>2</sub> Solution	
Pre-wetting techniques utilized **	(y/n or #) yes
Manual control spreaders used **	(y/n or #) yes
Zero-velocity spreaders used **	(y/n or #) no
Estimated net reduction or increase in typical year salt/chemical application rate	(±lbs/ln mi. or %) indeterminate
Estimated net reduction or increase in typical year sand application rate **	(±lbs/ln mi. or %) indeterminate
% of salt/chemical pile(s) covered in storage shed. Some mixed sand/salt stored outside under cover.	(%) 100% covered
Storage shed(s) in design or under construction	(y/n or #) In use
100% of salt/chemical pile(s) covered in storage shed(s) by May 2008	(y/n) yes

### Water Supply Protection

Storm water outfalls to public water supplies eliminated or relocated	# or y/n	no
Installed or planned treatment BMPs for public drinking water supplies and their protection areas	# or y/n	no
• Treatment units induce infiltration within 500-feet of a wellhead protection area	# or y/n	no

Fuller Brook Stormwater Outfalls  
Dry Weather Sampling  
March 2012

Parameter	FB3 Result	FB8 Result	Units	Range
Surfactants	ND	ND	mg/L	>0.25 mg/L
Fluoride	ND	ND	mg/L	>0.25 mg/L
Ammonia	0.088	ND	mg/L	Ratio >1.0
Potassium	ND	ND	mg/L	Ratio >1.0
pH	7.4	6.5	SU	

Determination: Discharge from both FB3 and FB8 is likely a natural water source.