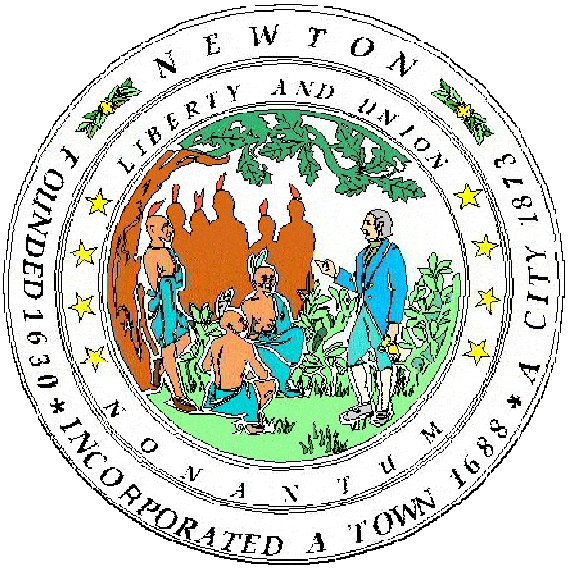
City of Newton



Stormwater Infrastructure Improvement Plan

Supporting Documentation

February 2015

Newton Stormwater Infrastructure Improvement Plan

Supporting Documentation

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Section 1:

Stormwater Infrastructure Improvement Plan Overview

Stormwater Infrastructure Improvement Plan Overview
Newton, MA

Like many communities, the City of Newton's stormwater system is old and faces challenges related to stormwater quality and quantity; system maintenance and capital upgrades; localized flooding; and NPDES Phase 2 MS4 General Permit (Federal Stormwater Permit) compliance. Even though the City completes regular maintenance tasks such as grate clearing and catch basin cleaning, as well as a variety of stormwater projects, including water quality sampling, relatively little is known about the condition of the City's 320 miles of drainage infrastructure. A comprehensive plan was required to understand the full range of current and future stormwater needs.

The development of a multi-year Stormwater Infrastructure Improvement Plan will allow the City to efficiently invest in infrastructure improvements to meet the City's stormwater goals over the next 20 years. These include federal permit compliance; protection and improvement of local water quality; and investing in infrastructure improvements to reduce flooding and ensure an adequate level of service. Given these goals, the Stormwater Infrastructure Improvement Plan focuses on four types of projects: federal permit compliance, localized flooding, stream improvements and culverts.

Federal Stormwater Permit Compliance

The City's current stormwater discharges are covered under EPA's 2003 NPDES Phase 2 Small MS4 General Permit. Although this permit technically expired in 2008, the City is covered under the permit until a new permit is issued. A Draft MS4 General Permit was released for public comment on September 29, 2014. Once the permit is final, the City will be required to fulfill a number of requirements to be in compliance. The requirements fall under the following minimum control measures:

- Public Education & Outreach
- Public Participation and Involvement
- Illicit Discharge Detection and Elimination
- Construction Site Stormwater Runoff Control
- Post-Construction Stormwater Management
- Good Housekeeping and Pollution Prevention

In addition, there are significant requirements included in the permit related to the Charles River Phosphorus and Charles River Pathogens Total Maximum Daily Loads. There are also separate requirements related to impaired waters without an approved Total Maximum Daily Load, including Saw Mill Brook, which is impaired for chloride.

A summary table was developed outlining the requirements of the draft permit with an estimated compliance cost for the twenty year life of the permit. The City will need to invest an estimated $11.0 million over the next twenty years to comply with the new permit. Complying with the Charles River Phosphorus Total Maximum Daily Load requirements and implementing the Illicit Discharge Detection and Elimination Program will carry the largest financial burden.

Localized Flooding Areas

Public works and engineering staff identified ten areas with reoccurring localized flooding. A site visit was conducted at each location to document existing conditions and identify potential solutions. At some locations the solution will require a phased approach that includes evaluation, design and construction phases. The goal at each location is to eliminate localized flooding while incorporating Best Management Practices for green infrastructure. Planning level costs for evaluation, design and construction are included in the Stormwater Infrastructure Improvement Plan for each flooding location. The total cost of localized flooding projects is estimated at $3.0 million.

Stream Improvements

A condition assessment of the City's streams and brooks was performed to understand the scope of work and cost associated with rehabilitating deficiencies in these assets. Open channel streams and brooks are an integral part of flood protection. A walking stream survey was conducted on more than 14 miles of stream to document stream condition and to develop a list of recommended improvements. Recommended improvements include: removal of debris within the stream channel and embankments, including fallen trees; removal of sediment in the stream bed and at culverts; structural evaluation, rehabilitation and maintenance at selected culverts; and repair of failing retaining walls. The estimated planning level cost to complete the stream improvement work is $12.3 million. The estimate includes an allowance for design, permitting and construction.

Culvert Inspections/Repairs

Since 2000, the City has completed a number of culvert evaluation projects, including the evaluation of 13,000 linear feet of Laundry Brook culvert and a preliminary inspection of various road-width culverts. The stream assessment work completed as part of this project collected additional data regarding the condition of road-width culverts and the headwalls of various pipe culverts. Culverts that were identified for future repair are identified as separate projects within the Stormwater Infrastructure Improvement Plan and have been assigned planning level repair costs. Many culverts will require a complete structural evaluation to fully understand the extent of repairs that will be required.

Most of the City's drainage piping has never been inspected and its condition is unknown. Inspection of all the drain pipes is unlikely to yield a positive return on investment and is not recommended at this time. However, it is important to evaluate the condition of critical drainage infrastructure to identify potential emergencies and schedule future improvements. Approximately 100,000 linear feet of critical drainage infrastructure was identified and was divided into four (4) evaluation projects. Each Culvert Evaluation Project includes a structural evaluation of 6 road-width culverts and cleaning/television inspection of 25,000 linear feet of critical storm drain. The total cost of the culvert evaluation work is estimated at $1.6 million. An allowance is included in the Stormwater Infrastructure Improvement Plan to repair deficiencies that may be identified during the evaluation.

The planning level cost estimate for design, permitting and construction of known culvert deficiencies as well as an allowance for problems that may be identified during the evaluation work is $12.7 million. The total cost of the culvert scope of work increases to $14.3 million when the evaluation work is incorporated.

Prioritization and Stormwater Infrastructure Improvement Plan Development

Rating criteria and project grouping alternatives were developed for each Stormwater Infrastructure Improvement Plan Project. The rating system was used as a basis to prioritize projects and develop the 22-year Stormwater Infrastructure Improvement Plan. Project prioritization is not always consistent with the rating system. For example, if a stream maintenance project was not highly rated individually, but was critical to the success of a highly rated flooding project, the two (2) projects were grouped and will be completed together. Other adjustments were made to decrease total project cost through economy of scale.

The requirements of the pending Federal Stormwater Permit play a significant role in the scope and prioritization of Projects. Permit work is prescriptive and must be completed in certain years. As such, the Stormwater Infrastructure Improvement Plan was built by scheduling the Federal Permit work first and adding other projects as the budget allowed. Funding has been set at $1 million for the first five (5) years, $1.5 million for the second five (5) years, $2 million for the third five (5) years, $2.5 million for the fourth five (5) years, and $3 million for the last two (2) years. The entire cost of the 22-year Program is estimated at $41 million (in 2015 dollars).

Project prioritization will be re-evaluated in Year #6 of the Plan following collection of the additional condition assessment data.

Section 2:

Project Prioritization

Stormwater Infrastructure Improvement Plan
Newton, MA

Stormwater Infrastructure Improvement Plan Prioritization Methodology and Rating Criteria

The City's risk-based approach, which they utilize to prioritize projects within their city-wide 5-year capital improvement program, will be used to analyze and prioritize stormwater capital projects, including stream improvements, localized flooding and culvert projects. Projects associated with the City's compliance with the pending NPDES Phase 2 Small MS4 General Permit (Federal Stormwater Permit) are not included herein as the timeline for implementation of these projects will be dictated by the permit.

Risk or Probable Magnitude of Future Loss (R) = Probability of Failure (PF) x Magnitude of Consequence of Failure or Expected Loss (Q)

Probability of Failure (PF)

Probability of Failure will be based entirely on the condition of the asset. The rating criteria will vary based on the asset type. Three separate tables were developed for use in classifying the condition of the following assets: streams, drainage infrastructure (as it relates to localized flooding), and culverts. In each table, values assigned to condition range from 0 to 10, with 0 being the worst condition and 10 being the best condition. Each value is then assigned a corresponding probability of failure ranging from 0% to 100%.

The asset's overall probability of failure is equal to the value given to the condition of the asset.

Probability of Failure (PF) = Overall Condition Value

Stream Improvement Projects

For Stream Improvement Projects, stream condition was evaluated based on the following factors: retaining wall condition, extent of overgrowth, extent of debris within the stream channel and the amount of sediment within the stream channel. Table 2 provides a detailed description for each condition value, along with the probability of failure.

Table 2.

Overall Stream Condition		
Rating	**Description**	**Value**
10	Pristine – For Engineered Streams, Retaining Walls Are in Like New Condition; and Sediment Accumulation, Overgrowth and Debris Within the Stream Channel are Minimal, if present at all.	0
9	Excellent– For Engineered Streams, Retaining Walls Are in Like New Condition; Overgrowth and Debris Within the Stream Channel are Minimal; and Sediment Accumulation is < 6”.	0.1
8	Very Good– For Engineered Streams, Retaining Walls Are in Good Condition with Minor Cracks that Require Little, if any, Repointing; Overgrowth and Debris Within the Stream Channel is Minor; and Sediment Accumulation is < 6”.	0.2
7	Good/Minor Deferred Maintenance – For Engineered Streams, Retaining Walls Need Minor Repointing; Overgrowth is Minor; Debris within the Stream Channel is Minor; and Sediment Accumulation within the Stream Channel is > 6”.	0.3
6	Above Average/ Minor Deferred Maintenance – For Engineered Streams, Retaining Walls Need Moderate Repointing; Overgrowth is Minor to Moderate; Debris within the Stream Channel is Minor to Moderate; Sediment Accumulation within the Stream Channel is > 6”.	0.4
5	Average / Functional - For Engineered Streams, Retaining Walls Need Widespread Repointing; Overgrowth is Minor to Moderate; Debris within the Stream Channel is Minor to Moderate; Sediment Accumulation within the Stream Channel is > 6”.	0.5
4	Below Average / Major Deferred Maintenance - For Engineered Streams, Retaining Walls Require a Combination of Rebuilding & Repointing; Overgrowth is Moderate; Debris within the Stream Channel is Moderate; Sediment Accumulation within the Stream Channel is > 12”.	0.6
3	Poor / Serious Condition - For Engineered Streams, Retaining Walls are Failing and Need Rebuilding; Overgrowth is Moderate to Severe; Debris within the Stream Channel is Moderate to Severe; Sediment Accumulation within the Stream Channel is > 18”.	0.7
2	Bad / Critical Condition - For Engineered Streams, Retaining Walls are Failing and Need Rebuilding; Overgrowth is Severe; Substantial Debris is located within the stream Channel; Sediment Accumulation within the Stream Channel is > 18”.	0.8
1	Very Bad / Imminent Failure – For Engineered Streams, Retaining Walls are Failing and Need Rebuilding; Overgrowth is Severe; Substantial Debris, including large fallen trees, are located within the stream Channel; Sediment Accumulation within the Stream Channel is > 24”.	0.9
0	Not Functioning/Failed – Stream Channel Can No Longer Convey Flow due to Large Obstructions or Significant Blockages; Water is Overflowing the Banks of the Stream Channel	1.0

Localized Flooding Projects

For Localized Flooding Projects, the condition of the drainage system, as it relates to the severity of flooding, was evaluated based on the following factors: the adequacy of the existing drainage system, the frequency of maintenance, the number of flooding complaints/frequency of flooding, the magnitude of the total amount of existing flood insurance claims, and the extent of flooding (street vs. private property). Table 3 provides a detailed description for each condition value, along with the probability of failure.

Table 3.

Overall Condition of Drainage Infrastructure		
Rating	**Description**	**Value**
10	New / Pristine - Drainage System is New and is Functioning As Designed; Flooding Complaints & Occurrences Are Rare; Flooding is Confined to the Street; Flood Insurance Claims are $0	0
9	Excellent - Drainage System Requires Only Routine Maintenance and is Functioning As Designed; Flooding Complaints & Occurrences Are Rare; Flooding is Confined to the Street; Flood Insurance Claims are $0	0.1
8	Very Good - Drainage System Requires More Frequent Maintenance, but is Functioning As Designed; Flooding Complaints & Occurrences Are Rare; Flooding is Confined to the Street; Flood Insurance Claims are $0	0.2
7	Good/Minor Deferred Maintenance – Drainage Structures/Pipes Require more than Routine Cleaning and/or Require Minor Repairs; Flooding Complaints & Occurrences Happen Occasionally; Flooding is Mostly Confined to the Street, but does Impact Private Property Periodically; Flood Insurance Claims are between $0 < X < $5,000	0.3
6	Above Average/ Minor Deferred Maintenance - Drainage Structures/Pipes Require Moderate Repair/Maintenance and/or Expansion (Additional Drainage Structures); Flooding Complaints & Occurrences Happen Occasionally; Flooding is Mostly Confined to the Street, but does Impact Private Property Periodically; Flood Insurance Claims are between $0 < X < $5,000	0.4
5	Average / Functional - Drainage Structures/Pipes Require Moderate Repair/Maintenance and/or Expansion (Additional Drainage Structures); Flooding Complaints & Occurrences Happen Occasionally; Flooding has a Greater Impact on Private Property; Flood Insurance Claims are between $5,000 ≤ X < $25,000	0.5
4	Below Average / Major Deferred Maintenance - Drainage Structures/Pipes Require More Substantial Repairs/Maintenance; Flooding Complaints & Occurrences Happen Regularly; Flooding has a Greater Impact on Private Property; Flood Insurance Claims are between $5,000 ≤ X < $25,000	0.6
3	Poor / Serious Condition – Drainage System is in Poor Condition; Existing Drainage System Appears to be Inadequate/Undersized; Flooding Complaints & Occurrences Happen Regularly; Flooding has a Substantial Impact on Private Property; Flood Insurance Claims are between $25,000 ≤ X ≤ $200,000	0.7
2	Bad / Critical Condition - Drainage System Defects are Significant and Require Urgent Attention; Flooding Complaints & Occurrences Are Numerous; Flooding has a Substantial Impact on Private Property; Flood Insurance Claims are between $25,000 ≤ X ≤ $200,000	0.8
1	Very Bad / Imminent Failure – Drainage System is Failing and in Need of Immediate Attention; Flooding Complaints & Occurrences Are Numerous; Flood Insurance Claims and Impacts to Private Property are Significant (>$200,000)	0.9
0	Not Functioning	1.0

Culvert Projects

For Culvert Projects, culvert condition was evaluated based on the following factors, where applicable: headwall and wingwall condition, including extent of cracks and spalls; condition of steel beams; presence of exposed rebar; pipe barrel condition; condition of stone masonry walls; depth of sediment within the culvert, and other maintenance issues as noted below. Table 4 provides a detailed description for each condition value, along with the probability of failure.

Table 4.

Overall Culvert Condition		
Rating	**Description**	**Value**
10	New / Pristine – Culvert is New	0
9	Excellent – Culvert Has No Visible Defects	0.1
8	Very Good – Culvert Has Minor Cracks, but Appears to be Structurally Sound and No Maintenance is Needed At This Time	0.2
7	Good/Minor Deferred Maintenance – Minor Debris or Vegetation is Blocking the Inlet or Outlet of the Culvert and Requires Cleaning or Removal; Trash Rack or Grate Needs Cleaning; Visible Cracks Visible Requiring Minor Masonry Repair; Tree Removal Needed at Culvert	0.3
6	Above Average/ Minor Deferred Maintenance - Sediment Removal Needed (<12”); Minor Concrete Spalling Visible at Headwalls and/or Wingwalls	0.4
5	Average / Functional – Map Cracks w/Effloresecence Visible at Wing Walls; Missing Bricks, Stone & Mortar Requiring Moderate Masonry Repair	0.5
4	Below Average / Major Deferred Maintenance – Moderate Surface Spalls and/or Cracks Visible at Wingwalls and/or Headwalls; Stone Masonry Walls have Large Areas of Missing Mortar & Loose Stones; Wingwall Needs Repair; Sediment Removal Needed (>12”); Extensive Concrete Deterioration with Exposed Rebar	0.6
3	Poor / Serious Condition – Large Deep Spalls Visible & Large Cracks Visible at Concrete Headwalls and/or Wingwalls; Extensive Exposed Steel Rebar; Walls have Stones or Blocks Bulging/Missing/Displaced; Concrete Deterioration Along Flow Line	0.7
2	Bad / Critical Condition – Steel Beams Supporting Stone Caps Have Considerable Rust & Section Loss; Wingwalls are Failing	0.8
1	Very Bad / Imminent Failure – Culvert is At Risk of Imminent Failure – Significant Pipe Deformation and Cracking; Large Sections of Exposed Steel Rebar, Significant Concrete Loss; Undermining of Culvert Walls	0.9
0	0 – Not Functioning / Failed – Culvert Has Failed & Needs Replacement	1.0

Consequence of Failure (Q) Categories:

Consequence of Failure looks at the potential impact if the asset fails. The following impacts were prioritized, examined and weighted.

Impact to Health & Safety (weight = 10) – Will the project reduce the potential for human injury or illness? Is the project critical to the protection of public safety & public health?
Potential for Property Damage (weight = 10) – Will the project mitigate impacts related to flooding? Will the project address damages to public or private property?
Cost of Deferred Maintenance (weight = 9) – What is the cost of deferred maintenance? If the project is not completed now, will the project's scope and cost increase substantially in the future?
Number of People Impacted (weight = 6) – How many people does the project affect? How many people will be positively impacted by the project's implementation?
Impacts to Traffic (weight = 6) – Will any major arterial streets be impacted? If the work is not done soon, will the magnitude of the impact to these streets be worse in the future if the work has to be done under emergency conditions?
Impact on City Development Priorities (weight = 4) – How does the project impact economic development within the City and the City's development priorities?

Table 5 summarizes each impact, or category of consequence, and its weighted value.

Table 5.

Category of Consequence	Weight Value (W_i)	% of Weight
Public Health & Safety	10.0	22.2%
Property Damage	10.0	22.2%
Cost of Deferred Maintenance	9.0	20.0%
People Impacted	6.0	13.3%
Traffic Impacts	6.0	13.3%
City Development Priorities	4.0	8.9%
Totals	**45.0**	**100.0%**

The extent of the impact of each consequence is assigned a value ranging from 0 to 10, which correlates to a rating between 0 and 10 as shown in Table 6. Each asset is rated under each category of consequence based on the potential magnitude of impact associated with that particular category on the asset.

Table 6.

Consequence	
Value	**Rating (Q_i)**
0 – No Impact	0
1	1
2 – Very Little Impact	2
3	3
4	4
5 – Moderate Impact	5
6	6
7	7
8 – High Impact	8
9	9
10 – Very High Impact	10

For each asset, the Magnitude of Consequence of Failure (or Expected Loss) (Q) is calculated by summing the product of the consequence rating and its percent weight for all 7 categories of consequence for each asset.

$$Q = \sum_{i=1}^{i=6} \left(Q_i \frac{Wi}{Wt} \right)$$

Where:
i = consequence of failure category counter (There are 6 consequences so "i" ranges from 1 to 6.)
Q_i = i-th consequence rating (as identified in Table 6)
W_i = Weight of i-th consequence (as identified in Table 5)
W_T = Total Weight (46 as identified in Table 5)

Risk for each asset or project is then calculated as follows:

Risk or Probable Magnitude of Future Loss (R) = Probability of Failure (PF) x Magnitude of Consequence of Failure or Expected Loss (Q)

Green Infrastructure Practices/Natural Drainage Enhancement

The opportunity to incorporate green infrastructure practices will be considered in the development and implementation of each project identified in the Stormwater Capital Improvement Plan. In addition, for those projects where opportunities for natural drainage enhancement are readily apparent, a separate field in the prioritization matrix has been added to highlight these projects. In the event that two projects are closely ranked, the project that has known potential for natural drainage enhancement will be given priority in the implementation of the overall plan.

Stormwater Infrastructure Improvement Plan - Prioritization

Newton, MA

						CONSEQUENCE OF FAILURE CATEGORIES & WEIGHTS - 0 (No Impact) to 10 (High Impact)									
						Weight	Weight	Weight	Weight	Weight	Weight				
						10.0	10.0	9.0	6.0	6.0	4.0				
Project Type	**Project**	**Project Description / Justification**	**Drainage Basin**	**Estimated Project Cost**	**Overall Condition 0: Worse to 10: Best**	**Impact to Public Health & Safety**	**Potential for Property Damage**	**Cost of Deferred Maintenance**	**Number of People Impacted**	**Impacts to Traffic**	**Impact on City Development Priorities**	**Likelihood of Failure**	**Conseq. Factor**	**Risk Factor**	**Opportunity for Natural Drainage Enhancement**
Culverts	**Laundry Brook - Relocation of the Culvert at the Cabot School (Bridges Avenue to Parkview Avenue) - Design & Construction**	Relocation of the Laundry Brook Culvert at the Cabot School. The Cabot School is being rebuilt and the culvert is to be relocated as part of this effort. Defects were also identified in the 2001 Report indicating that this section of the culvert requires repair.	77	-	2	10	10	10	10	7	10	**0.80**	**9.60**	**76.8**	
Culverts	**Laundry Brook - Design & Construction of Culvert Improvements (From Parkview Avenue to Bar Screen Before MASS Pike)**	Repair of Laundry Brook Culverts. Defects identified in 2001 Report. / Complete culvert repairs to prevent culvert collapse and flooding risk.	77	$ 550,000	2	10	10	10	10	7	0	**0.80**	**8.71**	**69.7**	
Culverts	**Cheesecake Brook - Eddy Street - Design & Construction of Culvert Improvements**	Repair culvert. / Stone masonry walls have some missing mortar. The east and west fascia steel beams have considerable rust and section loss. Complete culvert repairs to prevent culvert collapse and flooding risk.	68	$ 250,000	2	10	10	10	9	7	0	**0.80**	**8.58**	**68.6**	
Culverts	**Laundry Brook - Design & Construction of Culvert Improvements (From Hull Street to Bridges Avenue)**	Repair of Laundry Brook Culverts. Defects identified in 2001 Report. / Complete culvert repairs to prevent culvert collapse and flooding risk.	77	$ 650,000	2	9	9	10	9	10	0	**0.80**	**8.53**	**68.3**	
Culverts	**Cheesecake Brook - Parson Street - Design & Construction of Culvert Improvements**	Repair culvert. / Stone walls have missing mortar and loose stones. The east and west fascia steel beams have considerable rust and section loss. Complete culvert repairs to prevent culvert collapse and flooding risk.	68	$ 400,000	2	10	10	10	9	5	0	**0.80**	**8.31**	**66.5**	
Culverts	**Cheesecake Brook - Cross Street - Design & Construction of Culvert Improvements**	Repair culvert. / Stone masonry walls have missing mortar and loose stones. The east and west fascia steal beams are deteriorated. Complete culvert repairs to prevent culvert collapse and flooding risk.	68	$ 400,000	2	10	10	10	9	5	0	**0.80**	**8.31**	**66.5**	
Localized Flooding	**South Meadow Brook at Dedham Street - Design & Construction**	Improvements to the drainage system on Dedham Street. / The property at #229 Dedham Street and properties on Bound Brook Road & Heatherland Road flood during heavy rain events. Drain manholes on Dedham Street overflow.	11	$ 750,000	1	10	10	3	8	8	0	**0.90**	**7.18**	**64.6**	
Culverts	**Cheesecake Brook - Watertown Street – West Culvert - Design & Construction of Culvert Improvements**	Repair culvert. / Stone masonry walls have large areas of missing mortar and loose stones. Complete culvert repairs to prevent culvert collapse and flooding risk.	68	$ 250,000	3	10	10	10	10	10	0	**0.70**	**9.11**	**63.8**	
Culverts	**South Meadow Brook - Oak Street - Design & Construction of Culvert Improvements**	Repair culvert. / Missing mortar around the brick and granite blocks on the inside of the culvert. Large crack in wingwall with evidence of wall movement. Complete culvert repairs to prevent culvert collapse and flooding risk.	11	$ 250,000	3	10	10	10	10	10	0	**0.70**	**9.11**	**63.8**	
Culverts	**Cheesecake Brook - Dunstan Street - Design & Construction of Culvert Improvements**	Repair culvert. / Stone walls have large areas of missing mortar and loose stones. Large vertical crack at east fascia. Complete culvert repairs to prevent culvert collapse and flooding risk.	68	$ 250,000	3	10	10	10	8	5	0	**0.70**	**8.18**	**57.2**	

Stormwater Infrastructure Improvement Plan - Prioritization

Newton, MA

						CONSEQUENCE OF FAILURE CATEGORIES & WEIGHTS - 0 (No Impact) to 10 (High Impact)									
						Weight	Weight	Weight	Weight	Weight	Weight				
						10.0	10.0	9.0	6.0	6.0	4.0				
Project Type	**Project**	**Project Description / Justification**	**Drainage Basin**	**Estimated Project Cost**	**Overall Condition 0: Worse to 10: Best**	**Impact to Public Health & Safety**	**Potential for Property Damage**	**Cost of Deferred Maintenance**	**Number of People Impacted**	**Impacts to Traffic**	**Impact on City Development Priorities**	**Likelihood of Failure**	**Conseq. Factor**	**Risk Factor**	**Opportunity for Natural Drainage Enhancement**
Culverts	**South Meadow Brook - Needham Street - Design & Construction of Culvert Improvements**	Repair culvert. / Significant deterioration at the west end of the culvert with rebar exposed. Complete culvert repairs to prevent culvert collapse and flooding risk.	11	$ 250,000	4	10	10	10	10	10	0	**0.60**	**9.11**	**54.7**	
Culverts	**South Meadow Brook - Winchester Street - Design & Construction of Culvert Improvements**	Repair culvert. / Spalling and scaling of concrete at headwalls and wingwalls. Concrete is eroded along the interior walls of the culvert. Complete culvert repairs to prevent culvert collapse and flooding risk.	11	$ 250,000	4	10	10	10	10	10	0	**0.60**	**9.11**	**54.7**	
Culverts	**South Meadow Brook - Dedham Street - Design & Construction of Culvert Improvements**	Repair culvert. / Severe cracks and spalling visible. Concrete is eroding within the culvert and rebar is visible in certain locations. Complete culvert repairs to prevent culvert collapse and flooding risk.	11	$ 250,000	4	10	10	10	10	10	0	**0.60**	**9.11**	**54.7**	
Culverts	**South Meadow Brook - South of Tower Road to Oak Street - Design & Construction of Culvert Improvements**	Repair culvert. / Northeast wingwall of the south end culvert is failing. Complete culvert repairs to prevent culvert collapse and flooding risk.	11	$ 400,000	2	7	8	9	10	0	0	**0.80**	**6.47**	**51.7**	
Culverts	**Hammond Brook - Hammond Pond Parkway North Culvert - Design & Construction of Culvert Improvements**	Repair culvert. / Deep spall at concrete wingwall. Large crack in headwall. Complete culvert repairs to prevent culvert collapse and flooding risk.	77	$ 250,000	4	10	8	10	9	10	0	**0.60**	**8.53**	**51.2**	
Stream Improvements	**Cheesecake Brook - Stream Improvements Permitting, Design & Construction (From Cross to Watertown Street)**	Remove Sediment & Debris; Repair/Rebuild Retaining Walls	68	$ 950,000	3	7	10	10	10	0	0	**0.70**	**7.11**	**49.8**	
Culverts	**Paul Brook - Boylston Street - Design & Construction of Culvert Improvements**	Repair culvert. / Heavy deterioration of south concrete headwall and large spall on south fascia. Large vertical crack in the east wall near the south end.	11	$ 80,000	4	10	7	10	8	10	0	**0.60**	**8.18**	**49.1**	
Stream Improvements	**Cold Spring Brook - Stream Improvements - Permitting, Design & Construction**	Remove Sediment & Debris; Cut Back Overgrowth / Stream section between Beaconwood Road and the Zervas School has heavy overgrowth and fallen trees throughout. Sediment in streambed more than 2-feet in some locations. Work required to help alleviate flooding on Beaconwood Road.	77	$ 930,000	2	7	10	7	7	0	0	**0.80**	**6.11**	**48.9**	
Culverts	**South Meadow Brook - Dudley Road - Design & Construction of Culvert Improvements**	Repair culvert. / Loose, falling stones & exposed rebar observed at the east end of the culvert. Complete culvert repairs to prevent culvert collapse and flooding risk.	11	$ 250,000	3	8	6	8	6	10	0	**0.70**	**6.84**	**47.9**	
Stream Improvements	**Cheesecake Brook - Stream Improvements Permitting, Design & Construction (From Culverted Section at Watertown to Cross)**	Remove Sediment & Debris; Repair/Rebuild Retaining Walls	68	$ 1,500,000	3	7	8	10	10	0	0	**0.70**	**6.67**	**46.7**	
Stream Improvements	**Saw Mill Brook - Stream Improvements Permitting, Design & Construction (Downstream of Vine Street)**	Remove Sediment & Debris; Cut Back Overgrowth; Repair/Rebuild Retaining Walls / Work critical to alleviate flooding on Wayne Road - Fallen trees to be removed; Heavy Overgrowth; Retaining walls u/s and d/s of Marla Circle require some repointing & repair	101	$ 590,000	2	7	10	6	6	0	0	**0.80**	**5.78**	**46.2**	

Stormwater Infrastructure Improvement Plan - Prioritization

Newton, MA

						CONSEQUENCE OF FAILURE CATEGORIES & WEIGHTS - 0 (No Impact) to 10 (High Impact)									
						Weight	Weight	Weight	Weight	Weight	Weight				
						10.0	10.0	9.0	6.0	6.0	4.0				
Project Type	**Project**	**Project Description / Justification**	**Drainage Basin**	**Estimated Project Cost**	**Overall Condition 0: Worse to 10: Best**	**Impact to Public Health & Safety**	**Potential for Property Damage**	**Cost of Deferred Maintenance**	**Number of People Impacted**	**Impacts to Traffic**	**Impact on City Development Priorities**	**Likelihood of Failure**	**Conseq. Factor**	**Risk Factor**	**Opportunity for Natural Drainage Enhancement**
Culverts	**South Meadow Brook - Upland Avenue - Design & Construction of Culvert Improvements**	Repair culvert. / Wingwall failing at at the east end of the culvert. Complete culvert repairs to prevent culvert collapse and flooding risk.	11	$ 250,000	5	10	10	10	10	10	0	**0.50**	**9.11**	**45.6**	
Culverts	**Saw Mill Brook - Vine Street - Design & Construction of Culvert Improvements**	Repair culvert. / Crack in headwall; large spall visible that runs the full length and thickness of the wingwall. Complete culvert repairs to prevent culvert collapse and flooding risk.	101	$ 250,000	4	8	8	8	7	10	0	**0.60**	**7.42**	**44.5**	
Culverts	**Laundry Brook - Design & Construction of Culvert Improvements (From Mason Rice School to Homer Street)**	Repair of Laundry Brook Culverts. Defects identified in 2001 Report. / Complete culvert repairs to prevent culvert collapse and flooding risk.	77	$ 300,000	5	10	10	10	10	8	0	**0.50**	**8.84**	**44.2**	
Culverts	**Saw Mill Brook - Lagrange Street - Design & Construction of Culvert Improvements**	Repair culvert. / Deep spalls on outside of culvert. Large crack/spall inside the culvert. Complete culvert repairs to prevent culvert collapse and flooding risk.	101	$ 250,000	4	8	7	10	5	10	0	**0.60**	**7.33**	**44.0**	
Stream Improvements	**Saw Mill Brook - Stream Improvements Permitting, Design & Construction (Upstream Sections North & East of Hollywood Drive)**	Remove Sediment & Debris; Cut Back Overgrowth / Work critical to alleviating flooding on Harwich Road - Fallen trees & debris; Heavy Overgrowth; Up to 24" of sediment in some areas.	101	$ 490,000	2	7	10	5	5	0	0	**0.80**	**5.44**	**43.6**	
Localized Flooding	**Beaconwood Road at Cold Spring Brook - Design & Construction (includes inspection & rehabilitation of the culvert under the Zervas School)**	Design of drainage improvements at Beaconwood Road/Cold Spring Brook. / Properties on Beaconwood Road flood during heavy rain events.	77	$ 100,000	4	7	7	8	5	3	10	**0.60**	**6.67**	**40.0**	**GREEN+**
Stream Improvements	**Cheesecake Brook - Stream Improvements Permitting, Design & Construction (From Watertown Street to Charles River)**	Remove Sediment & Debris; Repair/Rebuild Retaining Walls	68	$ 1,200,000	4	7	10	7	10	0	0	**0.60**	**6.51**	**39.1**	**GREEN+**
Stream Improvements	**Hammond Brook - Stream Improvements Permitting, Design & Construction (From Homer Street & Centre Street to Pleasant Street, Chelsey Road to Sumner Street)**	Remove Debris; Cut Back Overgrowth; Repair/Rebuild Retaining Walls / Minor to Moderate Overgrowth; Minor to Moderate Debris; Retaining Walls Need Repair	77	$ 1,240,000	4	9	7	8	9	0	0	**0.60**	**6.36**	**38.1**	**GREEN+**
Localized Flooding	**Harwich Road at Saw Mill Brook - Design & Construction**	Drainage improvements at Harwich Road & Saw Mill Brook. / Backyards of homes along Harwich Road experience flooding.	101	$ 100,000	4	7	8	7	5	3	0	**0.60**	**5.80**	**34.8**	**GREEN+**
Stream Improvements	**South Meadow Brook/Dickerman Brook - Stream Improvements - Permitting, Design & Construction (Dedham Street to Charles River)**	Remove Sediment & Debris; Repair/Replace Concrete Panels / Work required to help alleviate flooding on Dedham Street	11	$ 1,400,000	4	8	8	5	7	0	0	**0.60**	**5.49**	**32.9**	**GREEN+**
Culverts	**Hahn Brook - Dudley Road - Design & Construction of Culvert Improvements**	Repair culvert. / Stones in headwall and wingwalls at west end are loose & need rebuilding. Complete culvert repairs to prevent culvert collapse and flooding risk.	11	$ 250,000	5	8	6	7	5	10	0	**0.50**	**6.51**	**32.6**	
Stream Improvements	**Hammond Brook - Stream Improvements Permitting, Design & Construction (Upstream of Glen Avenue near the MBTA Green Line Tracks)**	Remove Sediment & Debris; Cut Back Overgrowth / Heavy overgrowth & debris including fallen trees; Up to 12" of sediment in stream bed	77	$ 700,000	3	7	3	4	7	5	0	**0.70**	**4.62**	**32.4**	

Stormwater Infrastructure Improvement Plan - Prioritization

Newton, MA

						CONSEQUENCE OF FAILURE CATEGORIES & WEIGHTS - 0 (No Impact) to 10 (High Impact)									
						Weight	Weight	Weight	Weight	Weight	Weight				
						10.0	10.0	9.0	6.0	6.0	4.0				
Project Type	**Project**	**Project Description / Justification**	**Drainage Basin**	**Estimated Project Cost**	**Overall Condition 0: Worse to 10: Best**	**Impact to Public Health & Safety**	**Potential for Property Damage**	**Cost of Deferred Maintenance**	**Number of People Impacted**	**Impacts to Traffic**	**Impact on City Development Priorities**	**Likelihood of Failure**	**Conseq. Factor**	**Risk Factor**	**Opportunity for Natural Drainage Enhancement**
Stream Improvements	**South Meadow Brook - Stream Improvements Permitting, Design & Construction (Section upstream of Dudley Road to Brandeis Road)**	Remove Sediment & Debris; Cut Back Overgrowth / Heavy overgrowth & fallen trees; Up to 12" of sediment in stream bed in some areas	11	$ 170,000	3	6	7	5	5	0	0	**0.70**	**4.56**	**31.9**	
Localized Flooding	**Wayne Road Near Saw Mill Brook - Design & Construction**	Improvements to the drainage system on Wayne Road. / Wayne Road floods during heavy rain events.	101	$ 250,000	4	6	7	7	3	3	0	**0.60**	**5.09**	**30.5**	GREEN+
Stream Improvements	**Cheesecake Brook - Stream Improvements (From Braeburn Pond to Culvert Behind Oldham Road)**	Remove Sediment & Debris / Fallen Trees from Stream Bed; Up to 8" of sediment; Repair/Rebuild Retaining Walls or Remove Retaining Walls & Create Open Stream Channel	68	$ 370,000	3	5	7	6	7	0	0	**0.70**	**4.29**	**30.0**	GREEN+
Stream Improvements	**Hahn Brook - Stream Improvements - Permitting, Design & Construction**	Remove Sediment & Debris; Cut Back Overgrowth / Section u/s of Dudley Rd has some overgrowth & up to 24" sediment; Section d/s of Dudley has severe overgrowth & many fallen trees	11	$ 250,000	2	6	4	5	3	0	0	**0.80**	**3.62**	**29.0**	
Stream Improvements	**Brunnen Brook - Stream Improvements - Permitting, Design & Construction**	Remove Sediment & Debris; Cut Back Overgrowth / Extensive overgrowth, fallen trees & heavy sediment deposition up to 36" in some areas.	62	$ 220,000	3	5	6	5	5	0	0	**0.70**	**4.11**	**28.8**	
Culverts	**Laundry Brook - Design & Construction of Culvert Improvements (From Bar Screen Near MASS Pike to Jackson & Canseco)**	Repair of Laundry Brook Culverts. Defects identified in 2001 Report. / Complete culvert repairs to prevent culvert collapse and flooding risk.	77	$ 400,000	7	10	10	10	10	10	0	**0.30**	**9.11**	**27.3**	
Localized Flooding	**Hammond Brook - Design & Construction**	Establish underdrain outfall discharge point to Hammond Brook. / Existing underdrain for the lined 20" sewer interceptor adjacent to Hammond Brook is leaking into the brook and the brook retaining wall is failing.	77	$ 200,000	5	4	6	10	7	0	0	**0.50**	**5.16**	**25.8**	
Stream Improvements	**Runaway Brook - Stream Improvements - Permitting, Design & Construction**	Repair/Rebuild Retaining Walls / Retaining wall is failing in various locations and is in need of repair	47	$ 240,000	3	5	3	7	3	0	0	**0.70**	**3.58**	**25.0**	
Culverts	**South Meadow Brook - East End Near Brandeis Road and West End Near Parker Street**	Repair culvert. / Large deep crack in headwall at east end of culvert. Complete culvert repairs to prevent culvert collapse and flooding risk.	11	$ 250,000	4	5	5	5	7	0	0	**0.60**	**4.16**	**24.9**	
Culverts	**Runaway Brook - First Culvert Upstream Near Washington Street - West End of Culvert - Outlet Only Visible (on Woodland Country Club Golf Course) - Design & Construction of Culvert Improvements**	Repair culvert. / Cracks visible in the headwall. Concrete eroded along pipe interior. Complete culvert repairs to prevent culvert collapse and flooding risk.	47	$ 250,000	4	3	6	6	7	0	0	**0.60**	**4.13**	**24.8**	
Stream Improvements	**Cranberry Brook - Stream Improvements - Permitting, Design & Construction**	Remove Sediment & Debris; Cut Back Overgrowth / Extensive overgrowth, small fallen trees/branches & heavy sediment deposition up to 24" in some areas. Three outfalls draining to this area could not be located, completely submerged.	66	$ 160,000	3	5	5	3	4	0	0	**0.70**	**3.36**	**23.5**	
Culverts	**Strong's Brook - On Newton Commonwealth Golf Course east of Philmore Road - Design & Construction of Culvert Improvements**	Replace Culvert. / Culvert is collapsed; rebar exposed; retaining wall in vicinity of culvert is also collapsed. Replace collapsed culvert to prevent flooding.	93	$ 500,000	0	3	5	0	4	0	0	**1.00**	**2.31**	**23.1**	
Localized Flooding	**Oldham Road at Cheesecake Brook - Design & Construction**	Improvements to the drainage system on Oldham Road. / Catch basins on Oldham Road surcharge during heavy rain events and cause street flooding & runoff onto #60 Oldham Road.	68	$ 450,000	5	5	7	5	3	3	0	**0.50**	**4.47**	**22.3**	GREEN+

Stormwater Infrastructure Improvement Plan - Prioritization

Newton, MA

						CONSEQUENCE OF FAILURE CATEGORIES & WEIGHTS - 0 (No Impact) to 10 (High Impact)									
						Weight	Weight	Weight	Weight	Weight	Weight				
						10.0	10.0	9.0	6.0	6.0	4.0				
Project Type	**Project**	**Project Description / Justification**	**Drainage Basin**	**Estimated Project Cost**	**Overall Condition 0: Worse to 10: Best**	**Impact to Public Health & Safety**	**Potential for Property Damage**	**Cost of Deferred Maintenance**	**Number of People Impacted**	**Impacts to Traffic**	**Impact on City Development Priorities**	**Likelihood of Failure**	**Conseq. Factor**	**Risk Factor**	**Opportunity for Natural Drainage Enhancement**
Culverts	**Runaway Brook - On Woodland Country Golf Course - Design & Construction of Culvert Improvements**	Repair culvert. / Concrete eroded along pipe interior. Cracks in the headwall. Retaining wall adjacent to the culvert failing. Complete culvert repairs to prevent culvert collapse and flooding risk.	47	$ 250,000	4	2	5	6	5	0	0	**0.60**	**3.42**	**20.5**	
Stream Improvements	**South Meadow Brook - Stream Improvements Permitting, Design & Construction - (Parker Street to Dedham Street)**	Remove Sediment; Repair/Replace Concrete Panels / Work required to help alleviate flooding on Dedham Street	11	$ 30,000	7	10	10	5	10	0	0	**0.30**	**6.78**	**20.3**	
Stream Improvements	**Strongs Brook - Stream Improvements - Permitting, Design & Construction**	Repair & Rebuild Retaining Walls / Sections of retaining wall require rebuilding or repair	93	$ 150,000	4	5	3	6	3	0	0	**0.60**	**3.38**	**20.3**	
Stream Improvements	**Hyde Brook - Stream Improvements - Permitting, Design & Construction**	Remove Debris; Cut Back Overgrowth; Repair Retaining Walls / Sections of moderate overgrowth; few fallen trees; some retaining wall repair/repointing needed	81	$ 510,000	6	7	7	6	5	0	0	**0.40**	**4.98**	**19.9**	
Stream Improvements	**Edmands Brook - Stream Improvements - Permitting, Design & Construction**	Remove Sediment & Debris; Cut Back Overgrowth; Repair & Rebuild Retaining Walls / Retaining wall failing in various locations downstream of dam; From Colby Street to the dam, fallen trees & debris to be removed; From Cotton to Centre: 12" sediment, fallen trees & heavy overgrowth.	77	$ 310,000	4	4	4	4	5	0	0	**0.60**	**3.24**	**19.5**	**GREEN+**
Stream Improvements	**King Brook - Stream Improvements - Permitting, Design & Construction**	Remove Debris; Cut Back Overgrowth / Moderate to severe overgrowth; fallen trees	93	$ 20,000	3	3	5	3	3	0	0	**0.70**	**2.78**	**19.4**	
Culverts	**Strong's Brook - On Newton Commonwealth Golf Course near Strong's Pond - Design & Construction of Culvert Improvements**	Replace Twin CMP Culverts with HDPE / CMP Culverts are rusted.	93	$ 250,000	4	3	5	5	3	0	0	**0.60**	**3.18**	**19.1**	
Localized Flooding	**Quinobequin Road Between Irwin & Carleton Roads - Design & Construction**	Improvements to the drainage systems on Carlton Road and Rokeby Road. / The backyards of properties on Rokeby Road and Quinobequin Road flood during heavy rain events.	28, 28A & 29	$ 200,000	4	3	4	3	3	3	0	**0.60**	**2.96**	**17.7**	
Culverts	**Hammond Brook - South of Suffolk Road - Located Under Walking Path - Design & Construction of Culvert Improvements**	Replace CMP Culvert with HDPE / CMP Culvert is rusted.	77	$ 80,000	5	5	3	2	5	5	0	**0.50**	**3.51**	**17.6**	
Stream Improvements	**Laundry Brook - Stream Improvements - Bulloughs Pond to Hull Street, Walnut Street to Dexter Road and Pulsifer Street to Gay Street - Permitting, Design & Construction**	Remove Debris; Repair/Rebuild Retaining Walls / From Pulsifer to Gay, stone wall needs repointing/repair; From Bulloughs Pond to Hull, large fallen trees; From Walnut to Dexter, fallen trees & debris	77	$ 250,000	6	5	6	6	5	0	0	**0.40**	**4.31**	**17.2**	
Culverts	**Strong's Brook - On Newton Commonwealth Golf Course Near Montrose Street**	Line Concrete Culvert / Cracks Visible in RC Pipe	93	$ 260,000	5	3	5	5	4	0	0	**0.50**	**3.31**	**16.6**	
Localized Flooding	**Judkins Street Near the Hawthorne Playground - Design & Construction**	Improvement to the drainage system at the Hawthorne Playground/Judkins Path. / Flooding occurs on Jenison Street & Judkins Street. The existing 6-inch storm drain at the Hawthorne Playground is undersized and filled with roots.	77	$ 500,000	6	5	4	6	3	3	0	**0.40**	**4.00**	**16.0**	

Stormwater Infrastructure Improvement Plan - Prioritization

Newton, MA

						CONSEQUENCE OF FAILURE CATEGORIES & WEIGHTS - 0 (No Impact) to 10 (High Impact)									
						Weight	Weight	Weight	Weight	Weight	Weight				
						10.0	10.0	9.0	6.0	6.0	4.0				
Project Type	**Project**	**Project Description / Justification**	**Drainage Basin**	**Estimated Project Cost**	**Overall Condition 0: Worse to 10: Best**	**Impact to Public Health & Safety**	**Potential for Property Damage**	**Cost of Deferred Maintenance**	**Number of People Impacted**	**Impacts to Traffic**	**Impact on City Development Priorities**	**Likelihood of Failure**	**Conseq. Factor**	**Risk Factor**	**Opportunity for Natural Drainage Enhancement**
Stream Improvements	**Thompsonville Brook - Stream Improvements - Permitting, Design & Construction**	Remove Sediment & Debris; Cut Back Overgrowth / Some sections of the stream are heavily overgrown with fallen trees & up to 12" of sediment	77	$ 250,000	4	3	3	4	4	0	0	**0.60**	**2.67**	**16.0**	
Localized Flooding	**Harvard Street Between Madison Avenue & Newtonville Avenue - Design & Construction**	Improvements to the drainage system on Harvard Street. / Harvard Street floods during heavy rain events.	77	$ 350,000	6	5	4	3	5	5	0	**0.40**	**3.93**	**15.7**	
Stream Improvements	**Paul Brook - Stream Improvements - Permitting, Design & Construction**	Remove Debris; Cut Back Overgrowth / Minor overgrowth & debris to be removed	11	$ 30,000	7	6	6	5	8	0	0	**0.30**	**4.73**	**14.2**	
Stream Improvements	**Stearns Brook - Stream Improvements - Permitting, Design & Construction**	Remove Sediment & Debris / Some sediment removal needed; could not locate outfall discharging from Boylston Street	11	$ 50,000	6	3	4	3	4	0	0	**0.40**	**2.69**	**10.8**	
Stream Improvements	**Lacy Brook - Stream Improvements - Permitting, Design & Construction**	Cut Back Overgrowth / Some overgrowth & logs to be removed	3	$ 20,000	6	2	3	3	2	0	0	**0.40**	**1.98**	**7.9**	

Cost to be Incorporated As Additional Information Becomes Available

Localized Flooding Projects

Section 3:

Stormwater Infrastructure Improvement Plan

Stormwater Infrastructure Improvement Plan
Newton, MA

Project Type	Project	Project Scope	Drainage Basin	Map Sheet	Estimated Project Cost	Project Budget	Risk Factor	Fiscal Year Budget FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26
Year 1 - FY2016																		
Culverts	**Culvert Evaluation Project #1**	Inspection & structural evaluation of 6 road-width culverts (Cheesecake Brook) and approx. 25,000 lf of pipe culvert. Includes inspection of the Laundry Brook Culvert & the culvert that runs underneath the Zervas School.	Various	Various	$ 400,000	NC	-	$ 400,000										
Culverts	**Laundry Brook - Relocation of the Culvert at the Cabot School (Bridges Avenue to Parkview Avenue) - Design & Construction**	***(Pending due to Cabot School design and improvement—no plan established currently.)***	77	2		C	**76.8**											
Localized Flooding	**South Meadow Brook at Dedham Street - Design & Construction**	Improvements to the drainage system on Dedham Street. Hse #229 floods during heavy rain events.	11	4	$ 750,000	C	**64.6**	$ 750,000										
								FY16 Total Non-Capital Project Costs =		**$ 400,000**								
								FY16 Total Capital Project Costs =		**$ 750,000**								
								FY16 Total All Project Costs =		**$ 1,150,000**								
Year 2 - FY2017																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 1 of Permit - FY17**	Includes identification of illicit discharges to the storm drain system & development of the City's Phosphorus Control Plan.	Various	Various	$ 325,000	NC	-		$ 325,000									
Culverts	**Culvert Evaluation Project #2**	Inspection & structural evaluation of 6 road-width culverts (South Meadow Brook) and approx. 25,000 lf of pipe culvert.	Various	Various	$ 400,000	NC	-		$ 400,000									
Culverts	**Unknown Road Width Culvert Repair #1- Design & Construction (or Allocation for Potential Repairs to the Culvert at the Zervas School)**	Allowance for repair of 1 road width culvert based on findings from the culvert evaluations.	Unknown	Unknown	$ 250,000	C	-		$ 250,000									
Localized Flooding	**Quinobequin Road - Interceptor & Underdrain Evaluation**	Includes condition assessment of the abandoned lined 20" x 30" sewer interceptor on Quinobequin Road and the 12" underdrain, and the feasibility of using both pipes as storm drains.	27B, 27, 28, 28A, 29, 29A, 30A, 30B, 30C, 30D & 30E	3	$ 50,000	NC	-		$ 50,000									
								FY17 Total Non-Capital Project Costs =		**$ 775,000**								
								FY17 Total Capital Project Costs =		**$ 250,000**								
								FY17 Total All Project Costs =		**$ 1,025,000**								
Year 3 - FY2018																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 2 of Permit = FY18**	Includes identification of illicit discharges to the storm drain system & development of the City's Phosphorus Control Plan.	Various	Various	$ 460,000	NC	-			$ 460,000								
Culverts	**Unknown Pipe Culvert Point Repair Project #1 - Design & Construction**	Allowance for 8 pipe culvert point repairs based on findings from the Culvert Evaluation Work.	Unknown	Unknown	$ 350,000	C	-			$ 350,000								
								FY18 Total Non-Capital Project Costs =		**$ 460,000**								
								FY18 Total Capital Project Costs =		**$ 350,000**								
								FY18 Total All Project Costs =		**$ 810,000**								

Stormwater Infrastructure Improvement Plan
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Project Type	Project	Project Scope	Drainage Basin	Map Sheet	Estimated Project Cost	Project Budget	Risk Factor	Fiscal Year Budget FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26
Year 4 - FY2019																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 3 of Permit - FY19**	Includes identification of illicit discharges to the storm drain system & development of the City's Phosphorus Control Plan.	Various	Various	$ 445,000	NC	-				$ 445,000							
Culverts	**Culvert Evaluation Project #3**	Inspection & structural evaluation of 6 road-width culverts (Hammond Brook, Paul Brook, Hahn Brook and Saw Mill Brook), and approx. 25,000 lf of pipe culvert.	Various	Various	$ 400,000	NC	-				$ 400,000							
											FY19 Total Non-Capital Project Costs =	**$ 845,000**						
											FY19 Total Capital Project Costs =	**$ -**						
											FY19 Total All Project Costs =	**$ 845,000**						
Year 5 - FY2020																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 4 of Permit - FY20**	Includes identification of illicit discharges to the storm drain system & development of the City's Phosphorus Control Plan.	Various	Various	$ 415,000	NC	-					$ 415,000						
Culverts	**Culvert Evaluation Project #4**	Inspection & structural evaluation of 6 road-width culverts (Strong's Brook, Runaway Brook & South Meadow Brook), and approx. 25,000 lf of pipe culvert.	Various	Various	$ 400,000	NC	-					$ 400,000						
Culverts	**Laundry Brook - Design & Construction of Culvert Improvements (From Parkview Avenue to Bar Screen Before MASS Pike)**	Culvert Improvements Needed / Design & Construct Improvements Based on findings from Culvert Evaluation work.	77	2	$ 550,000	C	**69.7**					$ 550,000						
												FY20 Total Non-Capital Project Costs =	**$ 815,000**					
												FY20 Total Capital Project Costs =	**$ 550,000**					
												FY20 Total All Project Costs =	**$ 1,365,000**					
Year 6 - FY2021																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 5 of Permit - FY21**	Includes identification of illicit discharges to the storm drain system & development of the City's Phosphorus Control Plan.	Various	Various	$ 370,000	NC	-						$ 370,000					
Stream Improvements	**South Meadow Brook/Dickerman Brook - Stream Improvements - Permitting, Design & Construction (Dedham Street to Charles River)**	Sediment Removal/Debris Removal/Retaining Walls / Will help alleviate flooding on Dedham St. , Bound Brook Rd. & Heatherland Rd.	11	3, 4 & 5	$ 1,140,000	NC	**32.9**						$ 1,140,000					
													FY21 Total Non-Capital Project Costs =	**$ 1,510,000**				
													FY21 Total Capital Project Costs =	**$ -**				
													FY21 Total All Project Costs =	**$ 1,510,000**				
Year 7 - FY2022																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 6 of Permit = FY22**	Includes identification & elimination of illicit discharges to the storm drain system & implementation of the City's Phosphorus Control Plan.	Various	Various	$ 790,000	NC	-							$ 790,000				
Stream Improvements	**Laundry Brook - Stream Improvements - Bulloughs Pond to Hull Street, Pulsifer Street to Gay Street - Permitting, Design & Construction**	Debris Removal/Retaining Walls	77	2	$ 260,000	NC	**17.2**							$ 260,000				
Culverts	**Laundry Brook - Design & Construction of Culvert Improvements (From Hull Street to Bridges Avenue)**	Culvert Improvements Needed / Design & Construct Improvements Based on findings from Culvert Evaluation work.	77	2	$ 650,000	C	**68.3**							$ 650,000				
														FY22 Total Non-Capital Project Costs =	**$ 1,050,000**			
														FY22 Total Capital Project Costs =	**$ 650,000**			
														FY22 Total All Project Costs =	**$ 1,700,000**			

Stormwater Infrastructure Improvement Plan
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Project Type	Project	Project Scope	Drainage Basin	Map Sheet	Estimated Project Cost	Project Budget	Risk Factor	Fiscal Year Budget FY16	FY17	FY18	FY19	FY20	FY21	FY22	FY23	FY24	FY25	FY26
Year 8 - FY2023																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 7 of Permit = FY23**	Includes identification & elimination of illicit discharges to the storm drain system & implementation of the City's Phosphorus Control Plan.	Various	Various	$ 790,000	NC	-								$ 790,000			
Culverts	**Unknown Road Width Culvert Repair #2 - Design & Construction**	Allowance for repair of 1 road width culvert based on findings from the Culvert Evaluation Work.	Unknown	Unknown	$ 250,000	C	-								$ 250,000			
Culverts	**Cheesecake Brook - Parson Street - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	68	1	$ 400,000	C	**66.5**								$ 400,000			
															FY23 Total Non-Capital Project Costs =		**$ 790,000**		
															FY23 Total Capital Project Costs =		**$ 650,000**		
															FY23 Total All Project Costs =		**$ 1,440,000**		
Year 9 - FY2024																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 8 of Permit = FY24**	Includes identification & elimination of illicit discharges to the storm drain system & implementation of the City's Phosphorus Control Plan.	Various	Various	$ 790,000	NC	-									$ 790,000		
Culverts	**Cheesecake Brook - Eddy Street - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	68	1	$ 250,000	C	**68.6**									$ 250,000		
Culverts	**Cheesecake Brook - Cross Street - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	68	1	$ 400,000	C	**66.5**									$ 400,000		
																FY24 Total Non-Capital Project Costs =	**$ 790,000**		
																FY24 Total Capital Project Costs =	**$ 650,000**		
																FY24 Total All Project Costs =	**$ 1,440,000**		
Year 10 - FY2025																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 9 of Permit = FY25**	Includes identification & elimination of illicit discharges to the storm drain system & implementation of the City's Phosphorus Control Plan.	Various	Various	$ 790,000	NC	-										$ 790,000	
Culverts	**Unknown Road Width Culvert Replacement #1- Design & Construction**	Allowance for replacement of 1 road width culvert based on findings from the Culvert Evaluation Work.	Unknown	Unknown	$ 650,000	C	-										$ 650,000	
																	FY25 Total Non-Capital Project Costs =	**$ 790,000**	
																	FY25 Total Capital Project Costs =	**$ 650,000**	
																	FY25 Total All Project Costs =	**$ 1,440,000**	
Year 11 - FY2026																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 10 of Permit = FY26**	Includes identification & elimination of illicit discharges to the storm drain system & implementation of the City's Phosphorus Control Plan.	Various	Various	$ 790,000	NC	-											$ 790,000
Localized Flooding	**Beaconwood Road at Cold Spring Brook - Permitting, Design & Construction**	Work to be completed in conjunction with Stream Improvements at Cold Spring Brook	77	3 & 4	$ 100,000	C	**40.0**											$ 100,000
Stream Improvements	**Cold Spring Brook - Stream Improvements - Permitting, Design & Construction**	Sediment Removal/Debris Removal/Cut Back Overgrowth / Critical to alleviating flooding on Beaconwood Rd.	77	3, 4	$ 930,000	NC	**48.9**											$ 930,000
Culverts	**Cheesecake Brook - Watertown Street – West Culvert - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	68	1	$ 250,000	C	**63.8**											$ 250,000
																		FY26 Total Non-Capital Project Costs = **$ 1,820,000**
																		FY26 Total Capital Project Costs = **$ 250,000**
																		FY26 Total All Project Costs = **$ 2,070,000**

Stormwater Infrastructure Improvement Plan
Newton, MA

Project Type	Project	Project Scope	Drainage Basin	Map Sheet	Estimated Project Cost	Project Budget	Risk Factor	Fiscal Year Budget FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37
Year 12 - FY2027																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 11 of Permit = FY27**	Implementation of the City's Phosphorus Control Plan.	Various	Various	$ 500,000	NC	-	$ 500,000										
Stream Improvements	**Bullough's Pond - Dredging**	Allowance for Dredging at Bullough's Pond.	77	2	$ 500,000	NC	-	$ 500,000										
Stream Improvements	**Saw Mill Brook - Stream Improvements Permitting, Design & Construction (Downstream of Vine Street)**	Sediment Removal/Debris Removal/Cut Back Overgrowth/Retaining Walls / Will help alleviate flooding on Wayne Rd.	101	5	$ 590,000	NC	**46.2**	$ 590,000										
Culverts	**South Meadow Brook - Oak Street - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	11	3	$ 250,000	C	**63.8**	$ 250,000										
Culverts	**Cheesecake Brook - Dunstan Street - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	68	1	$ 250,000	C	**57.2**	$ 250,000										
							FY27 Total Non-Capital Project Costs =	**$ 1,590,000**										
							FY27 Total Capital Project Costs =	**$ 500,000**										
							FY27 Total All Project Costs =	**$ 2,090,000**										
Year 13 - FY2028																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 12 of Permit = FY28**	Implementation of the City's Phosphorus Control Plan.	Various	Various	$ 500,000	NC	-		$ 500,000									
Culverts	**Unknown Road Width Culvert Replacement #2 - Design & Construction**	Allowance for replacement of 1 road width culvert based on findings from the Culvert Evaluation Work.	Unknown	Unknown	$ 650,000	C	-		$ 650,000									
Stream Improvements	**Saw Mill Brook - Stream Improvements Permitting, Design & Construction (Upstream Sections North & East of Hollywood Drive)**	Sediment Removal/Debris Removal/Cut Back Overgrowth / Will help alleviate flooding on Harwich Rd.	101	5	$ 490,000	NC	**43.6**		$ 490,000									
Localized Flooding	**Harwich Road at Saw Mill Brook - Design & Construction**	Drainage improvements at Harwich Road & Saw Mill Brook to alleviate backyard flooding on Harwich Road.	101	5	$ 100,000	C	**34.8**		$ 100,000									
Localized Flooding	**Wayne Road Near Saw Mill Brook - Design & Construction**	Drainage improvements at Wayne Road & Saw Mill Brook to alleviate street flooding on Wayne Road.	101	5	$ 250,000	C	**30.5**		$ 250,000									
							FY28 Total Non-Capital Project Costs =		**$ 990,000**									
							FY28 Total Capital Project Costs =		**$ 1,000,000**									
							FY28 Total All Project Costs =		**$ 1,990,000**									

Stormwater Infrastructure Improvement Plan
Newton, MA

Project Type	Project	Project Scope	Drainage Basin	Map Sheet	Estimated Project Cost	Project Budget	Risk Factor	Fiscal Year Budget FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37
Year 14 - FY2029																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 13 of Permit = FY29**	Implementation of the City's Phosphorus Control Plan.	Various	Various	$ 500,000	NC	-			$ 500,000								
Culverts	**South Meadow Brook - Needham Street - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	11	4	$ 250,000	C	**54.7**			$ 250,000								
Culverts	**South Meadow Brook - Winchester Street - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	11	4	$ 250,000	C	**54.7**			$ 250,000								
Culverts	**Unknown Road Width Culvert Repair #3 - Design & Construction**	Allowance for repair of 1 road width culvert based on findings from the Culvert Evaluation Work.	Unknown	Unknown	$ 250,000	C	-			$ 250,000								
Culverts	**South Meadow Brook - Dedham Street - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	11	4	$ 250,000	C	**54.7**			$ 250,000								
Culverts	**South Meadow Brook - South of Tower Road to Oak Street - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	11	3	$ 400,000	C	**51.7**			$ 400,000								
							FY29 Total Non-Capital Project Costs =			**$ 500,000**								
							FY29 Total Capital Project Costs =			**$ 1,400,000**								
							FY29 Total All Project Costs =			**$ 1,900,000**								
Year 15 - FY2030																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 14 of Permit = FY30**	Implementation of the City's Phosphorus Control Plan.	Various	Various	$ 500,000	NC	-				$ 500,000							
Stream Improvements	**Cheesecake Brook - Stream Improvements Permitting, Design & Construction (From Cross to Watertown Street)**	Sediment Removal/Debris Removal/Retaining Walls	68	1	$ 950,000	NC	**49.8**				$ 950,000							
Culverts	**Unknown Pipe Culvert Point Repair Project #2 - Design & Construction**	Allowance for 8 pipe culvert point repairs based on findings from the Culvert Evaluation Work.	Unknown	Unknown	$ 350,000	C	-				$ 350,000							
Culverts	**Hammond Brook - Hammond Pond Parkway North Culvert - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	77	4	$ 250,000	C	**51.2**				$ 250,000							
							FY30 Total Non-Capital Project Costs =				**$ 1,450,000**							
							FY30 Total Capital Project Costs =				**$ 600,000**							
							FY30 Total All Project Costs =				**$ 2,050,000**							

Stormwater Infrastructure Improvement Plan
Newton, MA

Project Type	Project	Project Scope	Drainage Basin	Map Sheet	Estimated Project Cost	Project Budget	Risk Factor	Fiscal Year Budget FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37
Year 16 - FY2031																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 15 of Permit = FY31**	Implementation of the City's Phosphorus Control Plan.	Various	Various	$ 500,000	NC	-					$ 500,000						
Stream Improvements	**Cheesecake Brook - Stream Improvements Permitting, Design & Construction (From Culverted Section at Watertown to Cross)**	Sediment Removal/Debris Removal/Retaining Walls	68	1	$ 1,500,000	NC	**46.7**					$ 1,500,000						
Culverts	**Paul Brook - Boylston Street - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	11	4	$ 80,000	C	**49.1**					$ 80,000						
Culverts	**South Meadow Brook - Dudley Road - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	11	4	$ 250,000	C	**47.9**					$ 250,000						
Culverts	**Unknown Road Width Culvert Repair #4 - Design & Construction**	Allowance for repair of 1 road width culvert based on findings from the Culvert Evaluation Work.	Unknown	Unknown	$ 250,000	C	**-**					$ 250,000						
												FY31 Total Non-Capital Project Costs =	**$ 2,000,000**					
												FY31 Total Capital Project Costs =	**$ 580,000**					
												FY31 Total All Project Costs =	**$ 2,580,000**					
Year 17 - FY2032																		
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 16 of Permit = FY32**	Implementation of the City's Phosphorus Control Plan.	Various	Various	$ 500,000	NC	-						$ 500,000					
Culverts	**South Meadow Brook - Upland Avenue - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	11	4	$ 250,000	C	**45.6**						$ 250,000					
Culverts	**Unknown Pipe Culvert Point Repair Project #3 - Design & Construction**	Allowance for 8 pipe culvert point repairs based on findings from the Culvert Evaluation Work.	Unknown	Unknown	$ 350,000	C	-						$ 350,000					
Culverts	**Major Culvert Cleaning**		Various	Various	$ 500,000	NC							$ 500,000					
Culverts	**Saw Mill Brook - Vine Street - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	101	5	$ 250,000	C	**44.5**						$ 250,000					
Culverts	**Laundry Brook - Design & Construction of Culvert Improvements (From Mason Rice School to City Hall Ponds)**	Culvert Improvements Needed / Design & Construct Improvements Based on findings from Culvert Evaluation work.	77	4	$ 300,000	C	**44.2**						$ 300,000					
Culverts	**Saw Mill Brook - Lagrange Street - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	101	5	$ 250,000	C	**44.0**						$ 250,000					
													FY32 Total Non-Capital Project Costs =	**$ 1,000,000**				
													FY32 Total Capital Project Costs =	**$ 1,400,000**				
													FY32 Total All Project Costs =	**$ 2,400,000**				

Stormwater Infrastructure Improvement Plan
Newton, MA

Project Type	Project	Project Scope	Drainage Basin	Map Sheet	Estimated Project Cost	Project Budget	Risk Factor	Fiscal Year Budget FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37
								Year 18 - FY2033										
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 17 of Permit = FY33**	Implementation of the City's Phosphorus Control Plan.	Various	Various	$ 500,000	NC	-							$ 500,000				
Culverts	**Unknown Road Width Culvert Repair #5 - Design & Construction**	Allowance for repair of 1 road width culvert based on findings from the Culvert Evaluation Work.	Unknown	Unknown	$ 250,000	C	-							$ 250,000				
Stream Improvements	**Cheesecake Brook - Stream Improvements Permitting, Design & Construction (From Watertown Street to Charles River)**	Sediment Removal/Retaining Walls	68	1	$ 1,200,000	NC	**39.1**							$ 1,200,000				
Stream Improvements	**South Meadow Brook - Stream Improvements Permitting, Design & Construction (Section upstream of Dudley Road to Brandeis Road)**	Sediment Removal/Debris Removal/Cut Back Overgrowth	11	4	$ 170,000	NC	**31.9**							$ 170,000				
Culverts	**Hahn Brook - Dudley Road - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	11	4	$ 250,000	C	**32.6**							$ 250,000				
Localized Flooding	**Hammond Brook - Design & Construction**	Establish underdrain discharge at Hammond Brook.	77	4	$ 200,000	C	**25.8**							$ 200,000				
														FY33 Total Non-Capital Project Costs =	**$ 1,870,000**			
														FY33 Total Capital Project Costs =	**$ 700,000**			
														FY33 Total All Project Costs =	**$ 2,570,000**			
								Year 19 - FY2034										
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 18 of Permit = FY34**	Implementation of the City's Phosphorus Control Plan.	Various	Various	$ 500,000	NC	-								$ 500,000			
Culverts	**Unknown Pipe Culvert Point Repair Project #4 - Design & Construction**	Allowance for 8 pipe culvert point repairs based on findings from the Culvert Evaluation Work.	Unknown	Unknown	$ 350,000	C	-								$ 350,000			
Stream Improvements	**Hammond Brook - Stream Improvements Permitting, Design & Construction (From Homer Street & Centre Street to Pleasant Street, Chelsey Road to Sumner Street)**	Sediment Removal/Debris Removal/Cut Back Overgrowth/Retaining Walls	77	4	$ 1,240,000	NC	**38.1**								$ 1,240,000			
Localized Flooding	**Oldham Road at Cheesecake Brook - Design & Construction**	Improvements to the drainage system on Oldham Rd. to alleviate flooding to the property at #60 Oldham Rd.	68	1	$ 450,000	C	**22.3**								$ 450,000			
															FY34 Total Non-Capital Project Costs =	**$ 1,740,000**		
															FY34 Total Capital Project Costs =	**$ 800,000**		
															FY34 Total All Project Costs =	**$ 2,540,000**		

Stormwater Infrastructure Improvement Plan
Newton, MA

Project Type	Project	Project Scope	Drainage Basin	Map Sheet	Estimated Project Cost	Project Budget	Risk Factor	Fiscal Year Budget										
								FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37
								Year 20 - FY2035										
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 19 of Permit = FY35**	Implementation of the City's Phosphorus Control Plan.	Various	Various	$ 500,000	NC	-									$ 500,000		
Stream Improvements	**Hammond Brook - Stream Improvements Permitting, Design & Construction (Upstream of Glen Avenue near the MBTA Green Line Tracks)**	Sediment Removal/Debris Removal/Cut Back Overgrowth	77	4	$ 700,000	NC	**32.4**									$ 700,000		
Culverts	**Laundry Brook - Design & Construction of Culvert Improvements (From Bar Screen Near MASS Pike to Jackson & Canseco)**	Culvert Improvements Needed / Design & Construct Improvements Based on findings from Culvert Evaluation work.	77	2	$ 400,000	C	**27.3**									$ 400,000		
Culverts	**Runaway Brook - First Culvert Upstream Near Washington Street - West End of Culvert - Outlet Only Visible (on Woodland Country Club Golf Course) - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	47	3	$ 250,000	C	**24.8**									$ 250,000		
Stream Improvements	**Cheesecake Brook - Stream Improvements (From Braeburn Pond to Culvert Behind Oldham Road)**	Sediment Removal/Debris Removal/Cut Back Overgrowth/Retaining Walls	68	1	$ 370,000	NC	**30.0**									$ 370,000		
Stream Improvements	**Hahn Brook - Stream Improvements - Permitting, Design & Construction**	Sediment Removal/Debris Removal/Cut Back Overgrowth	11	4	$ 250,000	NC	**29.0**									$ 250,000		
															FY35 Total Non-Capital Project Costs =		**$ 1,820,000**		
															FY35 Total Capital Project Costs =		**$ 650,000**		
															FY35 Total All Project Costs =		**$ 2,470,000**		

Stormwater Infrastructure Improvement Plan
Newton, MA

Project Type	Project	Project Scope	Drainage Basin	Map Sheet	Estimated Project Cost	Project Budget	Risk Factor	Fiscal Year Budget										
								FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37
								Year 21 - FY2036										
MS4 Permit Compliance	**NPDES Phase 2 MS4 General Permit Compliance - Year 20 of Permit = FY36**	Implementation of the City's Phosphorus Control Plan.	Various	Various	$ 500,000	NC	-										$ 500,000	
Culverts	**South Meadow Brook - East End Near Brandeis Road and West End Near Parker Street**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	11	4	$ 250,000	C	**24.9**										$ 250,000	
Culverts	**Strong's Brook - On Newton Commonwealth Golf Course east of Philmore Road - Design & Construction of Culvert Improvements**	Culvert Needs Replacement. / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	93	2	$ 500,000	C	**23.1**										$ 500,000	
Stream Improvements	**Brunnen Brook - Stream Improvements - Permitting, Design & Construction**	Sediment Removal/Debris Removal/Cut Back Overgrowth	62	1	$ 220,000	NC	**28.8**										$ 220,000	
Stream Improvements	**Cranberry Brook - Stream Improvements - Permitting, Design & Construction**	Sediment Removal/Debris Removal/Cut Back Overgrowth	66	1	$ 160,000	NC	**23.5**										$ 160,000	
Stream Improvements	**Runaway Brook - Stream Improvements - Permitting, Design & Construction**	Retaining Walls	47	3	$ 240,000	NC	**25.0**										$ 240,000	
Culverts	**Runaway Brook - On Woodland Country Golf Course - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	47	3	$ 250,000	C	**20.5**										$ 250,000	
Culverts	**Strong's Brook - On Newton Commonwealth Golf Course near Strong's Pond - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	93	2	$ 250,000	C	**19.1**										$ 250,000	
Stream Improvements	**South Meadow Brook - Stream Improvements Permitting, Design & Construction - (Parker Street to Dedham Street)**	Debris Removal/Cut Back Overgrowth	11	4	$ 30,000	NC	**20.3**										$ 30,000	
Stream Improvements	**Strongs Brook - Stream Improvements - Permitting, Design & Construction**	Retaining Walls	93	2	$ 150,000	NC	**20.3**										$ 150,000	
Stream Improvements	**Edmands Brook - Stream Improvements - Permitting, Design & Construction**	Sediment Removal/Debris Removal/Cut Back Overgrowth/Retaining Walls	77	2	$ 310,000	NC	**19.5**										$ 310,000	
Localized Flooding	**Quinobequin Road Between Irwin & Carleton Roads - Design & Construction**	Drainage Improvements on Carlton Rd and Rokeby Rd. Flooding occurs to properties on Rokeby Rd. and Quinobequin Rd.	28, 28A & 29	3	$ 200,000	C	**17.7**										$ 200,000	
																FY35 Total Non-Capital Project Costs =	**$ 1,610,000**	
																FY35 Total Capital Project Costs =	**$ 1,450,000**	
																FY35 Total All Project Costs =	**$ 3,060,000**	

Stormwater Infrastructure Improvement Plan
Newton, MA

Project Type	Project	Project Scope	Drainage Basin	Map Sheet	Estimated Project Cost	Project Budget	Risk Factor	Fiscal Year Budget										
								FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	FY35	FY36	FY37
								Year 22 - FY2037										
Stream Improvements	**Hyde Brook - Stream Improvements - Permitting, Design & Construction**	Debris Removal/Cut Back Overgrowth/Retaining Walls	81	2	$ 510,000	NC	**19.9**											$ 510,000
Stream Improvements	**King Brook - Stream Improvements - Permitting, Design & Construction**	Debris Removal/Cut Back Overgrowth	93	5	$ 20,000	NC	**19.4**											$ 20,000
Culverts	**Hammond Brook - South of Suffolk Road - Located Under Walking Path - Design & Construction of Culvert Improvements**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	77	4	$ 80,000	C	**17.6**											$ 80,000
Culverts	**Strong's Brook - On Newton Commonwealth Golf Course Near Montrose Street**	Culvert Needs Repair / Design & Construct Culvert Improvements Based on findings from Culvert Evaluation work.	93	2	$ 250,000	C	**16.6**											$ 250,000
Localized Flooding	**Judkins Street Near Pellegrini Park - Design & Construction**	Improvement to the drainage system at Pellegrini Park/Judkins Path to alleviate flooding on Jenison Street & Judkins Street.	77	2	$ 500,000	C	**16.0**											$ 500,000
Stream Improvements	**Thompsonville Brook - Stream Improvements - Permitting, Design & Construction**	Sediment Removal/Debris Removal/Cut Back Overgrowth	77	4	$ 250,000	NC	**16.0**											$ 250,000
Localized Flooding	**Harvard Street Between Madison Avenue & Newtonville Avenue - Design & Construction**	Improvements to the drainage system on Harvard Street to prevent street flooding.	77	2	$ 350,000	C	**15.7**											$ 350,000
Stream Improvements	**Paul Brook - Stream Improvements - Permitting, Design & Construction**	Debris Removal/Cut Back Overgrowth	11	4	$ 30,000	NC	**14.2**											$ 30,000
Stream Improvements	**Stearns Brook - Stream Improvements - Permitting, Design & Construction**	Sediment Removal/Debris Removal	11	4	$ 50,000	NC	**10.8**											$ 50,000
Stream Improvements	**Lacy Brook - Stream Improvements - Permitting, Design & Construction**	Cut Back Overgrowth	3	5	$ 20,000	NC	**7.9**											$ 20,000
																	FY35 Total Non-Capital Project Costs =	**$ 880,000**
																	FY35 Total Capital Project Costs =	**$ 1,180,000**
																	FY35 Total All Project Costs =	**$ 2,060,000**

	Cost to be Incorporated As Additional Information Becomes Available
	Localized Flooding Projects
	Culvert Project Place Holders for Potential Projects Identified During Culvert Evaluation Projects (Years 1, 2, 4,5)
C	Capital Project
NC	Non-Capital Project
-	Not Applicable

Total Non-Capital Projects Cost: $ 25,495,000
Total Capital Projects Cost: $ 15,010,000
Total Program Cost for All Projects: $ 40,505,000

Total Cost of MS4 Permit Compliance Projects: $ 10,965,000
Total Cost of Culvert Projects: $ 14,310,000
Total Cost of Localized Flooding Projects: $ 2,950,000
Total Cost of Stream Improvement Projects: $ 12,280,000

NEWTON, MASSACHUSETTS

Stormwater Infrastructure Improvement Plan Projects

February 2015

Data Sources:

Client:
Storm drain network data.

MA Office of Geographic Information (MassGIS):
Basemapping datasets.

Disclaimer:

This information is for planning purposes only and should not be considered exact. Field inspection and verification is required. This data was created from schematic maps.

Legend

- Storm Drain
- Critical Culverts/Storm Drains to be Inspected/Evaluated
- Culvert Improvement Project Extents
- Exterior Outfall
- Interior Outfall
- Manhole
- Catch Basin
- Drain Catchments
- Stream Maintenance Projects
- Localized Flooding Projects
- Buildings
- Lake / Pond
- Streams
- Wetlands
- Open Space

Cheesecake Brook at Parsons Street Culvert Improvements

Cheesecake Brook at Eddy Street Culvert Improvements

Cheesecake Brook at Watertown Street - West Culvert Culvert Replacement

Cheesecake Brook at Cross Street Culvert Improvements

Cheesecake Brook at Dunstan Street Culvert Improvements

MAP SHEET 1 OF 5

0 540 1,080 1,620 Feet

Weston & Sampson ENGINEERS, INC.

NEWTON, MASSACHUSETTS

Stormwater Infrastructure Improvement Plan Projects

February 2015

Data Sources:
Client:
Storm drain network data.
MA Office of Geographic Information (MassGIS):
Basemapping datasets.

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Laundry Brook Culvert Improvements (Mass Pike to Jackson & Canseco)

Laundry Brook Culvert Improvements (Parkview Ave to Mass Pike)

Laundry Brook Culvert Relocation at Cabot School

Laundry Brook Culvert Improvements (Hull Street to Bridges Avenue)

Bullough's Pond Dredging

Strong's Brook at Strong's Pond Culvert Improvements

Strong's Brook East of Philmore Drive Culvert Improvements

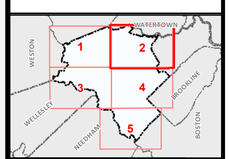
Strong's Brook Near Montrose Street Culvert Improvements

WATERTOWN

BOSTON

Legend

- Storm Drain
- Critical Culverts/Storm Drains to be Inspected/Evaluated
- Culvert Improvement Project Extents
- Exterior Outfall
- Interior Outfall
- Manhole
- Catch Basin
- Drain Catchments
- Stream Maintenance Projects
- Localized Flooding Projects
- Buildings
- Lake / Pond
- Streams
- Wetlands
- Open Space



MAP SHEET 2 OF 5

540 0 540 1,080 1,620 Feet

Weston&Sampson ENGINEERS, INC.

NEWTON, MASSACHUSETTS

Stormwater Infrastructure Improvement Plan Projects

February 2015

Runaway Brook Woodland Country Club Golf Course Culvert Improvements

Runaway Brook at Washington Street Culvert Improvements

QUINOBEQUIN ROAD INTERCEPTOR AND UNDERDRAIN EVALUATION

QUINOBEQUIN RD BETWEEN IRWIN AND CARLTON

BEACONWOOD RD. AT COLD SPRING BROOK

South Meadow Brook at Oak Street Culvert Improvements

South Meadow Brook South of Tower Road Culvert Improvements

Data Sources:
Client:
Storm drain network data.
MA Office of Geographic Information (MassGIS):
Basemapping datasets.

Disclaimer:
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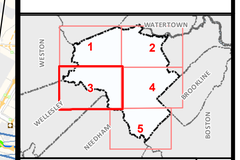
Legend

- Storm Drain
- Critical Culverts/Storm Drains to be Inspected/Evaluated
- Culvert Improvement Project Extents
- Exterior Outfall
- Interior Outfall
- Manhole
- Catch Basin
- Drain Catchments
- Stream Maintenance Projects
- Localized Flooding Projects
- Buildings
- Lake / Pond
- Streams
- Wetlands
- Open Space



3

MAP SHEET 3 OF 5

540 0 540 1,080 1,620 Feet

Weston&Sampson ENGINEERS, INC.

NEWTON, MASSACHUSETTS

Stormwater Infrastructure Improvement Plan Projects

February 2015

Data Sources:
Client:
Storm drain network data.
MA Office of Geographic Information (MassGIS):
Basemapping datasets.

Disclaimer:
This information is for planning purposes only and should not be considered exact. Field inspection and verification is required. This data was created from schematic maps.

Laundry Brook Culvert Improvements
(From Mason Rice School to City Hall Ponds)

Hammond Brook at
Hammond Pond Parkway
North Culvert
Culvert Improvements

Hammond Brook at Walking Path
Culvert Improvements

Paul Brook at Boylston Street
Culvert Improvements

South Meadow Brook
at Upland Ave
Culvert Improvements

South Meadow Brook
at Needham Street
Culvert Improvements

South Meadow Brook
at Winchester Street
Culvert Improvements

South Meadow Brook
at Dedham Street
Culvert Improvements

Hahn Brook at Dudley Road
Culvert Improvements

South Meadow Brook
Near Brandeis Road
Culvert Improvements

South Meadow Brook
at Dudley Road
Culvert Improvements

BEACONWOOD RD. AT COLD SPRING BROOK

SOUTH MEADOW BROOK AT DEDHAM ST

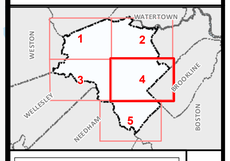
HAMMOND BROOK

BOSTON

BROOKLINE

Legend

- Storm Drain
- Critical Culverts/Storm Drains to be Inspected/Evaluated
- Culvert Improvement Project Extents
- Exterior Outfall
- Interior Outfall
- Manhole
- Catch Basin
- Drain Catchments
- Stream Maintenance Projects
- Localized Flooding Projects
- Buildings
- Lake / Pond
- Streams
- Wetlands
- Open Space



4

MAP SHEET 4 OF 5

540 0 540 1,080 1,620 Feet

Weston&Sampson
ENGINEERS, INC.

NEWTON, MASSACHUSETTS

Stormwater Infrastructure Improvement Plan Projects

February 2015

Saw Mill Brook at LaGrange Street Culvert Improvements

Saw Mill Brook at Vine Street Culvert Improvements

Data Sources:

Client:
Storm drain network data.

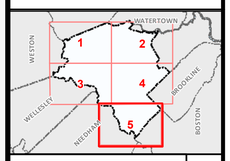
MA Office of Geographic Information (MassGIS):
Basemapping datasets.

Disclaimer:

This information is for planning purposes only and should not be considered exact. Field inspection and verification is required. This data was created from schematic maps.

Legend

- Storm Drain
- Critical Culverts/Storm Drains to be Inspected/Evaluated
- Culvert Improvement Project Extents
- Exterior Outfall
- Interior Outfall
- Manhole
- Catch Basin
- Drain Catchments
- Stream Maintenance Projects
- Localized Flooding Projects
- Buildings
- Lake / Pond
- Streams
- Wetlands
- Open Space



5

MAP SHEET 5 OF 5

540 0 540 1,080 1,620 Feet

Weston & Sampson ENGINEERS, INC.

Section 4:

Federal Stormwater Permit Compliance (MS4 Permit)

United States Environmental Protection Agency
Office of Water (4203)
EPA 833-F-00-002
January 2000 (revised December 2005)
Fact Sheet 2.0

Stormwater Phase II Final Rule

Small MS4 Stormwater Program Overview

Stormwater Phase II Final Rule Fact Sheet Series

Overview

1.0 – Stormwater Phase II Final Rule: An Overview

Small MS4 Program

2.0 – Small MS4 Stormwater Program Overview

2.1 – Who's Covered? Designation and Waivers of Regulated Small MS4s

2.2 – Urbanized Areas: Definition and Description

Minimum Control Measures

2.3 – Public Education and Outreach

2.4 – Public Participation/ Involvement

2.5 – Illicit Discharge Detection and Elimination

2.6 – Construction Site Runoff Control

2.7 – Post-Construction Runoff Control

2.8 – Pollution Prevention/Good Housekeeping

2.9 – Permitting and Reporting: The Process and Requirements

2.10 – Federal and State-Operated MS4s: Program Implementation

Construction Program

3.0 – Construction Program Overview

3.1 – Construction Rainfall Erosivity Waiver

Industrial "No Exposure"

4.0 – Conditional No Exposure Exclusion for Industrial Activity

Polluted storm water runoff is often transported to municipal separate storm sewer systems (MS4s) and ultimately discharged into local rivers and streams without treatment. EPA's Stormwater Phase II Rule establishes an MS4 stormwater management program that is intended to improve the Nation's waterways by reducing the quantity of pollutants that stormwater picks up and carries into storm sewer systems during storm events. Common pollutants include oil and grease from roadways, pesticides from lawns, sediment from construction sites, and carelessly discarded trash, such as cigarette butts, paper wrappers, and plastic bottles. When deposited into nearby waterways through MS4 discharges, these pollutants can impair the waterways, thereby discouraging recreational use of the resource, contaminating drinking water supplies, and interfering with the habitat for fish, other aquatic organisms, and wildlife.

In 1990, EPA promulgated rules establishing Phase I of the National Pollutant Discharge Elimination System (NPDES) stormwater program. The Phase I program for MS4s requires operators of "medium" and "large" MS4s, that is, those that generally serve populations of 100,000 or greater, to implement a stormwater management program as a means to control polluted discharges from these MS4s. The Stormwater Phase II Rule extends coverage of the NPDES stormwater program to certain "small" MS4s but takes a slightly different approach to how the stormwater management program is developed and implemented.

What Is a Phase II Small MS4?

A small MS4 is any MS4 not already covered by the Phase I program as a medium or large MS4. The Phase II Rule automatically covers on a nationwide basis all small MS4s located in "urbanized areas" (UAs) as defined by the Bureau of the Census (unless waived by the NPDES permitting authority), and on a case-by-case basis those small MS4s located outside of UAs that the NPDES permitting authority designates. For more information on Phase II small MS4 coverage, see Fact Sheets 2.1 and 2.2.

What Are the Phase II Small MS4 Program Requirements?

Operators of regulated small MS4s are required to design their programs to:

- ❑ Reduce the discharge of pollutants to the "maximum extent practicable" (MEP);
- ❑ Protect water quality; and
- ❑ Satisfy the appropriate water quality requirements of the Clean Water Act.

Implementation of the MEP standard will typically require the development and implementation of BMPs and the achievement of measurable goals to satisfy each of the six minimum control measures.

The Phase II Rule defines a small MS4 stormwater management program as a program comprising six elements that, when implemented in concert, are expected to result in significant reductions of pollutants discharged into receiving waterbodies.

The six MS4 program elements, termed "minimum control measures," are outlined below. For more information on each of these required control measures, see Fact Sheets 2.3 – 2.8.

❶ ***Public Education and Outreach***
Distributing educational materials and performing outreach to inform citizens about the impacts polluted stormwater runoff discharges can have on water quality.

❷ ***Public Participation/Involvement***
Providing opportunities for citizens to participate in program development and implementation, including effectively publicizing public hearings and/or encouraging citizen representatives on a stormwater management panel.

❸ ***Illicit Discharge Detection and Elimination***
Developing and implementing a plan to detect and eliminate illicit discharges to the storm sewer system (includes developing a system map and informing the community about hazards associated with illegal discharges and improper disposal of waste).

❹ ***Construction Site Runoff Control***
Developing, implementing, and enforcing an erosion and sediment control program for construction activities that disturb 1 or more acres of land (controls could include silt fences and temporary stormwater detention ponds).

❺ ***Post-Construction Runoff Control***
Developing, implementing, and enforcing a program to address discharges of post-construction stormwater runoff from new development and redevelopment areas. Applicable controls could include preventative actions such as protecting sensitive areas (e.g., wetlands) or the use of structural BMPs such as grassed swales or porous pavement.

❻ ***Pollution Prevention/Good Housekeeping***
Developing and implementing a program with the goal of preventing or reducing pollutant runoff from municipal operations. The program must include municipal staff training on pollution prevention measures and techniques (e.g., regular street sweeping, reduction in the use of pesticides or street salt, or frequent catch-basin cleaning).

What Information Must the NPDES Permit Application Include?

The Phase II program for MS4s is designed to accommodate a general permit approach using a Notice of Intent (NOI) as the permit application. The operator of a regulated small MS4 must include in its permit application, or NOI, its chosen BMPs and measurable goals for each minimum control measure. To help permittees identify the most appropriate BMPs for their programs, EPA issued a Menu of BMPs to serve as guidance. NPDES permitting authorities can modify the EPA menu or develop their own list. For more information on application requirements, see Fact Sheet 2.9.

What Are the Implementation Options?

The rule identifies a number of implementation options for regulated small MS4 operators. These include sharing responsibility for program development with a nearby regulated small MS4, taking advantage of existing local or State programs, or participating in the implementation of an existing Phase I MS4's stormwater program as a co-permittee. These options are intended to promote a regional approach to stormwater management coordinated on a watershed basis.

What Kind of Program Evaluation/Assessment Is Required?

Permittees need to evaluate the effectiveness of their chosen BMPs to determine whether the BMPs are reducing the discharge of pollutants from their systems to the "maximum extent practicable" and to determine if the BMP mix is satisfying the water quality requirements of the Clean Water Act. Permittees also are required to assess their progress in achieving their program's measurable goals. While monitoring is not required under the rule, the NPDES permitting authority has the discretion to require monitoring if deemed necessary. If there is an indication of a need for improved controls, permittees can revise their mix of BMPs to create a more effective program. For more information on program evaluation/assessment, see Fact Sheet 2.9.

For Additional Information

Contacts

☞ U.S. EPA Office of Wastewater Management
http://www.epa.gov/npdes/stormwater
Phone: 202-564-9545

☞ Your NPDES Permitting Authority. Most States and Territories are authorized to administer the NPDES Program, except the following, for which EPA is the permitting authority:

Alaska	Guam
District of Columbia	Johnston Atoll
Idaho	Midway and Wake Islands
Massachusetts	Northern Mariana Islands
New Hampshire	Puerto Rico
New Mexico	Trust Territories
American Samoa	

☞ A list of names and telephone numbers for each EPA Region and State is located at http://www.epa.gov/npdes/stormwater (click on "Contacts").

Reference Documents

☞ EPA's Stormwater Web Site
http://www.epa.gov/npdes/stormwater

- Stormwater Phase II Final Rule Fact Sheet Series
- Stormwater Phase II Final Rule (64 *FR* 68722)
- National Menu of Best Management Practices for Stormwater Phase II
- Measurable Goals Guidance for Phase II Small MS4s
- Stormwater Case Studies
- And many others

Federal Stormwater Permit Compliance
Breakdown of Permit Requirements - Newton, MA

Based on the 2014 Draft Massachusetts MS4 General Permit, the City of Newton must comply with the following permit conditions.

Notice of Intent/Stormwater Management Program Document

Complete Notice of Intent and submit within 90 days of the permit effective date.

Determine whether stormwater discharges will adversely impact endangered species and historic properties.

Select Best Management Practices to reduce the discharge of pollutants to the Maximum Extent Practicable.

Develop a written Stormwater Management Program (SWMP) to outline activities and measures to meet the conditions of the permit.

Discharges to Impaired Waters

Develop and implement a Phosphorous Control Plan to reduce the amount of phosphorus in discharges to the Charles River and its tributaries. The Waste Load Allocation identified in the Total Maximum Daily Load for the Charles River (52% reduction in total phosphorus) must be met.

Comply with permit requirements related to the Charles River Pathogens Total Maximum Daily Load, including dissemination of public education materials and ranking of catchments tributary to bacteria/pathogen impaired waters.

Comply with permit requirements for chloride impaired waters (Saw Mill Brook) including development of a salt reduction plan.

Public Education & Outreach

Distribute at least two educational messages to each of four (4) target audiences: (1) residents, (2) businesses, institutions, and commercial facilities, (3) developers (construction), and (4) industrial facilities.

Public Involvement & Participation

Provide opportunities for the public to participate in the review and implementation of the SWMP.

Illicit Discharge Detection & Elimination (IDDE)

Eliminate illicit discharges within 60 days of detection or establish a schedule to eliminate the discharge for those discharges that cannot be removed within 60 days.

Identify all known locations where Sanitary Sewer Overflows (SSOs) have discharged within the previous five years.

Identify all outfalls and interconnections, record their location and condition, and provide a framework for tracking inspections, screenings and other activities. Field label all outfalls with a unique identifier.

Update the City's drainage system mapping to include the following: additional catchment delineations; municipally owned stormwater treatment structures; use impairments for water bodies on the 303(d) list; septic system information (including inspections, upgrades & repairs); locations of past IDDE work; locations of suspected, confirmed and corrected illicit discharges; and drainage from new developments and re-developments.

Develop a written IDDE Program to identify the responsibility and process for IDDE, and to detail procedures for locating and removing illicit discharges.

Adopt a regulatory mechanism to provide legal authority to prohibit/investigate/eliminate illicit discharges.

Assess and rank all outfall drainage areas ("catchments") for illicit discharges and/or SSOs potential.

Complete dry-weather screening of all outfalls/interconnections (except Excluded/Problem catchments) within three (3) years of the permit effective date.

Complete IDDE investigations (including wet weather sampling) in 80% of Problem Areas within three years, and 100% within five years.

Complete IDDE investigations (including wet weather sampling) in 100% of High Priority Areas where screening indicates sewer input w/in five years.

Complete IDDE investigations (including wet weather sampling) in 40% of all catchments within five years, and 100% of all catchments within ten years.

Train municipal employees annually about the IDDE program.

Construction Site Stormwater Runoff Control (CSSRC)

Develop written procedures for site inspections and enforcement of sediment and erosion control measures.

Require developers to implement a sediment and erosion control program that includes BMPs appropriate for the conditions at the construction site.

Include requirements for waste control, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes, in the CSSRC Program.

Develop written site plan review procedures that meet the conditions of the permit.

Post Construction Stormwater Management

Modify City stormwater ordinances to require the incorporation of specific targets for retention/infiltration/treatment.

Develop a report assessing current street design and parking lot guidelines that impact the creation of impervious cover. Determine whether design standards can be modified to support low impact design.

Develop a report assessing existing local regulations to determine the feasibility of allowing green infrastructure practices when appropriate site conditions exist.

Develop a method to track changes in impervious area as development/redevelopment occurs.

Complete an inventory and priority ranking of City property and infrastructure that could be retrofitted with BMPs to reduce frequency, volume and pollutant loads associated with stormwater discharges.

Good House Keeping & Pollution Prevention for Permittee Owned Operations

Develop written operation & maintenance procedures for municipal operations, including: parks and open space; buildings and facilities; and vehicles and equipment.

Develop an inventory of all municipal-owned facilities.

Provide training on use, storage and disposal of petroleum products to municipal staff.

Develop written plan/schedule for activities such as street sweeping, catch basin cleaning, maintenance of structural BMPs, cleaning of storm drains, and assessment/upgrade of drainage system infrastructure.

Develop a written plan to optimize the inspection, cleaning and maintenance of catch basins so that no sump is more than 50% full at any given time.

Sweep streets once per year in spring.

Look at storage and usage of salt and sand; evaluate alternative deicing opportunities.

Establish/implement procedures to inspect/maintain storm drains & structural BMPs.

Develop and implement Stormwater Pollution Prevention Plans (SWPPPs) for the DPW Yards at Elliot Street and Crafts Street. Perform quarterly inspections and annual employee training at each facility.

Reporting

Submit annual reports each year.

Federal Stormwater Permit Compliance

Full Permit Term

NEWTON, MA
EPA NPDES PHASE 2 STORMWATER - MS4 GENERAL PERMIT REVIEW - 5 YEAR PERMIT TERM
Breakdown of Permit Requirements (Based on 2014 Draft Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
SECTION 1 - INTRODUCTION				
1.7.2	Complete Notice of Intent (NOI)	90 days from effective date	Prepare and Submit Notice of Intent.	$10,000 (7)
1.9.1	Endangered Species Determination (complete review; certify in Notice of Intent)	90 days from effective date	Revisit location of permitted stormwater discharges relative to endangered species and ensure no adverse impact (Part of NOI) or develop BMPs to reduce impact.	
1.9.2	Historic Properties Determination (complete review; certify in Notice of Intent)	90 days from effective date	Revisit location of permitted stormwater discharges relative to historic properties and ensure no adverse impact (Part of NOI) or develop BMPs to reduce impact.	
1.10	Develop Written Stormwater Management Plan (SWMP)	1 year from effective date	Develop written plan outlining activities and measures to be implemented to meet the conditions of the permit. The SWMP will be developed in Year 1 and then will need to be updated on an ongoing basis throughout the permit term. Required contents of the SWMP are outlined in Section 1.10.2 of the 2014 Draft MA MS4 General Permit.	
1.10.b	Update Best Management Practices (BMPs)	1 year from effective date	Modify and update BMPs from the 2003 permit to meet the conditions of the new permit - to be completed as part of the NOI process.	
1.10.1	Maintain copy of Stormwater Management Plan, make available to public	1 year from effective date	Make SWMP available to the public at City Hall and/or on City website.	-
SECTION 2 - NON-NUMERIC EFFLUENT LIMITATIONS				
2.1 - Water Quality Based Effluent Limitations				
2.1.1.b	For MS4 discharges to a water body with an approved TMDL identified in Part 2.2.1, comply with Part 2.2.1 and Appendix F of the Permit	see Appendix F of the 2014 Draft MA MS4 General Permit	Both the Charles River Phosphorous TMDL and the Charles River Pathogens TMDL are applicable to Newton: Charles River (52% reduction in total phosphorus) (MA72-07); Cheesecake Brook (MA 72-08 and MA 72-29) & unnamed tributary (MA 72-30); and South Meadow Brook (MA72-24). Saw Mill Brook (MA72-23) is also covered under the phosphorous and pathogen TMDLs. Include specific BMPs and other permit requirements identified in Appendix F in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, F.A.I and F.A.III.
2.1.1.c	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Part 2.2.2 and Appendix H of the Permit	see Appendix H of the 2014 Draft MA MS4 General Permit	Impaired waters in Newton without an approved TMDL and their reason for impairment are as follows: Bulloughs Pond (excess algal growth and nutrient/eutrophication biological indicators) and Saw Mill Brook (chloride). Include specific BMPs and other permit requirements identified in Appendix H in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, and H.IV.
2.1.1.d	For all other discharges (not subject to the requirements of Part 2.1.1.b and Part 2.1.1.c of the Permit) contributing to a violation of applicable receiving water quality standards, eliminate condition causing or contributing to exceedance of water quality standards	within 60 days of becoming aware of the situation	If a discharge is identified that contributes to an exceedance of applicable water quality standards, eliminate the conditions contributing to or causing the exceedance within 60 days.	Cost included under IDDE under Item 2.3.4.2.a.
2.1.2	Written notification to MADEP & EPA as needed & documentation in the City's SWMP regarding new or increased stormwater discharges	as-needed	Any new or increased stormwater discharges must satisfy MA antidegradation regulations.	-
2.2 - Discharges to Impaired Waters				
2.2	Identify all outfalls/interconnections that discharge to waters with an approved TMDL or discharge to certain waters identified as "water quality limited water bodies"	SWMP (1 yr) & annual MS4 stormwater reports	Identify all outfalls or interconnections that discharge to an approved TMDL or to water quality limited water bodies	(1) (2)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.2.1	For MS4 discharges to a water body with an approved TMDL, comply with Appendix F, Part A of the Permit	see Appendix F of the 2014 Draft MA MS4 General Permit	Both the Charles River Phosphorous TMDL and the Charles River Pathogens TMDL are applicable to Newton: Charles River (52% reduction in total phosphorus) (MA72-07); Cheesecake Brook (MA 72-08 and MA 72-29) & unnamed tributary (MA 72-30); and South Meadow Brook (MA72-24). Saw Mill Brook (MA72-23) is also covered under the phosphorous and pathogen TMDLs. Include specific BMPs and other permit requirements identified in Appendix F in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, F.A.I and F.A.III.
Charles River TMDL - Phosphorus (includes tributaries)				
F.A.I Tbl F-1	Legal analysis - authority to implement Phosphorus Control Plan (PCP)	2 years from effective date	Develop and implement Phosphorous Control Plan to reduce the amount of phosphorus in discharges to the Charles River and its tributaries to achieve consistency with the Waste Load Allocation identified in the TMDL for the Charles River (52% reduction in total phosphorus). The PCP shall include the components listed in Appendix F.	$100,000 per year should be allocated in Years 1, 2 & 3 for the development of the Phosphorus Control Plan. In Years 4 and 5, $50,000 per year should be allocated for structural BMP planning and optimization. Within Years 6 through 20, $500,000 should be allocated each year for implementation of the PCP.
F.A.I Tbl F-1	Funding assessment	3 years from effective date		
F.A.I Tbl F-1	Define scope of PCP	4 years from effective date		
F.A.I Tbl F-1	Phase 1 Plan (non-structural controls)	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Plan (structural controls)	5 years from effective date		
F.A.I Tbl F-1	O&M Plan (structural controls)	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Implementation Schedule	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Cost Estimate	5 years from effective date		
F.A.I Tbl F-1	Complete written Phase 1 PCP	5 years from effective date		
F.A.I Tbl F-1	Implementation of Phase 1 non-structural controls	6 years from effective date		
F.A.I	Performance evaluation	Annual Report Year 6-20		
F.A.I Tbl F-1	Implementation of Phase 1 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.80)$	8 years from effective date		
F.A.I Tbl F-1	Implementation of Phase 1 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.75)$	10 years from effective date		
F.A.I Tbl F-4	Review/update legal analysis	As necessary		
F.A.I Tbl F-4	Phase 2 Plan (non-structural controls)	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Plan (structural controls)	10 years from effective date		
F.A.I Tbl F-4	Update O&M Plan (structural controls)	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Implementation Schedule	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Cost Estimate	10 years from effective date		
F.A.I Tbl F-4	Complete written Phase 2 PCP	10 years from effective date		
F.A.I Tbl F-4	Implementation of Phase 2 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.65)$	13 years from effective date		
F.A.I Tbl F-4	Implementation of Phase 2 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.50)$	15 years from effective date		
F.A.I Tbl F-5	Review/update legal analysis	As necessary		
F.A.I Tbl F-5	Phase 3 Plan (non-structural controls)	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Plan (structural controls)	15 years from effective date		
F.A.I Tbl F-5	Update O&M Plan (structural controls)	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Implementation Schedule	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Cost Estimate	15 years from effective date		
F.A.I Tbl F-5	Complete written Phase 3 PCP	15 years from effective date		
F.A.I Tbl F-5	Implementation of Phase 3 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.30)$	18 years from effective date		
F.A.I Tbl F-5	Implementation of Phase 3 structural controls $P_{exp} \leq P_{allow}$	20 years from effective date		
Bacteria / Pathogen TMDL				
F.A.III.1.a.i.1	Distribute residential message on pet waste management (over/above 2.3.2)	Annually	Develop and disseminate required public education information.	Costs to be covered under City's operating budget.
F.A.III.1.a.i.1	Disseminate required public education info to dog owners	At license renewal (or similar)		
F.A.III.1.a.i.1	Send public education materials to septic system owners	Not specified; assume annually		
F.A.III.1.a.i.2	2.3.4.7 IDDE - Catchments to Bacteria/Pathogen Impaired Waters to be ranked Problem or High	With 2.3.4.7; 1 year from effective date	Rank catchments to bacteria/pathogen impaired waters as Problem or High in catchment ranking to be completed under Item 2.3.4.7.c.	Cost included under 2.3.4.7.c.

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.2.2	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Appendix H of the Permit	see Appendix H of the 2014 Draft MA MS4 General Permit	Impaired waters in Newton without an approved TMDL and their reason for impairment are as follows: Bulloughs Pond (excess algal growth and nutrient/eutrophication biological indicators) and Saw Mill Brook (chloride). Include specific BMPs and other permit requirements identified in Appendix H in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, and H.IV.
Impaired - Chloride				
H.IV.3	If discharge found to be to Chloride Impaired Water; update Salt Reduction Plan (SRP)	60 days from awareness	Develop and implement salt reduction plan in accordance with the requirements of Appendix H, IV. 4.	$5,000 to $10,000 per year over 5-year permit term
H.IV.3	If discharge to Chloride Impaired Water & no SRP; prepare SRP	3 years from awareness		
H.IV.3	If discharge to Chloride Impaired Water & no SRP; implement SRP	5 years from awareness		
H.IV.4.a.i	Track/report type/amount of salt applied to MS4-owned surfaces	Annual Reports beginning year SRP completed		
H.IV.4.a.ii	Implement required Salt Reduction activities	Not specified; assume ED		
H.IV.4.b.i	Establish regulatory mechanism to prevent runoff from private salt piles	Not specified	Establish ordinance requiring measures to prevent exposure of any salt stockpiles to precipitation and runoff at all commercial and industrial properties.	(7)
H.IV.4.b.ii	Distribute message to Commercial/Industrial & private applicators on storage/application of deicing materials (over/above 2.3.3)	Annually in Nov/Dec	Supplement commercial/industrial education program with an annual message to private road salt applicators, and commercial and industrial site owners on the proper storage and application rates of winter deicing material.	$500 to $1,000 per year over 5-year permit term
H.IV.4.b.iii	Establish procedures/requirements to minimize salt usage/require salt alternatives with new developments & re-developments	With 2.3.6; 2 years from ED	Establish procedures and requirements to minimize salt usage and require the use of salt alternatives.	(7)
H.IV.4.c	Submit Salt Reduction Plan to EPA	Annual Report after completion	Include Salt Reduction Plan in Annual Report	(2)
Alternative to Requirements H.IV.3-4 (above)				
H.IV.5	Submit documentation that discharges do not contain chloride	When Approved by EPA/DEP	Discharges should be characterized during the deicing season and capture discharges during deicing events. A written request shall be sent to EPA summarizing the data collected and methods used to characterize each outfall's discharge.	-
2.3 - Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)				
PUBLIC EDUCATION & OUTREACH				
2.3.2.a-d	Distribute at least 2 educational messages to each of 4 targeted audiences (residents, businesses/commercial/institutional, developers and industrial). Different messages to the same targeted audience shall be distributed at least one year apart.	begin year 1; continue throughout permit term	Develop/distribute a minumum of 8 messages over the permit term. Educational messages can include brochures, newsletters, information posted to the City's website, newspaper articles, public service announcements, displays in municipal buildings, etc.	$10,000 for 5-year permit term (Supplemental funding for public education requirements.)
2.3.2.e	Identify method to evaluate effectiveness of message; implement	not stated	Determine method to evaluate message effectiveness; implement method.	-
2.3.2.f	Modify ineffective messages/methods	before next message distribution	Modify message or distribution methods if applicable.	-
2.3.2.g	Report on messages as per permit	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
PUBLIC INVOLVEMENT & PARTICIPATION				
2.3.3.a	Meet Public Notice requirements	continuous	Ensure that all public involvement activities comply with state public notice requirements.	-
2.3.3.a	Make Stormwater Management Plan & Annual MS4 Stormwater Report available to public	continuous	Make SWMP and annual MS4 stormwater reports available to public at City Hall and/or on the City's website.	-
2.3.3.b	Public opportunity to participate in the review/implementation of the Stormwater Management Program	annually	May be implemented through the use of City website, City hotline, clean-up teams, monitoring teams, or a stormwater advisory committee.	-

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.3.c	Report on public participation opportunities	annually	Report progress in Annual MS4 Stormwater Report.	(2)
	ILLICIT DISCHARGE DETECTION & ELIMINATON			
2.3.4.2.a	Eliminate illicit discharges	60 days from detection or as expeditiously as possible	Eliminate illicit discharges as they are identified or establish a schedule for elimination for discharges that cannot be removed within 60 days.	Budget $25,000 to $50,000 per year for 10 years for compliance (Cost depends on number of illicit connections identified.)
2.3.4.2.a	Report dates of illicit identification and schedules for removal	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.4.a	Mitigate SSOs	Expeditiously as possible	Eliminate SSO as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from the City until elimination is completed.	-
2.3.4.4.b	Complete Inventory of Sanitary Sewer Overflows (SSOs)	120 days from effective date	Identify all known locations where SSOs have discharged within the previous five years.	-
2.3.4.4.c	Report SSOs	24 hours of awareness	Provide verbal notice to EPA within 24 hours, and written notice to EPA and MADEP within 5 days.	-
2.3.4.4.d	Update SSO inventory	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.5	Develop outfall & interconnection inventory	1 year from effective date	This requirement includes identifying each outfall and interconnection, recording its location and condition, and providing a framework for tracking inspections, screenings and other activities. The inventory needs to include the information identified under Item 2.3.4.5.c. All 143 outfalls discharging to the Charles River have been inventoried by the City. There are 241 additional outfalls & interconnections that have been mapped, but it is assumed that their condition still needs to be documented. Based on the stream assessment, assume that there are at least an additional 30 outfalls that have not yet been mapped that will need to be inventoried.	Assume inventory would be completed in conjunction with dry weather screening.
2.3.4.5.b	Report on outfall & interconnection inventory	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.5.b	Physically label all MS4 outfalls with unique identifier	end of permit term	All MS4 outfall pipes must be labeled in the field with a unique identifier. All 143 outfalls discharging to the Charles River have been labeled in the field by the City. The remaining 241 mapped outfalls and estimated 30 unmapped outfalls still need to be labeled in the field.	$2,700 (7) (Assumes $10 per sign per outfall to purchase and install.)
2.3.4.6	Map the MS4 features required & recommended in 2.3.4.6.a.i, ii & iii	2 years from effective date	The City currently has a comprehensive GIS map of their drainage system, with delineated drainage catchment areas. Potential mapping additions include: additional catchment delineation; municipally owned stormwater treatment structures; use impairments for water bodies on the 303(d) list; septic system information (including inspections, upgrades & repairs); locations of past IDDE work completed; locations of suspected, confirmed and corrected illicit discharges; and updated/new drainage from new developments and re-developments.	$10,000 to $20,000

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.4.6.c	Report on mapping progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.7	Written IDDE program (include responsibility statement, written procedure for outfall/interconnection sampling, written procedure for IDDE investigation)	1 year from effective date	Newton's Comprehensive Stormwater Plan developed in 2005 provides a framework for identifying illicit discharges. The IDDE Program will need to be enhanced/updated to fully meet the conditions of the permit.	(7)
2.3.4.7.a	Adopt regulatory mechanism providing legal authority to prohibit/investigate/eliminate illicit discharges	Should have been completed under 2003 permit.	A Draft IDDE Ordinance has been prepared, but it has not yet been adopted. It is in the process of being presented again to the Board of Alderman for adoption.	(3)
2.3.4.7.c	Complete initial illicit discharge potential assessment and priority ranking based on existing information	1 year from effective date	Assess and rank all outfall drainage areas ("catchments") for the potential to have illicit discharges and/or SSOs. Develop matrix to rank each outfall catchment area. Priority rank catchments based on where certain risk factors may be present as provided in the permit.	(7)
2.3.4.7.c.iii	Report on list of catchments and results of rankings	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.8.a	Dry-weather outfall/interconnection screening & sampling (except Excluded & Problem Catchments)	3 years from effective date	Complete dry weather screening of every MS4 outfall and interconnection (183 exterior outfalls/interconnections + 201 interior outfalls + 30 unmapped outfalls = 414). Assume that approx. 231 outfalls and interconnections will need to be inventoried during dry weather screening. Dry weather sampling parameters shall include, at a minimum, ammonia, chlorine, E.coli, surfactants and temperature. Phosphorus will also need to be included to meet the TMDL requirements. All can be performed with test kits with the exception of bacteria and phosphorus. The City has already separately budgeted for screening and sampling of their 183 exterior outfalls/interconnections. For budgeting purposes, it is assumed that the remaining 231 outfalls would be visited once and 25% of these outfalls would have dry weather flow in need of sampling (58 outfalls). Assume $125 per interior outfall plus $50 per outfall with dry weather flow requiring sampling.	$35,000 (Depends on number of outfalls with dry weather flow.)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.4.8.b	Implement IDDE catchment investigation procedure as per 2.3.4.7.e (System Vulnerability, MH inspection, wet-weather sampling, segment isolation, etc.)	3 months from written procedure; not more than 15 months from effective date	Assume that 100% of all outfalls/interconnections have at least one System Vulnerability Factor in its catchment, which triggers the requirement for wet-weather sampling. For this reason, the budget estimate assumes that 100% of the 414 outfalls/interconnections will require wet-weather sampling. Wet weather sampling parameters shall include, at a minimum, ammonia, chlorine, E.coli, surfactants and temperature. Phosphorus will also need to be included to meet the TMDL requirements. For budgeting purposes, it is assumed that an Illicit Discharge Detection and Elimination Investigation Program will need to be implemented in all catchments with dry weather flow. It is also assumed that 10% of those catchments with wet weather flow will have evidence of sewer input which will require implementation of the IDDE investigation program in these areas as well. Catchments with no potential for illicit discharges (based on the catchment ranking exercise completed under Task 2.3.4.7.c.) can be excluded from the IDDE Program. The City has had a comprehensive outfall monitoring program in place since 2006 for those outfalls discharging to the Charles River. The City may be able to get some credit for work already completed.	Budget $100,000 - $125,000 for wet weather sampling. Budget $100,000 to $125,000/yr allowance in Years 2 to 10 for IDDE investigation and sampling. Budget $25,000 to $50,000 allowance in Years 2 to 10 for CCTV inspection and dye testing to investigate illicit connections. Budget allowance for removal of illicit connections included under 2.3.4.2.a.
2.3.4.8.c	Complete IDDE in all catchments, regardless of sampling results	Not specified (see 2.3.4.8.c.iii)		
2.3.4.8.c.i	Complete IDDE investigation in 80% of Problem Catchments	3 years from effective date		
2.3.4.8.c.i	Complete IDDE investigation in 100% of Problem Catchments	5 years from effective date		
2.3.4.8.c.ii	Complete IDDE investigation in all catchments where outfall/interconnection screening information indicates sewer input based upon olfactory/visual evidence or sampling results	5 years from effective date		
2.3.4.8.c.iii	Complete IDDE investigation in 40% of catchments	5 years from effective date		
2.3.4.8.c.iii	Complete IDDE investigation in 100% of catchments	10 years from effective date		
2.3.4.8.e	Evaluate & report IDDE program progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.9	Define indicators of IDDE program success	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.10	Conduct IDDE employee training	at least annually	Continue to train employees about the IDDE Program including how to recognize illicit discharges and SSOs.	(4)
2.3.4.10	Report on IDDE employee training	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
CONSTRUCTION SITE STORMWATER RUNOFF CONTROL				
2.3.5	Implement & enforce Construction Site Stormwater Runoff Control (CSSRC) Program	not stated	Continue to implement and enforce a program to reduce pollutants in stormwater runoff from construction activities per the 2003 Permit.	-
2.3.5.c.i	Adopt regulatory mechanism requiring use of sediment/erosion control at construction sites	Should have been completed under 2003 permit.	The City has in place numerous mechanisms through which new construction site runoff is prevented and controlled. These mechanisms include: an existing Ordinance (Sec 30-5c and 5d), DPW/Eng. Division Policy and the Special Permit approval process. Most construction projects regardless of size are required to provide soil erosion control measures.	(3)
2.3.5.c.ii	Develop written procedures for site inspections and enforcement of sediment and erosion control measures. The procedures shall clearly define who is responsible for site inspections as well as who has authority to implement enforcement procedures. The program shall provide that the permittee may, to the extent authorized by law, impose sanctions to ensure compliance with the local program.	1 year from effective date	The City currently has two inspectors who ensure the measures shown on Approved Site Plans are implemented. Ensure that procedures for inspections are in written form.	(3)
2.3.5.c.iii	Require developers to implement a sediment and erosion control program that includes BMPs appropriate for the conditions at the construction site.	not stated	At present, most construction projects within the City, regardless of size, are required to provide soil erosion control measures. Ensure that current requirements meet all the conditions of the permit, and revise as needed.	(3)
2.3.5.c.iv	Include requirements for waste control, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes, in the CSSRC Program.	not stated	Include current requirements in City's CSSRC Program if not already included.	(3)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.5.c.v	Develop written site plan review procedures. Site plan review shall include a review by the permittee of the site design, the planned operations at the construction site, planned BMPs during the construction phase, and the planned BMPs to be used to manage runoff created after development. The review procedure shall incorporate procedures for the consideration of potential water quality impacts; procedures for pre-construction review; and procedures for receipt and consideration of information submitted by the public. Site plan review procedure shall include evaluation of opportunities for use of low impact design and green infrastructure. When the opportunity exists, the permittee shall encourage project proponents to incorporate these practices into the site design. The permittee shall track the number of site reviews, inspections, and enforcement actions.	1 year from effective date	Ensure that the City's site plan review procedures are in written form and that they meet current permit requirements.	(3)
POST-CONSTRUCTION STORMWATER MANAGEMENT				
2.3.6.a	Implement & enforce SW management for New Development/Redevelopment	not stated	Continue to implement and enforce a program to address post-construction stornmwater runoff from new development and redevelopment projects per the 2003 Permit.	-
2.3.6.a	Adopt regulatory mechanism that regulates runoff from new development/redevelopment	Should have been completed under 2003 permit.	The City has in place numerous mechanisms through which new construction site runoff is prevented and controlled. These mechanisms include: an existing Ordinance (Sec 30-5c and 5d), DPW/Eng. Division Policy and the Special Permit approval process. Most construction projects regardless of size are required to provide soil erosion control measures.	(3)
2.3.6.a.ii	Amend existing regulatory mechanism to contain provisions at least as stringent as those outlined under Part 2.3.6.a.ii	2 years of effective date	DPW/Engineering currently requires developers to implement MADEP Stormwater Standards (1-8) for applicable projects. Separate and supplemental requirements are outlined for smaller construction projects in the City's Stormwater Management Policy. Ensure that all permit requirements listed are met.	(3)
2.3.6.a.iii	Develop procedures for Post Construction Stormwater Management to ensure submission of as-built plans within a year from completed construction, and long-term O&M of BMPs; include in written SWMP.	1 year from effective date	Engineering currently requires the submittal of stormwater operation and maintenance plans for all construction > 1 acre. Ensure that all other permit requirements are met related to operation and maintenance of BMPs.	(3)
2.3.6.a.iii	Report on measures to comply with 2.3.6.a.iii in annual MS4 stormwater report	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.6.b	Develop a report assessing street/parking design related to creation of impervious cover	Report progress annually; complete 3 years from effective date	Develop report assessing current street design and parking lot guidelines and other local requirements impacting the creation of impervious cover. Determine whether design standards can be modified to support low impact design. If modifications can be made, outline recommendations and proposed schedule for modifying applicable standards.	$5,000 - $10,000
2.3.6.c	Develop a report assessing local regulations to allow the listed green practices	Report progress annually; complete 4 years from effective date	Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices (green roofs, infiltration practices, water harvesting devices) allowable when appropriate site conditions exist.	$5,000 - $10,000
2.3.6.d.i & ii	Estimate baseline impervious area and annual increase/decrease in acres of impervious area	annual MS4 stormwater reports	Develop method to track changes in impervious area as development/redevelopment occurs. Starting impervious area estimates available from EPA. Estimates to be included in Annual MS4 Stormwater Report each year.	-

EPA NPDES PHASE 2 STORMWATER - MS4 GENERAL PERMIT REVIEW - 5 YEAR PERMIT TERM
Breakdown of Permit Requirements (Based on 2014 Draft Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.6.d.iii	Inventory & priority ranking for permittee-owned BMP retrofits	4 years from effective date	Complete an inventory and priority ranking of City property and infrastructure that could be retrofitted with BMPs to reduce frequency, volume and pollutant loads associated with stormwater discharges.	$15,000 - $25,000
2.3.6.d.iv	Report progress on implementation of BMP retrofits	annual MS4 stormwater reports beginning Year 5	Report progress in Annual MS4 Stormwater Report.	(2)
GOOD HOUSEKEEPING & POLLUTION PREVENTION FOR PERMITEE-OWNED OPERATIONS				
2.3.7.a.i.	Develop written operation & maintenance procedures for municipal activities.	1 year from effective date	Develop written operation & maintenance procedures for parks and open space, buildings and facilities where pollutants are exposed to stormwater runoff, as well as vehicles and equipment.	$7,500 - $10,000
2.3.7.a.ii	Complete inventory of listed municipal facilities	1 year from effective date; review/update annually	Develop inventory of all municipal facilities; Review inventory annually and update as necessary.	-
2.3.7.a.ii.b	Provide training on use, storage, & disposal of petroleum products to applicable staff	not stated	Provide training on use, storage, & disposal of petroleum products to applicable municipal staff.	(4)
2.3.7.a.iii.a	Written program detailing activities/procedures the MS4 will implement to ensure infrastructure is maintained in timely manner	1 year from effective date	Develop written plan/schedule for activities such as street sweeping, catch basin cleaning, maintenance of structural BMPs, cleaning of storm drains, and assessment/upgrade of drainage system infrastructure.	Cost included under 2.3.7.a.i.
2.3.7.a.iii.b	Develop a plan to optimize catch basin cleaning & include in written SWMP	1 year from effective date	Develop a written plan to optimize inspection, cleaning, and maintenance of catch basins to ensure that permit conditions are met.	(1)
2.3.7.a.iii.b	Implement routine inspection/cleaning/maintenance of catch basins to ensure sumps <50% full; report on activities as specified; investigate excessive sediment; log/report CB cleaning	continuous; annual MS4 stormwater reports	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time. The City has 13,000 catch basins city-wide and currently cleans 1/2 of all catch basins each year. Based on current information, this cleaning frequency appears to be adequate to ensure that no sump is more than 50% full. Therefore, at this time, no increase above current catch basin cleaning frequency is anticipated for permit compliance.	Catch basin cleaning is already funded through the City's Stormwater Budget.
2.3.7.a.iii.c & d.	Sweep streets/parking lots 1x/year in spring; report on efforts	annually; annual MS4 stormwater reports	The City currently sweeps streets a minimum of 4 times per year, with village centers and main streets swept 5 times per week for 36 weeks of the year in 2013; all municipal parking lots are swept as well. Therefore, at this time, no increase above current sweeping frequency is anticipated.	Street sweeping is funded under the Highway Division's budget.
2.3.7.a.iii.d	Ensure proper storage of CB cleanings & street sweepings to prevent runoff	NA	Examine storage of CB cleanings & street sweepings	Cost included under 2.3.7.a.i.
2.3.7.a.iii.e	Establish procedures for winter road maintenance	not stated	Look at storage and usage of salt and sand; evaluate opportunities for use of alternative deicers.	Cost included under 2.3.7.a.i.
2.3.7.a.iii.f	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; and for annual inspection of treatment structures	not stated	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; inspect treatment structures annually at a minimum.	Cost to develop procedures included under 2.3.7.a.i.; implementation & inspection to be completed by the City
2.3.7.a.iv	Report on all Good Housekeeping/Pollution Prevention requirements	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)

EPA NPDES PHASE 2 STORMWATER - MS4 GENERAL PERMIT REVIEW - 5 YEAR PERMIT TERM
Breakdown of Permit Requirements (Based on 2014 Draft Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.7.a.v	Keep written record of all Good Housekeeping/Pollution Prevention activities	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
2.3.7.b	Develop/implement written Stormwater Pollution Prevention Plans for required facilities as per permit	2 years from effective date	Develop and implement SWPPPs for all municipal waste handling facilities. This would include the DPW Yards at Elliot Street and at Crafts Street. Good housekeeping practices are currently in place based upon a self-audit of DPW yards previously conducted, but a SWPPP still needs to be developed for each yard.	$15,000 - $20,000
2.3.7.b.ii & iii	Perform SWPPP required actions/inspections/training	frequencies as per permit	Perform quarterly inspections at facilities and conduct annual employee training.	(4)
2.3.7.b.iii	Report on Stormwater Pollution Prevention Plan inspections	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.7.b.iv	Maintain written records for 2.3.7	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
SECTION 3 - ADDITIONAL REQUIREMENTS FOR DISCHARGES TO SURFACE DRINKING WATER SUPPLIES AND THEIR TRIBUTARIES				
3.0.a	Make MS4 discharges to drinking water supply sources & their tributaries a priority in the SWMP	continuous; report annually	The City does not have any stormwater discharges to drinking water sources or their tributaries.	-
3.0.b	Provide pretreatment/spill control for MS4 discharges to public drinking water sources & their tributaries	continuous; report annually	The City does not have any stormwater discharges to drinking water sources or their tributaries.	-
3.0.c	Avoid direct discharges to Class A waters	continuous; report annually	There are no Class A waters in Newton.	-
SECTION 4 - PROGRAM EVALUATION, RECORDKEEPING & REPORTING				
4.1.a	Self-evaluate compliance with the permit; include documentation of evaluation in written SWMP	annually	Annually evaluate City's compliance with permit conditions.	(2)
4.1.b	Evaluate BMP effectiveness & change if needed under provisions of permit	not stated	Evaluate BMP effectiveness in achieving permit objectives & modify BMPs accordingly as needed.	(2)
4.1.b	Report BMP modifications	annual MS4 stormwater reports	Include in Annual MS4 Stormwater Report.	(2)
4.2	MS4 must keep records for ≥5yrs; make available to public	Continuous	Maintain annual MS4 stormwater reports and make available to the public.	-
4.3	Document results of MS4 outfall screening/sampling & any other monitoring/studies	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
4.4	Submit Annual MS4 Stormwater Report	annually 90 days from effective date	Prepare Annual MS4 Stormwater Report.	(7)

Requirements specific to discharges to waters with approved TMDLs (see Appendix F)
Requirements specific to discharges to impaired waters without an approved TMDL (see Appendix H)

Planning Level Estimate for Permit Compliance:	**$9,560,000 - $10,400,000**
w/20% Contingency[6]:	**$9,970,000 - $10,940,000**
Phosphorus Control Plan (PCP) Development & Implementation (20 years):	**$7,900,000 (~79%)**
IDDE Compliance (Dry Weather Sampling & IDDE Investigation) (10 years):	**$1,510,000 - $2,240,000 (~19%)**

(1) Cost included as part of completing Notice of Intent and developing written Stormwater Management Plan.
(2) Cost included as part of preparing Annual MS4 Stormwater Report.
(3) Budget $10,000 to $15,000 to review all regulatory mechanisms and make recommendations on how to modify the regulations for compliance.
(4) Budget $10,000 to $15,000 the first year to conduct all employee training required under the permit, and budget $5,000 to $7,500 in subsequent years of the permit.
(5) Costs for implementation of the Phosphorus Control Plan, and IDDE investigation and correction of illicit connections, were generated for the 20-year and 10-year timeframes allotted.
(6) No additional contingency was added to the Phosphorus Control Plan Implementation costs for Years 6 through 20. Allowance of $500,000 per year was carried each year.

Federal Stormwater Permit Compliance

Year 1

NEWTON, MA
EPA NPDES PHASE 2 STORMWATER - MS4 GENERAL PERMIT REVIEW - YEAR 1
Breakdown of Permit Requirements (Based on 2014 Draft Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
SECTION 1 - INTRODUCTION				
1.7.2	Complete Notice of Intent (NOI)	90 days from effective date	Prepare and Submit Notice of Intent.	$10,000 (5)
1.9.1	Endangered Species Determination (complete review; certify in Notice of Intent)	90 days from effective date	Revisit location of permitted stormwater discharges relative to endangered species and ensure no adverse impact (Part of NOI) or develop BMPs to reduce impact.	
1.9.2	Historic Properties Determination (complete review; certify in Notice of Intent)	90 days from effective date	Revisit location of permitted stormwater discharges relative to historic properties and ensure no adverse impact (Part of NOI) or develop BMPs to reduce impact.	
1.10	Develop Written Stormwater Management Plan (SWMP)	1 year from effective date	Develop written plan outlining activities and measures to be implemented to meet the conditions of the permit. The SWMP will be developed in Year 1 and then will need to be updated on an ongoing basis throughout the permit term. Required contents of the SWMP are outlined in Section 1.10.2 of the 2014 Draft MA MS4 General Permit.	
1.10.b	Update Best Management Practices (BMPs)	1 year from effective date	Modify and update BMPs from the 2003 permit to meet the conditions of the new permit - to be completed as part of the NOI process.	
1.10.1	Maintain copy of Stormwater Management Plan, make available to public	1 year from effective date	Make SWMP available to the public at City Hall and/or on City website.	-
SECTION 2 - NON-NUMERIC EFFLUENT LIMITATIONS				
2.1 - Water Quality Based Effluent Limitations				
2.1.1.b	For MS4 discharges to a water body with an approved TMDL identified in Part 2.2.1, comply with Part 2.2.1 and Appendix F of the Permit	see Appendix F of the 2014 Draft MA MS4 General Permit	Both the Charles River Phosphorous TMDL and the Charles River Pathogens TMDL are applicable to Newton: Charles River (52% reduction in total phosphorus) (MA72-07); Cheesecake Brook (MA 72-08 and MA 72-29) & unnamed tributary (MA 72-30); and South Meadow Brook (MA72-24). Saw Mill Brook (MA72-23) is also covered under the phosphorous and pathogen TMDLs. Include specific BMPs and other permit requirements identified in Appendix F in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, F.A.I and F.A.III.
2.1.1.c	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Part 2.2.2 and Appendix H of the Permit	see Appendix H of the 2014 Draft MA MS4 General Permit	Impaired waters in Newton without an approved TMDL and their reason for impairment are as follows: Bulloughs Pond (excess algal growth and nutrient/eutrophication biological indicators) and Saw Mill Brook (chloride). Include specific BMPs and other permit requirements identified in Appendix H in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, and H.IV.
2.1.1.d	For all other discharges (not subject to the requirements of Part 2.1.1.b and Part 2.1.1.c of the Permit) contributing to a violation of applicable receiving water quality standards, eliminate condition causing or contributing to exceedance of water quality standards	within 60 days of becoming aware of the situation	If a discharge is identified that contributes to an exceedance of applicable water quality standards, eliminate the conditions contributing to or causing the exceedance within 60 days.	Cost included under IDDE under Item 2.3.4.2.a.
2.1.2	Written notification to MADEP & EPA as needed & documentation in the City's SWMP regarding new or increased stormwater discharges	as-needed	Any new or increased stormwater discharges must satisfy MA antidegradation regulations.	-

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.2 - Discharges to Impaired Waters				
2.2	Identify all outfalls/interconnections that discharge to waters with an approved TMDL or discharge to certain waters identified as "water quality limited water bodies"	SWMP (1 yr) & annual MS4 stormwater reports	Identify all outfalls or interconnections that discharge to an approved TMDL or to water quality limited water bodies	(1) (2)
2.2.1	For MS4 discharges to a water body with an approved TMDL, comply with Appendix F, Part A of the Permit	see Appendix F of the 2014 Draft MA MS4 General Permit	Both the Charles River Phosphorous TMDL and the Charles River Pathogens TMDL are applicable to Newton: Charles River (52% reduction in total phosphorus) (MA72-07); Cheesecake Brook (MA 72-08 and MA 72-29) & unnamed tributary (MA 72-30); and South Meadow Brook (MA72-24). Saw Mill Brook (MA72-23) is also covered under the phosphorous and pathogen TMDLs. Include specific BMPs and other permit requirements identified in Appendix F in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, F.A.I and F.A.III.
Charles River TMDL - Phosphorus (includes tributaries)				
F.A.I Tbl F-1	Legal analysis - authority to implement Phosphorus Control Plan (PCP)	2 years from effective date	Develop and implement Phosphorous Control Plan to reduce the amount of phosphorus in discharges to the Charles River and its tributaries to achieve consistency with the Waste Load Allocation identified in the TMDL for the Charles River (52% reduction in total phosphorus). The PCP shall include the components listed in Appendix F.	$100,000 per year should be allocated in Years 1, 2 & 3 for the development of the Phosphorus Control Plan. In Years 4 and 5, $50,000 per year should be allocated for structural BMP planning and optimization. Within Years 6 through 20, $500,000 should be allocated each year for implementation of the PCP.
F.A.I Tbl F-1	Funding assessment	3 years from effective date		
F.A.I Tbl F-1	Define scope of PCP	4 years from effective date		
F.A.I Tbl F-1	Phase 1 Plan (non-structural controls)	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Plan (structural controls)	5 years from effective date		
F.A.I Tbl F-1	O&M Plan (structural controls)	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Implementation Schedule	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Cost Estimate	5 years from effective date		
F.A.I Tbl F-1	Complete written Phase 1 PCP	5 years from effective date		
F.A.I Tbl F-1	Implementation of Phase 1 non-structural controls	6 years from effective date		
F.A.I	Performance evaluation	Annual Report Year 6-20		
F.A.I Tbl F-1	Implementation of Phase 1 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.80)$	8 years from effective date		
F.A.I Tbl F-1	Implementation of Phase 1 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.75)$	10 years from effective date		
F.A.I Tbl F-4	Review/update legal analysis	As necessary		
F.A.I Tbl F-4	Phase 2 Plan (non-structural controls)	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Plan (structural controls)	10 years from effective date		
F.A.I Tbl F-4	Update O&M Plan (structural controls)	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Implementation Schedule	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Cost Estimate	10 years from effective date		
F.A.I Tbl F-4	Complete written Phase 2 PCP	10 years from effective date		
F.A.I Tbl F-4	Implementation of Phase 2 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.65)$	13 years from effective date		
F.A.I Tbl F-4	Implementation of Phase 2 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.50)$	15 years from effective date		
F.A.I Tbl F-5	Review/update legal analysis	As necessary		
F.A.I Tbl F-5	Phase 3 Plan (non-structural controls)	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Plan (structural controls)	15 years from effective date		
F.A.I Tbl F-5	Update O&M Plan (structural controls)	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Implementation Schedule	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Cost Estimate	15 years from effective date		
F.A.I Tbl F-5	Complete written Phase 3 PCP	15 years from effective date		
F.A.I Tbl F-5	Implementation of Phase 3 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.30)$	18 years from effective date		
F.A.I Tbl F-5	Implementation of Phase 3 structural controls $P_{exp} \leq P_{allow}$	20 years from effective date		
Bacteria / Pathogen TMDL				
F.A.III.1.a.i.1	Distribute residential message on pet waste management (over/above 2.3.2)	Annually	Develop and disseminate required public education information.	Costs to be covered under City's operating budget.
F.A.III.1.a.i.1	Disseminate required public education info to dog owners	At license renewal (or similar)		
F.A.III.1.a.i.1	Send public education materials to septic system owners	Not specified; assume annually		

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
F.A.III.1.a.i.2	2.3.4.7 IDDE - Catchments to Bacteria/Pathogen Impaired Waters to be ranked Problem or High	With 2.3.4.7; 1 year from effective date	Rank catchments to bacteria/pathogen impaired waters as Problem or High in catchment ranking to be completed under Item 2.3.4.7.c.	Cost included under 2.3.4.7.c.
2.2.2	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Appendix H of the Permit	see Appendix H of the 2014 Draft MA MS4 General Permit	Impaired waters in Newton without an approved TMDL and their reason for impairment are as follows: Bulloughs Pond (excess algal growth and nutrient/eutrophication biological indicators) and Saw Mill Brook (chloride). Include specific BMPs and other permit requirements identified in Appendix H in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, and H.IV.
Impaired - Chloride				
H.IV.3	If discharge found to be to Chloride Impaired Water; update Salt Reduction Plan (SRP)	60 days from awareness	Develop and implement salt reduction plan in accordance with the requirements of Appendix H, IV. 4.	$5,000 to $10,000 per year over 5-year permit term
H.IV.3	If discharge to Chloride Impaired Water & no SRP; prepare SRP	3 years from awareness		
H.IV.3	If discharge to Chloride Impaired Water & no SRP; implement SRP	5 years from awareness		
H.IV.4.a.i	Track/report type/amount of salt applied to MS4-owned surfaces	Annual Reports beginning year SRP completed		
H.IV.4.a.ii	Implement required Salt Reduction activities	Not specified; assume ED		
H.IV.4.b.i	Establish regulatory mechanism to prevent runoff from private salt piles	Not specified	Establish ordinance requiring measures to prevent exposure of any salt stockpiles to precipitation and runoff at all commercial and industrial properties.	(5)
H.IV.4.b.ii	Distribute message to Commercial/Industrial & private applicators on storage/application of deicing materials (over/above 2.3.3)	Annually in Nov/Dec	Supplement commercial/industrial education program with an annual message to private road salt applicators, and commercial and industrial site owners on the proper storage and application rates of winter deicing material.	$500 to $1,000 per year over 5-year permit term
H.IV.4.b.iii	Establish procedures/requirements to minimize salt usage/require salt alternatives with new developments & re-developments	With 2.3.6; 2 years from ED	Establish procedures and requirements to minimize salt usage and require the use of salt alternatives.	(5)
H.IV.4.c	Submit Salt Reduction Plan to EPA	Annual Report after completion	Include Salt Reduction Plan in Annual Report	(2)
Alternative to Requirements H.IV.3-4 (above)				
H.IV.5	Submit documentation that discharges do not contain chloride	When Approved by EPA/DEP	Discharges should be characterized during the deicing season and capture discharges during deicing events. A written request shall be sent to EPA summarizing the data collected and methods used to characterize each outfall's discharge.	-
2.3 - Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)				
PUBLIC EDUCATION & OUTREACH				
2.3.2.a-d	Distribute at least 2 educational messages to each of 4 targeted audiences (residents, businesses/commercial/institutional, developers and industrial). Different messages to the same targeted audience shall be distributed at least one year apart.	begin year 1; continue throughout permit term	Develop/distribute a minumum of 8 messages over the permit term. Educational messages can include brochures, newsletters, information posted to the City's website, newspaper articles, public service announcements, displays in municipal buildings, etc.	$10,000 for 5-year permit term (Supplemental funding for public education requirements.)
2.3.2.e	Identify method to evaluate effectiveness of message; implement	not stated	Determine method to evaluate message effectiveness; implement method.	-
2.3.2.f	Modify ineffective messages/methods	before next message distribution	Modify message or distribution methods if applicable.	-
2.3.2.g	Report on messages as per permit	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
PUBLIC INVOLVEMENT & PARTICIPATION				
2.3.3.a	Meet Public Notice requirements	continuous	Ensure that all public involvement activities comply with state public notice requirements.	-

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.3.a	Make Stormwater Management Plan & Annual MS4 Stormwater Report available to public	continuous	Make SWMP and annual MS4 stormwater reports available to public at City Hall and/or on the City's website.	-
2.3.3.b	Public opportunity to participate in the review/implementation of the Stormwater Management Program	annually	May be implemented through the use of City website, City hotline, clean-up teams, monitoring teams, or a stormwater advisory committee.	-
2.3.3.c	Report on public participation opportunities	annually	Report progress in Annual MS4 Stormwater Report.	(2)
ILLICIT DISCHARGE DETECTION & ELIMINATON				
2.3.4.2.a	Eliminate illicit discharges	60 days from detection or as expeditiously as possible	Eliminate illicit discharges as they are identified or establish a schedule for elimination for discharges that cannot be removed within 60 days.	Budget $25,000 to $50,000 per year for 10 years for compliance (Cost depends on number of illicit connections identified.)
2.3.4.2.a	Report dates of illicit identification and schedules for removal	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.4.a	Mitigate SSOs	Expeditiously as possible	Eliminate SSO as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from the City until elimination is completed.	-
2.3.4.4.b	Complete Inventory of Sanitary Sewer Overflows (SSOs)	120 days from effective date	Identify all known locations where SSOs have discharged within the previous five years.	-
2.3.4.4.c	Report SSOs	24 hours of awareness	Provide verbal notice to EPA within 24 hours, and written notice to EPA and MADEP within 5 days.	-
2.3.4.4.d	Update SSO inventory	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.5	Develop outfall & interconnection inventory	1 year from effective date	This requirement includes identifying each outfall and interconnection, recording its location and condition, and providing a framework for tracking inspections, screenings and other activities. The inventory needs to include the information identified under Item 2.3.4.5.c. All 143 outfalls discharging to the Charles River have been inventoried by the City. There are 241 additional outfalls & interconnections that have been mapped, but it is assumed that their condition still needs to be documented.	Assume inventory would be completed in conjunction with dry weather screening.
2.3.4.5.b	Report on outfall & interconnection inventory	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.5.b	Physically label all MS4 outfalls with unique identifier	end of permit term	All MS4 outfall pipes must be labeled in the field with a unique identifier. All 143 outfalls discharging to the Charles River have been labeled in the field by the City. The remaining 241 mapped outfalls and estimated 30 unmapped outfalls still need to be labeled in the field.	$2,700 (7) (Assumes $10 per sign per outfall to purchase.)
2.3.4.6	Map the MS4 features required & recommended in 2.3.4.6.a.i, ii & iii	2 years from effective date	The City currently has a comprehensive GIS map of their drainage system, with delineated drainage catchment areas. Potential mapping additions include: additional catchment delineation; municipally owned stormwater treatment structures; use impairments for water bodies on the 303(d) list; septic system information (including inspections, upgrades & repairs); locations of past IDDE work completed; locations of suspected, confirmed and corrected illicit discharges; and updated/new drainage from new developments and re-developments.	$10,000 to $20,000

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.4.6.c	Report on mapping progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.7	Written IDDE program (include responsibility statement, written procedure for outfall/interconnection sampling, written procedure for IDDE investigation)	1 year from effective date	Newton's Comprehensive Stormwater Plan developed in 2005 provides a framework for identifying illicit discharges. The IDDE Program will need to be enhanced/updated to fully meet the conditions of the permit.	(5)
2.3.4.7.a	Adopt regulatory mechanism providing legal authority to prohibit/investigate/eliminate illicit discharges	Should have been completed under 2003 permit.	A Draft IDDE Ordinance has been prepared, but it has not yet been adopted. It is in the process of being presented again to the Board of Alderman for adoption.	(3)
2.3.4.7.c	Complete initial illicit discharge potential assessment and priority ranking based on existing information	1 year from effective date	Assess and rank all outfall drainage areas ("catchments") for the potential to have illicit discharges and/or SSOs. Develop matrix to rank each outfall catchment area. Priority rank catchments based on where certain risk factors may be present as provided in the permit.	(5)
2.3.4.7.c.iii	Report on list of catchments and results of rankings	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.8.a	Dry-weather outfall/interconnection screening & sampling (except Excluded & Problem Catchments)	3 years from effective date	Complete dry weather screening of every MS4 outfall and interconnection (183 exterior outfalls/interconnections + 201 interior outfalls + 30 unmapped outfalls = 414). Assume that approx. 231 outfalls and interconnections will need to be inventoried during dry weather screening. Dry weather sampling parameters shall include, at a minimum, ammonia, chlorine, E.coli, surfactants and temperature. Phosphorus will also need to be included to meet the TMDL requirements. All can be performed with test kits with the exception of bacteria and phosphorus. The City has already separately budgeted for screening and sampling of their 183 exterior outfalls/interconnections. For budgeting purposes, it is assumed that the remaining 231 outfalls would be visited once and 25% of these outfalls would have dry weather flow in need of sampling (58 outfalls). Assume $125 per interior outfall plus $50 per outfall with dry weather flow requiring sampling.	$35,000 (Depends on number of outfalls with dry weather flow.)
2.3.4.10	Conduct IDDE employee training	at least annually	Continue to train employees about the IDDE Program including how to recognize illicit discharges and SSOs.	(4)
2.3.4.10	Report on IDDE employee training	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
CONSTRUCTION SITE STORMWATER RUNOFF CONTROL				
2.3.5	Implement & enforce Construction Site Stormwater Runoff Control (CSSRC) Program	not stated	Continue to implement and enforce a program to reduce pollutants in stormwater runoff from construction activities per the 2003 Permit.	-
2.3.5.c.i	Adopt regulatory mechanism requiring use of sediment/erosion control at construction sites	Should have been completed under 2003 permit.	The City has in place numerous mechanisms through which new construction site runoff is prevented and controlled. These mechanisms include: an existing Ordinance (Sec 30-5c and 5d), DPW/Eng. Division Policy and the Special Permit approval process. Most construction projects regardless of size are required to provide soil erosion control measures.	(3)
2.3.5.c.ii	Develop written procedures for site inspections and enforcement of sediment and erosion control measures. The procedures shall clearly define who is responsible for site inspections as well as who has authority to implement enforcement procedures. The program shall provide that the permittee may, to the extent authorized by law, impose sanctions to ensure compliance with the local program.	1 year from effective date	The City currently has two inspectors who ensure the measures shown on Approved Site Plans are implemented. Ensure that procedures for inspections are in written form.	(3)
2.3.5.c.iii	Require developers to implement a sediment and erosion control program that includes BMPs appropriate for the conditions at the construction site.	not stated	At present, most construction projects within the City, regardless of size, are required to provide soil erosion control measures. Ensure that current requirements meet all the conditions of the permit, and revise as needed.	(3)
2.3.5.c.iv	Include requirements for waste control, including but not limited to, discarded building materials, concrete truck wash out, chemicals, litter, and sanitary wastes, in the CSSRC Program.	not stated	Include current requirements in City's CSSRC Program if not already included.	(3)
2.3.5.c.v	Develop written site plan review procedures. Site plan review shall include a review by the permittee of the site design, the planned operations at the construction site, planned BMPs during the construction phase, and the planned BMPs to be used to manage runoff created after development. The review procedure shall incorporate procedures for the consideration of potential water quality impacts; procedures for pre-construction review; and procedures for receipt and consideration of information submitted by the public. Site plan review procedure shall include evaluation of opportunities for use of low impact design and green infrastructure. When the opportunity exists, the permittee shall encourage project proponents to incorporate these practices into the site design. The permittee shall track the number of site reviews, inspections, and enforcement actions.	1 year from effective date	Ensure that the City's site plan review procedures are in written form and that they meet current permit requirements.	(3)
POST-CONSTRUCTION STORMWATER MANAGEMENT				
2.3.6.a	Implement & enforce SW management for New Development/Redevelopment	not stated	Continue to implement and enforce a program to address post-construction stornmwater runoff from new development and redevelopment projects per the 2003 Permit.	-
2.3.6.a	Adopt regulatory mechanism that regulates runoff from new development/redevelopment	Should have been completed under 2003 permit.	The City has in place numerous mechanisms through which new construction site runoff is prevented and controlled. These mechanisms include: an existing Ordinance (Sec 30-5c and 5d), DPW/Eng. Division Policy and the Special Permit approval process. Most construction projects regardless of size are required to provide soil erosion control measures.	(3)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.6.a.ii	Amend existing regulatory mechanism to contain provisions at least as stringent as those outlined under Part 2.3.6.a.ii	2 years of effective date	DPW/Engineering currently requires developers to implement MADEP Stormwater Standards (1-8) for applicable projects. Separate and supplemental requirements are outlined for smaller construction projects in the City's Stormwater Management Policy. Ensure that all permit requirements listed are met.	(3)
2.3.6.a.iii	Develop procedures for Post Construction Stormwater Management to ensure submission of as-built plans within a year from completed construction, and long-term O&M of BMPs; include in written SWMP.	1 year from effective date	Engineering currently requires the submittal of stormwater operation and maintenance plans for all construction > 1 acre. Ensure that all other permit requirements are met related to operation and maintenance of BMPs.	(3)
2.3.6.a.iii	Report on measures to comply with 2.3.6.a.iii in annual MS4 stormwater report	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.6.d.i & ii	Estimate baseline impervious area and annual increase/decrease in acres of impervious area	annual MS4 stormwater reports	Develop method to track changes in impervious area as development/redevelopment occurs. Starting impervious area estimates available from EPA. Estimates to be included in Annual MS4 Stormwater Report each year.	-
GOOD HOUSEKEEPING & POLLUTION PREVENTION FOR PERMITEE-OWNED OPERATIONS				
2.3.7.a.i.	Develop written operation & maintenance procedures for municipal activities.	1 year from effective date	Develop written operation & maintenance procedures for parks and open space, buildings and facilities where pollutants are exposed to stormwater runoff, as well as vehicles and equipment.	$7,500 - $10,000
2.3.7.a.ii	Complete inventory of listed municipal facilities	1 year from effective date; review/update annually	Develop inventory of all municipal facilities; Review inventory annually and update as necessary.	-
2.3.7.a.ii.b	Provide training on use, storage, & disposal of petroleum products to applicable staff	not stated	Provide training on use, storage, & disposal of petroleum products to applicable municipal staff.	(4)
2.3.7.a.iii.a	Written program detailing activities/procedures the MS4 will implement to ensure infrastructure is maintained in timely manner	1 year from effective date	Develop written plan/schedule for activities such as street sweeping, catch basin cleaning, maintenance of structural BMPs, cleaning of storm drains, and assessment/upgrade of drainage system infrastructure.	Cost included under 2.3.7.a.i.
2.3.7.a.iii.b	Develop a plan to optimize catch basin cleaning & include in written SWMP	1 year from effective date	Develop a written plan to optimize inspection, cleaning, and maintenance of catch basins to ensure that permit conditions are met.	(1)
2.3.7.a.iii.b	Implement routine inspection/cleaning/maintenance of catch basins to ensure sumps <50% full; report on activities as specified; investigate excessive sediment; log/report CB cleaning	continuous; annual MS4 stormwater reports	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time. The City has 13,000 catch basins city-wide and currently cleans 1/2 of all catch basins each year. Based on current information, this cleaning frequency appears to be adequate to ensure that no sump is more than 50% full. Therefore, at this time, no increase above current catch basin cleaning frequency is anticipated for permit compliance.	Catch basin cleaning is already funded through the City's Stormwater Budget.
2.3.7.a.iii.c & d.	Sweep streets/parking lots 1x/year in spring; report on efforts	annually; annual MS4 stormwater reports	The City currently sweeps streets a minimum of 4 times per year, with village centers and main streets swept 5 times per week for 36 weeks of the year in 2013; all municipal parking lots are swept as well. Therefore, at this time, no increase above current sweeping frequency is anticipated.	Street sweeping is funded under the Highway Division's budget.

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.7.a.iii.d	Ensure proper storage of CB cleanings & street sweepings to prevent runoff	NA	Examine storage of CB cleanings & street sweepings	Cost included under 2.3.7.a.i.
2.3.7.a.iii.e	Establish procedures for winter road maintenance	not stated	Look at storage and usage of salt and sand; evaluate opportunities for use of alternative deicers.	Cost included under 2.3.7.a.i.
2.3.7.a.iii.f	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; and for annual inspection of treatment structures	not stated	Establish/implement procedures to inspect/maintain storm drains & structural BMPs; inspect treatment structures annually at a minimum.	Cost to develop procedures included under 2.3.7.a.i.; implementation & inspection to be completed by the City
2.3.7.a.iv	Report on all Good Housekeeping/Pollution Prevention requirements	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.7.a.v	Keep written record of all Good Housekeeping/Pollution Prevention activities	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
2.3.7.b.iv	Maintain written records for 2.3.7	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
SECTION 4 - PROGRAM EVALUATION, RECORDKEEPING & REPORTING				
4.1.a	Self-evaluate compliance with the permit; include documentation of evaluation in written SWMP	annually	Annually evaluate City's compliance with permit conditions.	(2)
4.1.b	Evaluate BMP effectiveness & change if needed under provisions of permit	not stated	Evaluate BMP effectiveness in achieving permit objectives & modify BMPs accordingly as needed.	(2)
4.1.b	Report BMP modifications	annual MS4 stormwater reports	Include in Annual MS4 Stormwater Report.	(2)
4.2	MS4 must keep records for ≥5yrs; make available to public	Continuous	Maintain annual MS4 stormwater reports and make available to the public.	-
4.3	Document results of MS4 outfall screening/sampling & any other monitoring/studies	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
4.4	Submit Annual MS4 Stormwater Report	annually 90 days from effective date	Prepare Annual MS4 Stormwater Report.	(5)

	Requirements specific to discharges to waters with approved TMDLs (see Appendix F)
	Requirements specific to discharges to impaired waters without an approved TMDL (see Appendix H)

Planning Level Estimate for Permit Compliance:	**$215,000 - $270,000**
w/20% Contingency:	**$260,000 - $325,000**

(1) Cost included as part of completing Notice of Intent and developing written Stormwater Management Plan.
(2) Cost included as part of preparing Annual MS4 Stormwater Report.
(3) Budget $10,000 to $15,000 to review all regulatory mechanisms and make recommendations on how to modify the regulations for compliance.
(4) Budget $10,000 to $15,000 the first year to conduct all employee training required under the permit, and budget $5,000 to $7,500 in subsequent years of the permit.
(5) The City will perform some or all of the work using existing City staff and resources.

Federal Stormwater Permit Compliance

Year 2

NEWTON, MA
EPA NPDES PHASE 2 STORMWATER - MS4 GENERAL PERMIT REVIEW - YEAR 2
Breakdown of Permit Requirements (Based on 2014 Draft Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
SECTION 2 - NON-NUMERIC EFFLUENT LIMITATIONS				
2.1 - Water Quality Based Effluent Limitations				
2.1.1.b	For MS4 discharges to a water body with an approved TMDL identified in Part 2.2.1, comply with Part 2.2.1 and Appendix F of the Permit	see Appendix F of the 2014 Draft MA MS4 General Permit	Both the Charles River Phosphorous TMDL and the Charles River Pathogens TMDL are applicable to Newton: Charles River (52% reduction in total phosphorus) (MA72-07); Cheesecake Brook (MA 72-08 and MA 72-29) & unnamed tributary (MA 72-30); and South Meadow Brook (MA72-24). Saw Mill Brook (MA72-23) is also covered under the phosphorous and pathogen TMDLs. Include specific BMPs and other permit requirements identified in Appendix F in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, F.A.I and F.A.III.
2.1.1.c	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Part 2.2.2 and Appendix H of the Permit	see Appendix H of the 2014 Draft MA MS4 General Permit	Impaired waters in Newton without an approved TMDL and their reason for impairment are as follows: Bulloughs Pond (excess algal growth and nutrient/eutrophication biological indicators) and Saw Mill Brook (chloride). Include specific BMPs and other permit requirements identified in Appendix H in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, and H.IV.
2.1.1.d	For all other discharges (not subject to the requirements of Part 2.1.1.b and Part 2.1.1.c of the Permit) contributing to a violation of applicable receiving water quality standards, eliminate condition causing or contributing to exceedance of water quality standards	within 60 days of becoming aware of the situation	If a discharge is identified that contributes to an exceedance of applicable water quality standards, eliminate the conditions contributing to or causing the exceedance within 60 days.	Cost included under IDDE under Item 2.3.4.2.a.
2.1.2	Written notification to MADEP & EPA as needed & documentation in the City's SWMP regarding new or increased stormwater discharges	as-needed	Any new or increased stormwater discharges must satisfy MA antidegradation regulations.	-
2.2 - Discharges to Impaired Waters				
2.2	Identify all outfalls/interconnections that discharge to waters with an approved TMDL or discharge to certain waters identified as "water quality limited water bodies"	SWMP (1 yr) & annual MS4 stormwater reports	Identify all outfalls or interconnections that discharge to an approved TMDL or to water quality limited water bodies	(1) (2)
2.2.1	For MS4 discharges to a water body with an approved TMDL, comply with Appendix F, Part A of the Permit	see Appendix F of the 2014 Draft MA MS4 General Permit	Both the Charles River Phosphorous TMDL and the Charles River Pathogens TMDL are applicable to Newton: Charles River (52% reduction in total phosphorus) (MA72-07); Cheesecake Brook (MA 72-08 and MA 72-29) & unnamed tributary (MA 72-30); and South Meadow Brook (MA72-24). Saw Mill Brook (MA72-23) is also covered under the phosphorous and pathogen TMDLs. Include specific BMPs and other permit requirements identified in Appendix F in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, F.A.I and F.A.III.

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
Charles River TMDL - Phosphorus (includes tributaries)				
F.A.I Tbl F-1	Legal analysis - authority to implement Phosphorus Control Plan (PCP)	2 years from effective date	Develop and implement Phosphorous Control Plan to reduce the amount of phosphorus in discharges to the Charles River and its tributaries to achieve consistency with the Waste Load Allocation identified in the TMDL for the Charles River (52% reduction in total phosphorus). The PCP shall include the components listed in Appendix F.	$100,000 per year should be allocated in Years 1, 2 & 3 for the development of the Phosphorus Control Plan. In Years 4 and 5, $50,000 per year should be allocated for structural BMP planning and optimization. Within Years 6 through 20, $500,000 should be allocated each year for implementation of the PCP.
F.A.I Tbl F-1	Funding assessment	3 years from effective date		
F.A.I Tbl F-1	Define scope of PCP	4 years from effective date		
F.A.I Tbl F-1	Phase 1 Plan (non-structural controls)	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Plan (structural controls)	5 years from effective date		
F.A.I Tbl F-1	O&M Plan (structural controls)	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Implementation Schedule	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Cost Estimate	5 years from effective date		
F.A.I Tbl F-1	Complete written Phase 1 PCP	5 years from effective date		
F.A.I Tbl F-1	Implementation of Phase 1 non-structural controls	6 years from effective date		
F.A.I	Performance evaluation	Annual Report Year 6-20		
F.A.I Tbl F-1	Implementation of Phase 1 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.80)$	8 years from effective date		
F.A.I Tbl F-1	Implementation of Phase 1 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.75)$	10 years from effective date		
F.A.I Tbl F-4	Review/update legal analysis	As necessary		
F.A.I Tbl F-4	Phase 2 Plan (non-structural controls)	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Plan (structural controls)	10 years from effective date		
F.A.I Tbl F-4	Update O&M Plan (structural controls)	10 years from effective date		
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F.A.I Tbl F-4	Phase 2 Cost Estimate	10 years from effective date		
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F.A.I Tbl F-4	Implementation of Phase 2 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.50)$	15 years from effective date		
F.A.I Tbl F-5	Review/update legal analysis	As necessary		
F.A.I Tbl F-5	Phase 3 Plan (non-structural controls)	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Plan (structural controls)	15 years from effective date		
F.A.I Tbl F-5	Update O&M Plan (structural controls)	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Implementation Schedule	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Cost Estimate	15 years from effective date		
F.A.I Tbl F-5	Complete written Phase 3 PCP	15 years from effective date		
F.A.I Tbl F-5	Implementation of Phase 3 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.30)$	18 years from effective date		
F.A.I Tbl F-5	Implementation of Phase 3 structural controls $P_{exp} \leq P_{allow}$	20 years from effective date		
Bacteria / Pathogen TMDL				
F.A.III.1.a.i.1	Distribute residential message on pet waste management (over/above 2.3.2)	Annually	Develop and disseminate required public education information.	Costs to be covered under City's operating budget.
F.A.III.1.a.i.1	Disseminate required public education info to dog owners	At license renewal (or similar)		
F.A.III.1.a.i.1	Send public education materials to septic system owners	Not specified; assume annually		
F.A.III.1.a.i.2	2.3.4.7 IDDE - Catchments to Bacteria/Pathogen Impaired Waters to be ranked Problem or High	With 2.3.4.7; 1 year from effective date	Rank catchments to bacteria/pathogen impaired waters as Problem or High in catchment ranking to be completed under Item 2.3.4.7.c.	Cost included under 2.3.4.7.c.
2.2.2	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Appendix H of the Permit	see Appendix H of the 2014 Draft MA MS4 General Permit	Impaired waters in Newton without an approved TMDL and their reason for impairment are as follows: Bulloughs Pond (excess algal growth and nutrient/eutrophication biological indicators) and Saw Mill Brook (chloride). Include specific BMPs and other permit requirements identified in Appendix H in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, and H.IV.

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
Impaired - Chloride				
H.IV.3	If discharge found to be to Chloride Impaired Water; update Salt Reduction Plan (SRP)	60 days from awareness	Develop and implement salt reduction plan in accordance with the requirements of Appendix H, IV. 4.	$5,000 to $10,000 per year over 5-year permit term
H.IV.3	If discharge to Chloride Impaired Water & no SRP; prepare SRP	3 years from awareness		
H.IV.3	If discharge to Chloride Impaired Water & no SRP; implement SRP	5 years from awareness		
H.IV.4.a.i	Track/report type/amount of salt applied to MS4-owned surfaces	Annual Reports beginning year SRP completed		
H.IV.4.a.ii	Implement required Salt Reduction activities	Not specified; assume ED		
H.IV.4.b.ii	Distribute message to Commercial/Industrial & private applicators on storage/application of deicing materials (over/above 2.3.3)	Annually in Nov/Dec	Supplement commercial/industrial education program with an annual message to private road salt applicators, and commercial and industrial site owners on the proper storage and application rates of winter deicing material.	$500 to $1,000 per year over 5-year permit term
H.IV.4.c	Submit Salt Reduction Plan to EPA	Annual Report after completion	Include Salt Reduction Plan in Annual Report	(2)
Alternative to Requirements H.IV.3-4 (above)				
H.IV.5	Submit documentation that discharges do not contain chloride	When Approved by EPA/DEP	Discharges should be characterized during the deicing season and capture discharges during deicing events. A written request shall be sent to EPA summarizing the data collected and methods used to characterize each outfall's discharge.	-
2.3 - Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)				
PUBLIC EDUCATION & OUTREACH				
2.3.2.a-d	Distribute at least 2 educational messages to each of 4 targeted audiences (residents, businesses/commercial/institutional, developers and industrial). Different messages to the same targeted audience shall be distributed at least one year apart.	begin year 1; continue throughout permit term	Develop/distribute a minumum of 8 messages over the permit term. Educational messages can include brochures, newsletters, information posted to the City's website, newspaper articles, public service announcements, displays in municipal buildings, etc.	$10,000 for 5-year permit term (Supplemental funding for public education requirements.)
2.3.2.e	Identify method to evaluate effectiveness of message; implement	not stated	Determine method to evaluate message effectiveness; implement method.	-
2.3.2.f	Modify ineffective messages/methods	before next message distribution	Modify message or distribution methods if applicable.	-
2.3.2.g	Report on messages as per permit	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
PUBLIC INVOLVEMENT & PARTICIPATION				
2.3.3.a	Meet Public Notice requirements	continuous	Ensure that all public involvement activities comply with state public notice requirements.	-
2.3.3.a	Make Stormwater Management Plan & Annual MS4 Stormwater Report available to public	continuous	Make SWMP and annual MS4 stormwater reports available to public at City Hall and/or on the City's website.	-
2.3.3.b	Public opportunity to participate in the review/implementation of the Stormwater Management Program	annually	May be implemented through the use of City website, City hotline, clean-up teams, monitoring teams, or a stormwater advisory committee.	-
2.3.3.c	Report on public participation opportunities	annually	Report progress in Annual MS4 Stormwater Report.	(2)
ILLICIT DISCHARGE DETECTION & ELIMINATON				
2.3.4.2.a	Eliminate illicit discharges	60 days from detection or as expeditiously as possible	Eliminate illicit discharges as they are identified or establish a schedule for elimination for discharges that cannot be removed within 60 days.	Budget $25,000 to $50,000 per year for 10 years for compliance (Cost depends on number of illicit connections identified.)
2.3.4.2.a	Report dates of illicit identification and schedules for removal	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.4.a	Mitigate SSOs	Expeditiously as possible	Eliminate SSO as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from the City until elimination is completed.	-

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.4.4.b	Complete Inventory of Sanitary Sewer Overflows (SSOs)	120 days from effective date	Identify all known locations where SSOs have discharged within the previous five years.	-
2.3.4.4.c	Report SSOs	24 hours of awareness	Provide verbal notice to EPA within 24 hours, and written notice to EPA and MADEP within 5 days.	-
2.3.4.4.d	Update SSO inventory	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.5.b	Physically label all MS4 outfalls with unique identifier	end of permit term	All MS4 outfall pipes must be labeled in the field with a unique identifier. All 143 outfalls discharging to the Charles River have been labeled in the field by the City. The remaining 241 mapped outfalls and estimated 30 unmapped outfalls still need to be labeled in the field.	$2,700 (7) (Assumes $10 per sign per outfall to purchase.)
2.3.4.6.c	Report on mapping progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.8.b	Implement IDDE catchment investigation procedure as per 2.3.4.7.e (System Vulnerability, MH inspection, wet-weather sampling, segment isolation, etc.)	3 months from written procedure; not more than 15 months from effective date	Assume that 100% of all outfalls/interconnections have at least one System Vulnerability Factor in its catchment, which triggers the requirement for wet-weather sampling. For this reason, the budget estimate assumes that 100% of the 414 outfalls/interconnections will require wet-weather sampling. Wet weather sampling parameters shall include, at a minimum, ammonia, chlorine, E.coli, surfactants and temperature. Phosphorus will also need to be included to meet the TMDL requirements. For budgeting purposes, it is assumed that an Illicit Discharge Detection and Elimination Investigation Program will need to be implemented in all catchments with dry weather flow. It is also assumed that 10% of those catchments with wet weather flow will have evidence of sewer input which will require implementation of the IDDE investigation program in these areas as well. Catchments with no potential for illicit discharges (based on the catchment ranking exercise completed under Task 2.3.4.7.c.) can be excluded from the IDDE Program. The City has had a comprehensive outfall monitoring program in place since 2006 for those outfalls discharging to the Charles River. The City may be able to get some credit for work already completed.	Budget $100,000 - $125,000 for wet weather sampling. Budget $100,000 to $125,000/yr allowance in Years 2 to 10 for IDDE investigation and sampling. Budget $25,000 to $50,000 allowance in Years 2 to 10 for CCTV inspection and dye testing to investigate illicit connections. Budget allowance for removal of illicit connections included under 2.3.4.2.a.
2.3.4.8.c	Complete IDDE in all catchments, regardless of sampling results	Not specified (see 2.3.4.8.c.iii)		
2.3.4.8.c.i	Complete IDDE investigation in 80% of Problem Catchments	3 years from effective date		
2.3.4.8.c.i	Complete IDDE investigation in 100% of Problem Catchments	5 years from effective date		
2.3.4.8.c.ii	Complete IDDE investigation in all catchments where outfall/interconnection screening information indicates sewer input based upon olfactory/visual evidence or sampling results	5 years from effective date		
2.3.4.8.c.iii	Complete IDDE investigation in 40% of catchments	5 years from effective date		
2.3.4.8.c.iii	Complete IDDE investigation in 100% of catchments	10 years from effective date		
2.3.4.8.e	Evaluate & report IDDE program progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.9	Define indicators of IDDE program success	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.10	Conduct IDDE employee training	at least annually	Continue to train employees about the IDDE Program including how to recognize illicit discharges and SSOs.	(4)
2.3.4.10	Report on IDDE employee training	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
POST-CONSTRUCTION STORMWATER MANAGEMENT				
2.3.6.a.ii	Amend existing regulatory mechanism to contain provisions at least as stringent as those outlined under Part 2.3.6.a.ii	2 years of effective date	DPW/Engineering currently requires developers to implement MADEP Stormwater Standards (1-8) for applicable projects. Separate and supplemental requirements are outlined for smaller construction projects in the City's Stormwater Management Policy. Ensure that all permit requirements listed are met.	(3)
2.3.6.a.iii	Report on measures to comply with 2.3.6.a.iii in annual MS4 stormwater report	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.6.d.i & ii	Estimate baseline impervious area and annual increase/decrease in acres of impervious area	annual MS4 stormwater reports	Develop method to track changes in impervious area as development/redevelopment occurs. Starting impervious area estimates available from EPA. Estimates to be included in Annual MS4 Stormwater Report each year.	-
GOOD HOUSEKEEPING & POLLUTION PREVENTION FOR PERMITEE-OWNED OPERATIONS				
2.3.7.a.ii.b	Provide training on use, storage, & disposal of petroleum products to applicable staff	not stated	Provide training on use, storage, & disposal of petroleum products to applicable municipal staff.	(4)
2.3.7.a.iii.b	Implement routine inspection/cleaning/maintenance of catch basins to ensure sumps <50% full; report on activities as specified; investigate excessive sediment; log/report CB cleaning	continuous; annual MS4 stormwater reports	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time. The City has 13,000 catch basins city-wide and currently cleans 1/2 of all catch basins each year. Based on current information, this cleaning frequency appears to be adequate to ensure that no sump is more than 50% full. Therefore, at this time, no increase above current catch basin cleaning frequency is anticipated for permit compliance.	Catch basin cleaning is already funded through the City's Stormwater Budget.
2.3.7.a.iii.c & d.	Sweep streets/parking lots 1x/year in spring; report on efforts	annually; annual MS4 stormwater reports	The City currently sweeps streets a minimum of 4 times per year, with village centers and main streets swept 5 times per week for 36 weeks of the year in 2013; all municipal parking lots are swept as well. Therefore, at this time, no increase above current sweeping frequency is anticipated.	Street sweeping is funded under the Highway Division's budget.
2.3.7.a.iv	Report on all Good Housekeeping/Pollution Prevention requirements	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.7.a.v	Keep written record of all Good Housekeeping/Pollution Prevention activities	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
2.3.7.b	Develop/implement written Stormwater Pollution Prevention Plans for required facilities as per permit	2 years from effective date	Develop and implement SWPPPs for all municipal waste handling facilities. This would include the DPW Yards at Elliot Street and at Crafts Street. Good housekeeping practices are currently in place based upon a self-audit of DPW yards previously conducted, but a SWPPP still needs to be developed for each yard.	$15,000 - $20,000
2.3.7.b.ii & iii	Perform SWPPP required actions/inspections/training	frequencies as per permit	Perform quarterly inspections at facilities and conduct annual employee training.	(4)
2.3.7.b.iii	Report on Stormwater Pollution Prevention Plan inspections	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.7.b.iv	Maintain written records for 2.3.7	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
SECTION 4 - PROGRAM EVALUATION, RECORDKEEPING & REPORTING				
4.1.a	Self-evaluate compliance with the permit; include documentation of evaluation in written SWMP	annually	Annually evaluate City's compliance with permit conditions.	(2)
4.1.b	Evaluate BMP effectiveness & change if needed under provisions of permit	not stated	Evaluate BMP effectiveness in achieving permit objectives & modify BMPs accordingly as needed.	(2)
4.1.b	Report BMP modifications	annual MS4 stormwater reports	Include in Annual MS4 Stormwater Report.	(2)
4.2	MS4 must keep records for ≥5yrs; make available to public	Continuous	Maintain annual MS4 stormwater reports and make available to the public.	-

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
4.3	Document results of MS4 outfall screening/sampling & any other monitoring/studies	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
4.4	Submit Annual MS4 Stormwater Report	annually 90 days from effective date	Prepare Annual MS4 Stormwater Report.	(5)

	Requirements specific to discharges to waters with approved TMDLs (see Appendix F)
	Requirements specific to discharges to impaired waters without an approved TMDL (see Appendix H)

Planning Level Estimate for Permit Compliance:	**$290,000 - $380,000**
w/20% Contingency:	**$350,000 - $460,000**

(1) Cost included as part of completing Notice of Intent and developing written Stormwater Management Plan.

(2) Cost included as part of preparing Annual MS4 Stormwater Report.

(3) Budget $10,000 to $15,000 to review all regulatory mechanisms and make recommendations on how to modify the regulations for compliance.

(4) Budget $10,000 to $15,000 the first year to conduct all employee training required under the permit, and budget $5,000 to $7,500 in subsequent years of the permit.

(5) The City will perform some or all of the work using existing City staff and resources.

Federal Stormwater Permit Compliance

Year 3

NEWTON, MA
EPA NPDES PHASE 2 STORMWATER - MS4 GENERAL PERMIT REVIEW - YEAR 3
Breakdown of Permit Requirements (Based on 2014 Draft Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
SECTION 2 - NON-NUMERIC EFFLUENT LIMITATIONS				
2.1 - Water Quality Based Effluent Limitations				
2.1.1.b	For MS4 discharges to a water body with an approved TMDL identified in Part 2.2.1, comply with Part 2.2.1 and Appendix F of the Permit	see Appendix F of the 2014 Draft MA MS4 General Permit	Both the Charles River Phosphorous TMDL and the Charles River Pathogens TMDL are applicable to Newton: Charles River (52% reduction in total phosphorus) (MA72-07); Cheesecake Brook (MA 72-08 and MA 72-29) & unnamed tributary (MA 72-30); and South Meadow Brook (MA72-24). Saw Mill Brook (MA72-23) is also covered under the phosphorous and pathogen TMDLs. Include specific BMPs and other permit requirements identified in Appendix F in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, F.A.I and F.A.III.
2.1.1.c	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Part 2.2.2 and Appendix H of the Permit	see Appendix H of the 2014 Draft MA MS4 General Permit	Impaired waters in Newton without an approved TMDL and their reason for impairment are as follows: Bulloughs Pond (excess algal growth and nutrient/eutrophication biological indicators) and Saw Mill Brook (chloride). Include specific BMPs and other permit requirements identified in Appendix H in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, and H.IV.
2.1.1.d	For all other discharges (not subject to the requirements of Part 2.1.1.b and Part 2.1.1.c of the Permit) contributing to a violation of applicable receiving water quality standards, eliminate condition causing or contributing to exceedance of water quality standards	within 60 days of becoming aware of the situation	If a discharge is identified that contributes to an exceedance of applicable water quality standards, eliminate the conditions contributing to or causing the exceedance within 60 days.	Cost included under IDDE under Item 2.3.4.2.a.
2.1.2	Written notification to MADEP & EPA as needed & documentation in the City's SWMP regarding new or increased stormwater discharges	as-needed	Any new or increased stormwater discharges must satisfy MA antidegradation regulations.	-
2.2 - Discharges to Impaired Waters				
2.2	Identify all outfalls/interconnections that discharge to waters with an approved TMDL or discharge to certain waters identified as "water quality limited water bodies"	SWMP (1 yr) & annual MS4 stormwater reports	Identify all outfalls or interconnections that discharge to an approved TMDL or to water quality limited water bodies	(1) (2)
2.2.1	For MS4 discharges to a water body with an approved TMDL, comply with Appendix F, Part A of the Permit	see Appendix F of the 2014 Draft MA MS4 General Permit	Both the Charles River Phosphorous TMDL and the Charles River Pathogens TMDL are applicable to Newton: Charles River (52% reduction in total phosphorus) (MA72-07); Cheesecake Brook (MA 72-08 and MA 72-29) & unnamed tributary (MA 72-30); and South Meadow Brook (MA72-24). Saw Mill Brook (MA72-23) is also covered under the phosphorous and pathogen TMDLs. Include specific BMPs and other permit requirements identified in Appendix F in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, F.A.I and F.A.III.

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
Charles River TMDL - Phosphorus (includes tributaries)				
F.A.I Tbl F-1	Legal analysis - authority to implement Phosphorus Control Plan (PCP)	2 years from effective date	Develop and implement Phosphorous Control Plan to reduce the amount of phosphorus in discharges to the Charles River and its tributaries to achieve consistency with the Waste Load Allocation identified in the TMDL for the Charles River (52% reduction in total phosphorus). The PCP shall include the components listed in Appendix F.	$100,000 per year should be allocated in Years 1, 2 & 3 for the development of the Phosphorus Control Plan. In Years 4 and 5, $50,000 per year should be allocated for structural BMP planning and optimization. Within Years 6 through 20, $500,000 should be allocated each year for implementation of the PCP.
F.A.I Tbl F-1	Funding assessment	3 years from effective date		
F.A.I Tbl F-1	Define scope of PCP	4 years from effective date		
F.A.I Tbl F-1	Phase 1 Plan (non-structural controls)	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Plan (structural controls)	5 years from effective date		
F.A.I Tbl F-1	O&M Plan (structural controls)	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Implementation Schedule	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Cost Estimate	5 years from effective date		
F.A.I Tbl F-1	Complete written Phase 1 PCP	5 years from effective date		
F.A.I Tbl F-1	Implementation of Phase 1 non-structural controls	6 years from effective date		
F.A.I	Performance evaluation	Annual Report Year 6-20		
F.A.I Tbl F-1	Implementation of Phase 1 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.80)$	8 years from effective date		
F.A.I Tbl F-1	Implementation of Phase 1 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.75)$	10 years from effective date		
F.A.I Tbl F-4	Review/update legal analysis	As necessary		
F.A.I Tbl F-4	Phase 2 Plan (non-structural controls)	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Plan (structural controls)	10 years from effective date		
F.A.I Tbl F-4	Update O&M Plan (structural controls)	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Implementation Schedule	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Cost Estimate	10 years from effective date		
F.A.I Tbl F-4	Complete written Phase 2 PCP	10 years from effective date		
F.A.I Tbl F-4	Implementation of Phase 2 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.65)$	13 years from effective date		
F.A.I Tbl F-4	Implementation of Phase 2 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.50)$	15 years from effective date		
F.A.I Tbl F-5	Review/update legal analysis	As necessary		
F.A.I Tbl F-5	Phase 3 Plan (non-structural controls)	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Plan (structural controls)	15 years from effective date		
F.A.I Tbl F-5	Update O&M Plan (structural controls)	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Implementation Schedule	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Cost Estimate	15 years from effective date		
F.A.I Tbl F-5	Complete written Phase 3 PCP	15 years from effective date		
F.A.I Tbl F-5	Implementation of Phase 3 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.30)$	18 years from effective date		
F.A.I Tbl F-5	Implementation of Phase 3 structural controls $P_{exp} \leq P_{allow}$	20 years from effective date		
Bacteria / Pathogen TMDL				
F.A.III.1.a.i.1	Distribute residential message on pet waste management (over/above 2.3.2)	Annually	Develop and disseminate required public education information.	Costs to be covered under City's operating budget.
F.A.III.1.a.i.1	Disseminate required public education info to dog owners	At license renewal (or similar)		
F.A.III.1.a.i.1	Send public education materials to septic system owners	Not specified; assume annually		
F.A.III.1.a.i.2	2.3.4.7 IDDE - Catchments to Bacteria/Pathogen Impaired Waters to be ranked Problem or High	With 2.3.4.7; 1 year from effective date	Rank catchments to bacteria/pathogen impaired waters as Problem or High in catchment ranking to be completed under Item 2.3.4.7.c.	Cost included under 2.3.4.7.c.
2.2.2	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Appendix H of the Permit	see Appendix H of the 2014 Draft MA MS4 General Permit	Impaired waters in Newton without an approved TMDL and their reason for impairment are as follows: Bulloughs Pond (excess algal growth and nutrient/eutrophication biological indicators) and Saw Mill Brook (chloride). Include specific BMPs and other permit requirements identified in Appendix H in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, and H.IV.

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
Impaired - Chloride				
H.IV.3	If discharge found to be to Chloride Impaired Water; update Salt Reduction Plan (SRP)	60 days from awareness	Develop and implement salt reduction plan in accordance with the requirements of Appendix H, IV. 4.	$5,000 to $10,000 per year over 5-year permit term
H.IV.3	If discharge to Chloride Impaired Water & no SRP; prepare SRP	3 years from awareness		
H.IV.3	If discharge to Chloride Impaired Water & no SRP; implement SRP	5 years from awareness		
H.IV.4.a.i	Track/report type/amount of salt applied to MS4-owned surfaces	Annual Reports beginning year SRP completed		
H.IV.4.a.ii	Implement required Salt Reduction activities	Not specified; assume ED		
H.IV.4.b.ii	Distribute message to Commercial/Industrial & private applicators on storage/application of deicing materials (over/above 2.3.3)	Annually in Nov/Dec	Supplement commercial/industrial education program with an annual message to private road salt applicators, and commercial and industrial site owners on the proper storage and application rates of winter deicing material.	$500 to $1,000 per year over 5-year permit term
H.IV.4.c	Submit Salt Reduction Plan to EPA	Annual Report after completion	Include Salt Reduction Plan in Annual Report	(2)
Alternative to Requirements H.IV.3-4 (above)				
H.IV.5	Submit documentation that discharges do not contain chloride	When Approved by EPA/DEP	Discharges should be characterized during the deicing season and capture discharges during deicing events. A written request shall be sent to EPA summarizing the data collected and methods used to characterize each outfall's discharge.	-
2.3 - Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)				
PUBLIC EDUCATION & OUTREACH				
2.3.2.a-d	Distribute at least 2 educational messages to each of 4 targeted audiences (residents, businesses/commercial/institutional, developers and industrial). Different messages to the same targeted audience shall be distributed at least one year apart.	begin year 1; continue throughout permit term	Develop/distribute a minumum of 8 messages over the permit term. Educational messages can include brochures, newsletters, information posted to the City's website, newspaper articles, public service announcements, displays in municipal buildings, etc.	$10,000 for 5-year permit term (Supplemental funding for public education requirements.)
2.3.2.e	Identify method to evaluate effectiveness of message; implement	not stated	Determine method to evaluate message effectiveness; implement method.	-
2.3.2.f	Modify ineffective messages/methods	before next message distribution	Modify message or distribution methods if applicable.	-
2.3.2.g	Report on messages as per permit	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
PUBLIC INVOLVEMENT & PARTICIPATION				
2.3.3.a	Meet Public Notice requirements	continuous	Ensure that all public involvement activities comply with state public notice requirements.	-
2.3.3.a	Make Stormwater Management Plan & Annual MS4 Stormwater Report available to public	continuous	Make SWMP and annual MS4 stormwater reports available to public at City Hall and/or on the City's website.	-
2.3.3.b	Public opportunity to participate in the review/implementation of the Stormwater Management Program	annually	May be implemented through the use of City website, City hotline, clean-up teams, monitoring teams, or a stormwater advisory committee.	-
2.3.3.c	Report on public participation opportunities	annually	Report progress in Annual MS4 Stormwater Report.	(2)
ILLICIT DISCHARGE DETECTION & ELIMINATON				
2.3.4.2.a	Eliminate illicit discharges	60 days from detection or as expeditiously as possible	Eliminate illicit discharges as they are identified or establish a schedule for elimination for discharges that cannot be removed within 60 days.	Budget $25,000 to $50,000 per year for 10 years for compliance (Cost depends on number of illicit connections identified.)
2.3.4.2.a	Report dates of illicit identification and schedules for removal	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.4.a	Mitigate SSOs	Expeditiously as possible	Eliminate SSO as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from the City until elimination is completed.	-

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.4.4.b	Complete Inventory of Sanitary Sewer Overflows (SSOs)	120 days from effective date	Identify all known locations where SSOs have discharged within the previous five years.	-
2.3.4.4.c	Report SSOs	24 hours of awareness	Provide verbal notice to EPA within 24 hours, and written notice to EPA and MADEP within 5 days.	-
2.3.4.4.d	Update SSO inventory	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.5.b	Physically label all MS4 outfalls with unique identifier	end of permit term	All MS4 outfall pipes must be labeled in the field with a unique identifier. All 143 outfalls discharging to the Charles River have been labeled in the field by the City. The remaining 241 mapped outfalls and estimated 30 unmapped outfalls still need to be labeled in the field.	$2,700 (7) (Assumes $10 per sign per outfall to purchase.)
2.3.4.8.b	Implement IDDE catchment investigation procedure as per 2.3.4.7.e (System Vulnerability, MH inspection, wet-weather sampling, segment isolation, etc.)	3 months from written procedure; not more than 15 months from effective date	Assume that 100% of all outfalls/interconnections have at least one System Vulnerability Factor in its catchment, which triggers the requirement for wet-weather sampling. For this reason, the budget estimate assumes that 100% of the 414 outfalls/interconnections will require wet-weather sampling. Wet weather sampling parameters shall include, at a minimum, ammonia, chlorine, E.coli, surfactants and temperature. Phosphorus will also need to be included to meet the TMDL requirements. For budgeting purposes, it is assumed that an Illicit Discharge Detection and Elimination Investigation Program will need to be implemented in all catchments with dry weather flow. It is also assumed that 10% of those catchments with wet weather flow will have evidence of sewer input which will require implementation of the IDDE investigation program in these areas as well. Catchments with no potential for illicit discharges (based on the catchment ranking exercise completed under Task 2.3.4.7.c.) can be excluded from the IDDE Program. The City has had a comprehensive outfall monitoring program in place since 2006 for those outfalls discharging to the Charles River. The City may be able to get some credit for work already completed.	Budget $100,000 - $125,000 for wet weather sampling. Budget $100,000 to $125,000/yr allowance in Years 2 to 10 for IDDE investigation and sampling. Budget $25,000 to $50,000 allowance in Years 2 to 10 for CCTV inspection and dye testing to investigate illicit connections. Budget allowance for removal of illicit connections included under 2.3.4.2.a.
2.3.4.8.c	Complete IDDE in all catchments, regardless of sampling results	Not specified (see 2.3.4.8.c.iii)		
2.3.4.8.c.i	Complete IDDE investigation in 80% of Problem Catchments	3 years from effective date		
2.3.4.8.c.i	Complete IDDE investigation in 100% of Problem Catchments	5 years from effective date		
2.3.4.8.c.ii	Complete IDDE investigation in all catchments where outfall/interconnection screening information indicates sewer input based upon olfactory/visual evidence or sampling results	5 years from effective date		
2.3.4.8.c.iii	Complete IDDE investigation in 40% of catchments	5 years from effective date		
2.3.4.8.c.iii	Complete IDDE investigation in 100% of catchments	10 years from effective date		
2.3.4.8.e	Evaluate & report IDDE program progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.9	Define indicators of IDDE program success	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.10	Conduct IDDE employee training	at least annually	Continue to train employees about the IDDE Program including how to recognize illicit discharges and SSOs.	(4)
2.3.4.10	Report on IDDE employee training	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
POST-CONSTRUCTION STORMWATER MANAGEMENT				
2.3.6.b	Develop a report assessing street/parking design related to creation of impervious cover	Report progress annually; complete 3 years from effective date	Develop report assessing current street design and parking lot guidelines and other local requirements impacting the creation of impervious cover. Determine whether design standards can be modified to support low impact design. If modifications can be made, outline recommendations and proposed schedule for modifying applicable standards.	$5,000 - $10,000

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.6.d.i & ii	Estimate baseline impervious area and annual increase/decrease in acres of impervious area	annual MS4 stormwater reports	Develop method to track changes in impervious area as development/redevelopment occurs. Starting impervious area estimates available from EPA. Estimates to be included in Annual MS4 Stormwater Report each year.	-
GOOD HOUSEKEEPING & POLLUTION PREVENTION FOR PERMITEE-OWNED OPERATIONS				
2.3.7.a.ii.b	Provide training on use, storage, & disposal of petroleum products to applicable staff	not stated	Provide training on use, storage, & disposal of petroleum products to applicable municipal staff.	(4)
2.3.7.a.iii.b	Implement routine inspection/cleaning/maintenance of catch basins to ensure sumps <50% full; report on activities as specified; investigate excessive sediment; log/report CB cleaning	continuous; annual MS4 stormwater reports	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time. The City has 13,000 catch basins city-wide and currently cleans 1/2 of all catch basins each year. Based on current information, this cleaning frequency appears to be adequate to ensure that no sump is more than 50% full. Therefore, at this time, no increase above current catch basin cleaning frequency is anticipated for permit compliance.	Catch basin cleaning is already funded through the City's Stormwater Budget.
2.3.7.a.iii.c & d.	Sweep streets/parking lots 1x/year in spring; report on efforts	annually; annual MS4 stormwater reports	The City currently sweeps streets a minimum of 4 times per year, with village centers and main streets swept 5 times per week for 36 weeks of the year in 2013; all municipal parking lots are swept as well. Therefore, at this time, no increase above current sweeping frequency is anticipated.	Street sweeping is funded under the Highway Division's budget.
2.3.7.a.iv	Report on all Good Housekeeping/Pollution Prevention requirements	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.7.a.v	Keep written record of all Good Housekeeping/Pollution Prevention activities	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
2.3.7.b.ii & iii	Perform SWPPP required actions/inspections/training	frequencies as per permit	Perform quarterly inspections at facilities and conduct annual employee training.	(4)
2.3.7.b.iii	Report on Stormwater Pollution Prevention Plan inspections	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.7.b.iv	Maintain written records for 2.3.7	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
SECTION 4 - PROGRAM EVALUATION, RECORDKEEPING & REPORTING				
4.1.a	Self-evaluate compliance with the permit; include documentation of evaluation in written SWMP	annually	Annually evaluate City's compliance with permit conditions.	(2)
4.1.b	Evaluate BMP effectiveness & change if needed under provisions of permit	not stated	Evaluate BMP effectiveness in achieving permit objectives & modify BMPs accordingly as needed.	(2)
4.1.b	Report BMP modifications	annual MS4 stormwater reports	Include in Annual MS4 Stormwater Report.	(2)
4.2	MS4 must keep records for ≥5yrs; make available to public	Continuous	Maintain annual MS4 stormwater reports and make available to the public.	-
4.3	Document results of MS4 outfall screening/sampling & any other monitoring/studies	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
4.4	Submit Annual MS4 Stormwater Report	annually 90 days from effective date	Prepare Annual MS4 Stormwater Report.	(5)

	Requirements specific to discharges to waters with approved TMDLs (see Appendix F)
	Requirements specific to discharges to impaired waters without an approved TMDL (see Appendix H)

Planning Level Estimate for Permit Compliance:	**$280,000 - $370,000**
w/20% Contingency:	**$335,000 - $445,000**

(1) Cost included as part of completing Notice of Intent and developing written Stormwater Management Plan.
(2) Cost included as part of preparing Annual MS4 Stormwater Report.
(3) Budget $10,000 to $15,000 to review all regulatory mechanisms and make recommendations on how to modify the regulations for compliance.
(4) Budget $10,000 to $15,000 the first year to conduct all employee training required under the permit, and budget $5,000 to $7,500 in subsequent years of the permit.
(5) The City will perform some or all of the work using existing City staff and resources.

Federal Stormwater Permit Compliance

Year 4

NEWTON, MA
EPA NPDES PHASE 2 STORMWATER - MS4 GENERAL PERMIT REVIEW - YEAR 4
Breakdown of Permit Requirements (Based on 2014 Draft Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
SECTION 2 - NON-NUMERIC EFFLUENT LIMITATIONS				
2.1 - Water Quality Based Effluent Limitations				
2.1.1.b	For MS4 discharges to a water body with an approved TMDL identified in Part 2.2.1, comply with Part 2.2.1 and Appendix F of the Permit	see Appendix F of the 2014 Draft MA MS4 General Permit	Both the Charles River Phosphorous TMDL and the Charles River Pathogens TMDL are applicable to Newton: Charles River (52% reduction in total phosphorus) (MA72-07); Cheesecake Brook (MA 72-08 and MA 72-29) & unnamed tributary (MA 72-30); and South Meadow Brook (MA72-24). Saw Mill Brook (MA72-23) is also covered under the phosphorous and pathogen TMDLs. Include specific BMPs and other permit requirements identified in Appendix F in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, F.A.I and F.A.III.
2.1.1.c	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Part 2.2.2 and Appendix H of the Permit	see Appendix H of the 2014 Draft MA MS4 General Permit	Impaired waters in Newton without an approved TMDL and their reason for impairment are as follows: Bulloughs Pond (excess algal growth and nutrient/eutrophication biological indicators) and Saw Mill Brook (chloride). Include specific BMPs and other permit requirements identified in Appendix H in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, and H.IV.
2.1.1.d	For all other discharges (not subject to the requirements of Part 2.1.1.b and Part 2.1.1.c of the Permit) contributing to a violation of applicable receiving water quality standards, eliminate condition causing or contributing to exceedance of water quality standards	within 60 days of becoming aware of the situation	If a discharge is identified that contributes to an exceedance of applicable water quality standards, eliminate the conditions contributing to or causing the exceedance within 60 days.	Cost included under IDDE under Item 2.3.4.2.a.
2.1.2	Written notification to MADEP & EPA as needed & documentation in the City's SWMP regarding new or increased stormwater discharges	as-needed	Any new or increased stormwater discharges must satisfy MA antidegradation regulations.	-
2.2 - Discharges to Impaired Waters				
2.2	Identify all outfalls/interconnections that discharge to waters with an approved TMDL or discharge to certain waters identified as "water quality limited water bodies"	SWMP (1 yr) & annual MS4 stormwater reports	Identify all outfalls or interconnections that discharge to an approved TMDL or to water quality limited water bodies	(1) (2)
2.2.1	For MS4 discharges to a water body with an approved TMDL, comply with Appendix F, Part A of the Permit	see Appendix F of the 2014 Draft MA MS4 General Permit	Both the Charles River Phosphorous TMDL and the Charles River Pathogens TMDL are applicable to Newton: Charles River (52% reduction in total phosphorus) (MA72-07); Cheesecake Brook (MA 72-08 and MA 72-29) & unnamed tributary (MA 72-30); and South Meadow Brook (MA72-24). Saw Mill Brook (MA72-23) is also covered under the phosphorous and pathogen TMDLs. Include specific BMPs and other permit requirements identified in Appendix F in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, F.A.I and F.A.III.

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
Charles River TMDL - Phosphorus (includes tributaries)				
F.A.I Tbl F-1	Legal analysis - authority to implement Phosphorus Control Plan (PCP)	2 years from effective date	Develop and implement Phosphorous Control Plan to reduce the amount of phosphorus in discharges to the Charles River and its tributaries to achieve consistency with the Waste Load Allocation identified in the TMDL for the Charles River (52% reduction in total phosphorus). The PCP shall include the components listed in Appendix F.	$100,000 per year should be allocated in Years 1, 2 & 3 for the development of the Phosphorus Control Plan. In Years 4 and 5, $50,000 per year should be allocated for structural BMP planning and optimization. Within Years 6 through 20, $500,000 should be allocated each year for implementation of the PCP.
F.A.I Tbl F-1	Funding assessment	3 years from effective date		
F.A.I Tbl F-1	Define scope of PCP	4 years from effective date		
F.A.I Tbl F-1	Phase 1 Plan (non-structural controls)	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Plan (structural controls)	5 years from effective date		
F.A.I Tbl F-1	O&M Plan (structural controls)	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Implementation Schedule	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Cost Estimate	5 years from effective date		
F.A.I Tbl F-1	Complete written Phase 1 PCP	5 years from effective date		
F.A.I Tbl F-1	Implementation of Phase 1 non-structural controls	6 years from effective date		
F.A.I	Performance evaluation	Annual Report Year 6-20		
F.A.I Tbl F-1	Implementation of Phase 1 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.80)$	8 years from effective date		
F.A.I Tbl F-1	Implementation of Phase 1 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.75)$	10 years from effective date		
F.A.I Tbl F-4	Review/update legal analysis	As necessary		
F.A.I Tbl F-4	Phase 2 Plan (non-structural controls)	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Plan (structural controls)	10 years from effective date		
F.A.I Tbl F-4	Update O&M Plan (structural controls)	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Implementation Schedule	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Cost Estimate	10 years from effective date		
F.A.I Tbl F-4	Complete written Phase 2 PCP	10 years from effective date		
F.A.I Tbl F-4	Implementation of Phase 2 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.65)$	13 years from effective date		
F.A.I Tbl F-4	Implementation of Phase 2 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.50)$	15 years from effective date		
F.A.I Tbl F-5	Review/update legal analysis	As necessary		
F.A.I Tbl F-5	Phase 3 Plan (non-structural controls)	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Plan (structural controls)	15 years from effective date		
F.A.I Tbl F-5	Update O&M Plan (structural controls)	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Implementation Schedule	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Cost Estimate	15 years from effective date		
F.A.I Tbl F-5	Complete written Phase 3 PCP	15 years from effective date		
F.A.I Tbl F-5	Implementation of Phase 3 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.30)$	18 years from effective date		
F.A.I Tbl F-5	Implementation of Phase 3 structural controls $P_{exp} \leq P_{allow}$	20 years from effective date		
Bacteria / Pathogen TMDL				
F.A.III.1.a.i.1	Distribute residential message on pet waste management (over/above 2.3.2)	Annually	Develop and disseminate required public education information.	Costs to be covered under City's operating budget.
F.A.III.1.a.i.1	Disseminate required public education info to dog owners	At license renewal (or similar)		
F.A.III.1.a.i.1	Send public education materials to septic system owners	Not specified; assume annually		
2.2.2	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Appendix H of the Permit	see Appendix H of the 2014 Draft MA MS4 General Permit	Impaired waters in Newton without an approved TMDL and their reason for impairment are as follows: Bulloughs Pond (excess algal growth and nutrient/eutrophication biological indicators) and Saw Mill Brook (chloride). Include specific BMPs and other permit requirements identified in Appendix H in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, and H.IV.
Impaired - Chloride				
H.IV.3	If discharge found to be to Chloride Impaired Water; update Salt Reduction Plan (SRP)	60 days from awareness	Develop and implement salt reduction plan in accordance with the requirements of Appendix H, IV. 4.	$5,000 to $10,000 per year over 5-year permit term
H.IV.3	If discharge to Chloride Impaired Water & no SRP; prepare SRP	3 years from awareness		
H.IV.3	If discharge to Chloride Impaired Water & no SRP; implement SRP	5 years from awareness		
H.IV.4.a.i	Track/report type/amount of salt applied to MS4-owned surfaces	Annual Reports beginning year SRP completed		
H.IV.4.a.ii	Implement required Salt Reduction activities	Not specified; assume ED		

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
H.IV.4.b.ii	Distribute message to Commercial/Industrial & private applicators on storage/application of deicing materials (over/above 2.3.3)	Annually in Nov/Dec	Supplement commercial/industrial education program with an annual message to private road salt applicators, and commercial and industrial site owners on the proper storage and application rates of winter deicing material.	$500 to $1,000 per year over 5-year permit term
H.IV.4.c	Submit Salt Reduction Plan to EPA	Annual Report after completion	Include Salt Reduction Plan in Annual Report	(2)
Alternative to Requirements H.IV.3-4 (above)				
H.IV.5	Submit documentation that discharges do not contain chloride	When Approved by EPA/DEP	Discharges should be characterized during the deicing season and capture discharges during deicing events. A written request shall be sent to EPA summarizing the data collected and methods used to characterize each outfall's discharge.	-
2.3 - Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)				
PUBLIC EDUCATION & OUTREACH				
2.3.2.a-d	Distribute at least 2 educational messages to each of 4 targeted audiences (residents, businesses/commercial/institutional, developers and industrial). Different messages to the same targeted audience shall be distributed at least one year apart.	begin year 1; continue throughout permit term	Develop/distribute a minumum of 8 messages over the permit term. Educational messages can include brochures, newsletters, information posted to the City's website, newspaper articles, public service announcements, displays in municipal buildings, etc.	$10,000 for 5-year permit term (Supplemental funding for public education requirements.)
2.3.2.e	Identify method to evaluate effectiveness of message; implement	not stated	Determine method to evaluate message effectiveness; implement method.	-
2.3.2.f	Modify ineffective messages/methods	before next message distribution	Modify message or distribution methods if applicable.	-
2.3.2.g	Report on messages as per permit	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
PUBLIC INVOLVEMENT & PARTICIPATION				
2.3.3.a	Meet Public Notice requirements	continuous	Ensure that all public involvement activities comply with state public notice requirements.	-
2.3.3.a	Make Stormwater Management Plan & Annual MS4 Stormwater Report available to public	continuous	Make SWMP and annual MS4 stormwater reports available to public at City Hall and/or on the City's website.	-
2.3.3.b	Public opportunity to participate in the review/implementation of the Stormwater Management Program	annually	May be implemented through the use of City website, City hotline, clean-up teams, monitoring teams, or a stormwater advisory committee.	-
2.3.3.c	Report on public participation opportunities	annually	Report progress in Annual MS4 Stormwater Report.	(2)
ILLICIT DISCHARGE DETECTION & ELIMINATON				
2.3.4.2.a	Eliminate illicit discharges	60 days from detection or as expeditiously as possible	Eliminate illicit discharges as they are identified or establish a schedule for elimination for discharges that cannot be removed within 60 days.	Budget $25,000 to $50,000 per year for 10 years for compliance (Cost depends on number of illicit connections identified.)
2.3.4.2.a	Report dates of illicit identification and schedules for removal	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.4.a	Mitigate SSOs	Expeditiously as possible	Eliminate SSO as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from the City until elimination is completed.	-
2.3.4.4.b	Complete Inventory of Sanitary Sewer Overflows (SSOs)	120 days from effective date	Identify all known locations where SSOs have discharged within the previous five years.	-
2.3.4.4.c	Report SSOs	24 hours of awareness	Provide verbal notice to EPA within 24 hours, and written notice to EPA and MADEP within 5 days.	-
2.3.4.4.d	Update SSO inventory	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.4.5.b	Physically label all MS4 outfalls with unique identifier	end of permit term	All MS4 outfall pipes must be labeled in the field with a unique identifier. All 143 outfalls discharging to the Charles River have been labeled in the field by the City. The remaining 241 mapped outfalls and estimated 30 unmapped outfalls still need to be labeled in the field.	$2,700 (7) (Assumes $10 per sign per outfall to purchase.)
2.3.4.8.b	Implement IDDE catchment investigation procedure as per 2.3.4.7.e (System Vulnerability, MH inspection, wet-weather sampling, segment isolation, etc.)	3 months from written procedure; not more than 15 months from effective date	Assume that 100% of all outfalls/interconnections have at least one System Vulnerability Factor in its catchment, which triggers the requirement for wet-weather sampling. For this reason, the budget estimate assumes that 100% of the 414 outfalls/interconnections will require wet-weather sampling. Wet weather sampling parameters shall include, at a minimum, ammonia, chlorine, E.coli, surfactants and temperature. Phosphorus will also need to be included to meet the TMDL requirements. For budgeting purposes, it is assumed that an Illicit Discharge Detection and Elimination Investigation Program will need to be implemented in all catchments with dry weather flow. It is also assumed that 10% of those catchments with wet weather flow will have evidence of sewer input which will require implementation of the IDDE investigation program in these areas as well. Catchments with no potential for illicit discharges (based on the catchment ranking exercise completed under Task 2.3.4.7.c.) can be excluded from the IDDE Program. The City has had a comprehensive outfall monitoring program in place since 2006 for those outfalls discharging to the Charles River. The City may be able to get some credit for work already completed.	Budget $100,000 - $125,000 for wet weather sampling. Budget $100,000 to $125,000/yr allowance in Years 2 to 10 for IDDE investigation and sampling. Budget $25,000 to $50,000 allowance in Years 2 to 10 for CCTV inspection and dye testing to investigate illicit connections. Budget allowance for removal of illicit connections included under 2.3.4.2.a.
2.3.4.8.c	Complete IDDE in all catchments, regardless of sampling results	Not specified (see 2.3.4.8.c.iii)		
2.3.4.8.c.i	Complete IDDE investigation in 80% of Problem Catchments	3 years from effective date		
2.3.4.8.c.i	Complete IDDE investigation in 100% of Problem Catchments	5 years from effective date		
2.3.4.8.c.ii	Complete IDDE investigation in all catchments where outfall/interconnection screening information indicates sewer input based upon olfactory/visual evidence or sampling results	5 years from effective date		
2.3.4.8.c.iii	Complete IDDE investigation in 40% of catchments	5 years from effective date		
2.3.4.8.c.iii	Complete IDDE investigation in 100% of catchments	10 years from effective date		
2.3.4.8.e	Evaluate & report IDDE program progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.9	Define indicators of IDDE program success	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.10	Conduct IDDE employee training	at least annually	Continue to train employees about the IDDE Program including how to recognize illicit discharges and SSOs.	(4)
2.3.4.10	Report on IDDE employee training	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
POST-CONSTRUCTION STORMWATER MANAGEMENT				
2.3.6.c	Develop a report assessing local regulations to allow the listed green practices	Report progress annually; complete 4 years from effective date	Develop a report assessing existing local regulations to determine the feasibility of making green infrastructure practices (green roofs, infiltration practices, water harvesting devices) allowable when appropriate site conditions exist.	$5,000 - $10,000
2.3.6.d.i & ii	Estimate baseline impervious area and annual increase/decrease in acres of impervious area	annual MS4 stormwater reports	Develop method to track changes in impervious area as development/redevelopment occurs. Starting impervious area estimates available from EPA. Estimates to be included in Annual MS4 Stormwater Report each year.	-
2.3.6.d.iii	Inventory & priority ranking for permittee-owned BMP retrofits	4 years from effective date	Complete an inventory and priority ranking of City property and infrastructure that could be retrofitted with BMPs to reduce frequency, volume and pollutant loads associated with stormwater discharges.	$15,000 - $25,000

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
GOOD HOUSEKEEPING & POLLUTION PREVENTION FOR PERMITEE-OWNED OPERATIONS				
2.3.7.a.ii.b	Provide training on use, storage, & disposal of petroleum products to applicable staff	not stated	Provide training on use, storage, & disposal of petroleum products to applicable municipal staff.	(4)
2.3.7.a.iii.b	Implement routine inspection/cleaning/maintenance of catch basins to ensure sumps <50% full; report on activities as specified; investigate excessive sediment; log/report CB cleaning	continuous; annual MS4 stormwater reports	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time. The City has 13,000 catch basins city-wide and currently cleans 1/2 of all catch basins each year. Based on current information, this cleaning frequency appears to be adequate to ensure that no sump is more than 50% full. Therefore, at this time, no increase above current catch basin cleaning frequency is anticipated for permit compliance.	Catch basin cleaning is already funded through the City's Stormwater Budget.
2.3.7.a.iii.c & d.	Sweep streets/parking lots 1x/year in spring; report on efforts	annually; annual MS4 stormwater reports	The City currently sweeps streets a minimum of 4 times per year, with village centers and main streets swept 5 times per week for 36 weeks of the year in 2013; all municipal parking lots are swept as well. Therefore, at this time, no increase above current sweeping frequency is anticipated.	Street sweeping is funded under the Highway Division's budget.
2.3.7.a.iv	Report on all Good Housekeeping/Pollution Prevention requirements	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.7.a.v	Keep written record of all Good Housekeeping/Pollution Prevention activities	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
2.3.7.b.ii & iii	Perform SWPPP required actions/inspections/training	frequencies as per permit	Perform quarterly inspections at facilities and conduct annual employee training.	(4)
2.3.7.b.iii	Report on Stormwater Pollution Prevention Plan inspections	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.7.b.iv	Maintain written records for 2.3.7	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
SECTION 4 - PROGRAM EVALUATION, RECORDKEEPING & REPORTING				
4.1.a	Self-evaluate compliance with the permit; include documentation of evaluation in written SWMP	annually	Annually evaluate City's compliance with permit conditions.	(2)
4.1.b	Evaluate BMP effectiveness & change if needed under provisions of permit	not stated	Evaluate BMP effectiveness in achieving permit objectives & modify BMPs accordingly as needed.	(2)
4.1.b	Report BMP modifications	annual MS4 stormwater reports	Include in Annual MS4 Stormwater Report.	(2)
4.2	MS4 must keep records for ≥5yrs; make available to public	Continuous	Maintain annual MS4 stormwater reports and make available to the public.	-
4.3	Document results of MS4 outfall screening/sampling & any other monitoring/studies	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
4.4	Submit Annual MS4 Stormwater Report	annually 90 days from effective date	Prepare Annual MS4 Stormwater Report.	(5)

Requirements specific to discharges to waters with approved TMDLs (see Appendix F)

Requirements specific to discharges to impaired waters without an approved TMDL (see Appendix H)

Planning Level Estimate for Permit Compliance:	**$245,000 - $345,000**
w/20% Contingency:	**$295,000 - $415,000**

(1) Cost included as part of completing Notice of Intent and developing written Stormwater Management Plan.

(2) Cost included as part of preparing Annual MS4 Stormwater Report.

(3) Budget $10,000 to $15,000 to review all regulatory mechanisms and make recommendations on how to modify the regulations for compliance.

(4) Budget $10,000 to $15,000 the first year to conduct all employee training required under the permit, and budget $5,000 to $7,500 in subsequent years of the permit.

(5) The City will perform some or all of the work using existing City staff and resources.

Federal Stormwater Permit Compliance

Year 5

NEWTON, MA
EPA NPDES PHASE 2 STORMWATER - MS4 GENERAL PERMIT REVIEW - YEAR 5
Breakdown of Permit Requirements (Based on 2014 Draft Massachusetts MS4 General Permit)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
SECTION 2 - NON-NUMERIC EFFLUENT LIMITATIONS				
2.1 - Water Quality Based Effluent Limitations				
2.1.1.b	For MS4 discharges to a water body with an approved TMDL identified in Part 2.2.1, comply with Part 2.2.1 and Appendix F of the Permit	see Appendix F of the 2014 Draft MA MS4 General Permit	Both the Charles River Phosphorous TMDL and the Charles River Pathogens TMDL are applicable to Newton: Charles River (52% reduction in total phosphorus) (MA72-07); Cheesecake Brook (MA 72-08 and MA 72-29) & unnamed tributary (MA 72-30); and South Meadow Brook (MA72-24). Saw Mill Brook (MA72-23) is also covered under the phosphorous and pathogen TMDLs. Include specific BMPs and other permit requirements identified in Appendix F in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, F.A.I and F.A.III.
2.1.1.c	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Part 2.2.2 and Appendix H of the Permit	see Appendix H of the 2014 Draft MA MS4 General Permit	Impaired waters in Newton without an approved TMDL and their reason for impairment are as follows: Bulloughs Pond (excess algal growth and nutrient/eutrophication biological indicators) and Saw Mill Brook (chloride). Include specific BMPs and other permit requirements identified in Appendix H in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, and H.IV.
2.1.1.d	For all other discharges (not subject to the requirements of Part 2.1.1.b and Part 2.1.1.c of the Permit) contributing to a violation of applicable receiving water quality standards, eliminate condition causing or contributing to exceedance of water quality standards	within 60 days of becoming aware of the situation	If a discharge is identified that contributes to an exceedance of applicable water quality standards, eliminate the conditions contributing to or causing the exceedance within 60 days.	Cost included under IDDE under Item 2.3.4.2.a.
2.1.2	Written notification to MADEP & EPA as needed & documentation in the City's SWMP regarding new or increased stormwater discharges	as-needed	Any new or increased stormwater discharges must satisfy MA antidegradation regulations.	-
2.2 - Discharges to Impaired Waters				
2.2	Identify all outfalls/interconnections that discharge to waters with an approved TMDL or discharge to certain waters identified as "water quality limited water bodies"	SWMP (1 yr) & annual MS4 stormwater reports	Identify all outfalls or interconnections that discharge to an approved TMDL or to water quality limited water bodies	(1) (2)
2.2.1	For MS4 discharges to a water body with an approved TMDL, comply with Appendix F, Part A of the Permit	see Appendix F of the 2014 Draft MA MS4 General Permit	Both the Charles River Phosphorous TMDL and the Charles River Pathogens TMDL are applicable to Newton: Charles River (52% reduction in total phosphorus) (MA72-07); Cheesecake Brook (MA 72-08 and MA 72-29) & unnamed tributary (MA 72-30); and South Meadow Brook (MA72-24). Saw Mill Brook (MA72-23) is also covered under the phosphorous and pathogen TMDLs. Include specific BMPs and other permit requirements identified in Appendix F in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, F.A.I and F.A.III.

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
Charles River TMDL - Phosphorus (includes tributaries)				
F.A.I Tbl F-1	Legal analysis - authority to implement Phosphorus Control Plan (PCP)	2 years from effective date	Develop and implement Phosphorous Control Plan to reduce the amount of phosphorus in discharges to the Charles River and its tributaries to achieve consistency with the Waste Load Allocation identified in the TMDL for the Charles River (52% reduction in total phosphorus). The PCP shall include the components listed in Appendix F.	$100,000 per year should be allocated in Years 1, 2 & 3 for the development of the Phosphorus Control Plan. In Years 4 and 5, $50,000 per year should be allocated for structural BMP planning and optimization. Within Years 6 through 20, $500,000 should be allocated each year for implementation of the PCP.
F.A.I Tbl F-1	Funding assessment	3 years from effective date		
F.A.I Tbl F-1	Define scope of PCP	4 years from effective date		
F.A.I Tbl F-1	Phase 1 Plan (non-structural controls)	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Plan (structural controls)	5 years from effective date		
F.A.I Tbl F-1	O&M Plan (structural controls)	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Implementation Schedule	5 years from effective date		
F.A.I Tbl F-1	Phase 1 Cost Estimate	5 years from effective date		
F.A.I Tbl F-1	Complete written Phase 1 PCP	5 years from effective date		
F.A.I Tbl F-1	Implementation of Phase 1 non-structural controls	6 years from effective date		
F.A.I	Performance evaluation	Annual Report Year 6-20		
F.A.I Tbl F-1	Implementation of Phase 1 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.80)$	8 years from effective date		
F.A.I Tbl F-1	Implementation of Phase 1 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.75)$	10 years from effective date		
F.A.I Tbl F-4	Review/update legal analysis	As necessary		
F.A.I Tbl F-4	Phase 2 Plan (non-structural controls)	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Plan (structural controls)	10 years from effective date		
F.A.I Tbl F-4	Update O&M Plan (structural controls)	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Implementation Schedule	10 years from effective date		
F.A.I Tbl F-4	Phase 2 Cost Estimate	10 years from effective date		
F.A.I Tbl F-4	Complete written Phase 2 PCP	10 years from effective date		
F.A.I Tbl F-4	Implementation of Phase 2 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.65)$	13 years from effective date		
F.A.I Tbl F-4	Implementation of Phase 2 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.50)$	15 years from effective date		
F.A.I Tbl F-5	Review/update legal analysis	As necessary		
F.A.I Tbl F-5	Phase 3 Plan (non-structural controls)	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Plan (structural controls)	15 years from effective date		
F.A.I Tbl F-5	Update O&M Plan (structural controls)	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Implementation Schedule	15 years from effective date		
F.A.I Tbl F-5	Phase 3 Cost Estimate	15 years from effective date		
F.A.I Tbl F-5	Complete written Phase 3 PCP	15 years from effective date		
F.A.I Tbl F-5	Implementation of Phase 3 structural controls $P_{exp} \leq P_{allow} + (P_{rr} \times 0.30)$	18 years from effective date		
F.A.I Tbl F-5	Implementation of Phase 3 structural controls $P_{exp} \leq P_{allow}$	20 years from effective date		
Bacteria / Pathogen TMDL				
F.A.III.1.a.i.1	Distribute residential message on pet waste management (over/above 2.3.2)	Annually	Develop and disseminate required public education information.	Costs to be covered under City's operating budget.
F.A.III.1.a.i.1	Disseminate required public education info to dog owners	At license renewal (or similar)		
F.A.III.1.a.i.1	Send public education materials to septic system owners	Not specified; assume annually		
F.A.III.1.a.i.2	2.3.4.7 IDDE - Catchments to Bacteria/Pathogen Impaired Waters to be ranked Problem or High	With 2.3.4.7; 1 year from effective date	Rank catchments to bacteria/pathogen impaired waters as Problem or High in catchment ranking to be completed under Item 2.3.4.7.c.	Cost included under 2.3.4.7.c.
2.2.2	For MS4 discharges to a water body that is water quality limited and not subject to an approved TMDL or for municipalities located within Part 2.2.2a.-b., comply with Appendix H of the Permit	see Appendix H of the 2014 Draft MA MS4 General Permit	Impaired waters in Newton without an approved TMDL and their reason for impairment are as follows: Bulloughs Pond (excess algal growth and nutrient/eutrophication biological indicators) and Saw Mill Brook (chloride). Include specific BMPs and other permit requirements identified in Appendix H in the Notice of Intent for compliance.	Costs included under 1.7.2, 1.10, and H.IV.

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
Impaired - Chloride				
H.IV.3	If discharge found to be to Chloride Impaired Water; update Salt Reduction Plan (SRP)	60 days from awareness	Develop and implement salt reduction plan in accordance with the requirements of Appendix H, IV. 4.	$5,000 to $10,000 per year over 5-year permit term
H.IV.3	If discharge to Chloride Impaired Water & no SRP; prepare SRP	3 years from awareness		
H.IV.3	If discharge to Chloride Impaired Water & no SRP; implement SRP	5 years from awareness		
H.IV.4.a.i	Track/report type/amount of salt applied to MS4-owned surfaces	Annual Reports beginning year SRP completed		
H.IV.4.a.ii	Implement required Salt Reduction activities	Not specified; assume ED		
H.IV.4.b.ii	Distribute message to Commercial/Industrial & private applicators on storage/application of deicing materials (over/above 2.3.3)	Annually in Nov/Dec	Supplement commercial/industrial education program with an annual message to private road salt applicators, and commercial and industrial site owners on the proper storage and application rates of winter deicing material.	$500 to $1,000 per year over 5-year permit term
H.IV.4.c	Submit Salt Reduction Plan to EPA	Annual Report after completion	Include Salt Reduction Plan in Annual Report	(2)
Alternative to Requirements H.IV.3-4 (above)				
H.IV.5	Submit documentation that discharges do not contain chloride	When Approved by EPA/DEP	Discharges should be characterized during the deicing season and capture discharges during deicing events. A written request shall be sent to EPA summarizing the data collected and methods used to characterize each outfall's discharge.	-
2.3 - Requirements to Reduce Pollutants to the Maximum Extent Practicable (MEP)				
PUBLIC EDUCATION & OUTREACH				
2.3.2.a-d	Distribute at least 2 educational messages to each of 4 targeted audiences (residents, businesses/commercial/institutional, developers and industrial). Different messages to the same targeted audience shall be distributed at least one year apart.	begin year 1; continue throughout permit term	Develop/distribute a minumum of 8 messages over the permit term. Educational messages can include brochures, newsletters, information posted to the City's website, newspaper articles, public service announcements, displays in municipal buildings, etc.	$10,000 for 5-year permit term (Supplemental funding for public education requirements.)
2.3.2.e	Identify method to evaluate effectiveness of message; implement	not stated	Determine method to evaluate message effectiveness; implement method.	-
2.3.2.f	Modify ineffective messages/methods	before next message distribution	Modify message or distribution methods if applicable.	-
2.3.2.g	Report on messages as per permit	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
PUBLIC INVOLVEMENT & PARTICIPATION				
2.3.3.a	Meet Public Notice requirements	continuous	Ensure that all public involvement activities comply with state public notice requirements.	-
2.3.3.a	Make Stormwater Management Plan & Annual MS4 Stormwater Report available to public	continuous	Make SWMP and annual MS4 stormwater reports available to public at City Hall and/or on the City's website.	-
2.3.3.b	Public opportunity to participate in the review/implementation of the Stormwater Management Program	annually	May be implemented through the use of City website, City hotline, clean-up teams, monitoring teams, or a stormwater advisory committee.	-
2.3.3.c	Report on public participation opportunities	annually	Report progress in Annual MS4 Stormwater Report.	(2)
ILLICIT DISCHARGE DETECTION & ELIMINATON				
2.3.4.2.a	Eliminate illicit discharges	60 days from detection or as expeditiously as possible	Eliminate illicit discharges as they are identified or establish a schedule for elimination for discharges that cannot be removed within 60 days.	Budget $25,000 to $50,000 per year for 10 years for compliance (Cost depends on number of illicit connections identified.)
2.3.4.2.a	Report dates of illicit identification and schedules for removal	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.4.a	Mitigate SSOs	Expeditiously as possible	Eliminate SSO as expeditiously as possible and take interim mitigation measures to minimize the discharge of pollutants to and from the City until elimination is completed.	-
2.3.4.4.b	Complete Inventory of Sanitary Sewer Overflows (SSOs)	120 days from effective date	Identify all known locations where SSOs have discharged within the previous five years.	-

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
2.3.4.4.c	Report SSOs	24 hours of awareness	Provide verbal notice to EPA within 24 hours, and written notice to EPA and MADEP within 5 days.	-
2.3.4.4.d	Update SSO inventory	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.5.b	Physically label all MS4 outfalls with unique identifier	end of permit term	All MS4 outfall pipes must be labeled in the field with a unique identifier. All 143 outfalls discharging to the Charles River have been labeled in the field by the City. The remaining 241 mapped outfalls and estimated 30 unmapped outfalls still need to be labeled in the field.	$2,700 (7) (Assumes $10 per sign per outfall to purchase.)
2.3.4.8.b	Implement IDDE catchment investigation procedure as per 2.3.4.7.e (System Vulnerability, MH inspection, wet-weather sampling, segment isolation, etc.)	3 months from written procedure; not more than 15 months from effective date	Assume that 100% of all outfalls/interconnections have at least one System Vulnerability Factor in its catchment, which triggers the requirement for wet-weather sampling. For this reason, the budget estimate assumes that 100% of the 414 outfalls/interconnections will require wet-weather sampling. Wet weather sampling parameters shall include, at a minimum, ammonia, chlorine, E.coli, surfactants and temperature. Phosphorus will also need to be included to meet the TMDL requirements. For budgeting purposes, it is assumed that an Illicit Discharge Detection and Elimination Investigation Program will need to be implemented in all catchments with dry weather flow. It is also assumed that 10% of those catchments with wet weather flow will have evidence of sewer input which will require implementation of the IDDE investigation program in these areas as well. Catchments with no potential for illicit discharges (based on the catchment ranking exercise completed under Task 2.3.4.7.c.) can be excluded from the IDDE Program. The City has had a comprehensive outfall monitoring program in place since 2006 for those outfalls discharging to the Charles River. The City may be able to get some credit for work already completed.	Budget $100,000 - $125,000 for wet weather sampling. Budget $100,000 to $125,000/yr allowance in Years 2 to 10 for IDDE investigation and sampling. Budget $25,000 to $50,000 allowance in Years 2 to 10 for CCTV inspection and dye testing to investigate illicit connections. Budget allowance for removal of illicit connections included under 2.3.4.2.a.
2.3.4.8.c	Complete IDDE in all catchments, regardless of sampling results	Not specified (see 2.3.4.8.c.iii)		
2.3.4.8.c.i	Complete IDDE investigation in 80% of Problem Catchments	3 years from effective date		
2.3.4.8.c.i	Complete IDDE investigation in 100% of Problem Catchments	5 years from effective date		
2.3.4.8.c.ii	Complete IDDE investigation in all catchments where outfall/interconnection screening information indicates sewer input based upon olfactory/visual evidence or sampling results	5 years from effective date		
2.3.4.8.c.iii	Complete IDDE investigation in 40% of catchments	5 years from effective date		
2.3.4.8.c.iii	Complete IDDE investigation in 100% of catchments	10 years from effective date		
2.3.4.8.e	Evaluate & report IDDE program progress	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.9	Define indicators of IDDE program success	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.4.10	Conduct IDDE employee training	at least annually	Continue to train employees about the IDDE Program including how to recognize illicit discharges and SSOs.	(4)
2.3.4.10	Report on IDDE employee training	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)

Item No.	Requirement	Deadline	Needs Specific to Newton	Estimated Cost to Comply
POST-CONSTRUCTION STORMWATER MANAGEMENT				
2.3.6.d.i & ii	Estimate baseline impervious area and annual increase/decrease in acres of impervious area	annual MS4 stormwater reports	Develop method to track changes in impervious area as development/redevelopment occurs. Starting impervious area estimates available from EPA. Estimates to be included in Annual MS4 Stormwater Report each year.	-
2.3.6.d.iv	Report progress on implementation of BMP retrofits	annual MS4 stormwater reports beginning Year 5	Report progress in Annual MS4 Stormwater Report.	(2)
GOOD HOUSEKEEPING & POLLUTION PREVENTION FOR PERMITEE-OWNED OPERATIONS				
2.3.7.a.ii.b	Provide training on use, storage, & disposal of petroleum products to applicable staff	not stated	Provide training on use, storage, & disposal of petroleum products to applicable municipal staff.	(4)
2.3.7.a.iii.b	Implement routine inspection/cleaning/maintenance of catch basins to ensure sumps <50% full; report on activities as specified; investigate excessive sediment; log/report CB cleaning	continuous; annual MS4 stormwater reports	Clean catch basins as needed to ensure that no sump is more than 50% full at any given time. The City has 13,000 catch basins city-wide and currently cleans 1/2 of all catch basins each year. Based on current information, this cleaning frequency appears to be adequate to ensure that no sump is more than 50% full. Therefore, at this time, no increase above current catch basin cleaning frequency is anticipated for permit compliance.	Catch basin cleaning is already funded through the City's Stormwater Budget.
2.3.7.a.iii.c & d.	Sweep streets/parking lots 1x/year in spring; report on efforts	annually; annual MS4 stormwater reports	The City currently sweeps streets a minimum of 4 times per year, with village centers and main streets swept 5 times per week for 36 weeks of the year in 2013; all municipal parking lots are swept as well. Therefore, at this time, no increase above current sweeping frequency is anticipated.	Street sweeping is funded under the Highway Division's budget.
2.3.7.a.iv	Report on all Good Housekeeping/Pollution Prevention requirements	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.7.a.v	Keep written record of all Good Housekeeping/Pollution Prevention activities	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
2.3.7.b.ii & iii	Perform SWPPP required actions/inspections/training	frequencies as per permit	Perform quarterly inspections at facilities and conduct annual employee training.	(4)
2.3.7.b.iii	Report on Stormwater Pollution Prevention Plan inspections	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
2.3.7.b.iv	Maintain written records for 2.3.7	continuous	Keep written record of all maintenance activities, inspections and training completed.	-
SECTION 4 - PROGRAM EVALUATION, RECORDKEEPING & REPORTING				
4.1.a	Self-evaluate compliance with the permit; include documentation of evaluation in written SWMP	annually	Annually evaluate City's compliance with permit conditions.	(2)
4.1.b	Evaluate BMP effectiveness & change if needed under provisions of permit	not stated	Evaluate BMP effectiveness in achieving permit objectives & modify BMPs accordingly as needed.	(2)
4.1.b	Report BMP modifications	annual MS4 stormwater reports	Include in Annual MS4 Stormwater Report.	(2)
4.2	MS4 must keep records for ≥5yrs; make available to public	Continuous	Maintain annual MS4 stormwater reports and make available to the public.	-
4.3	Document results of MS4 outfall screening/sampling & any other monitoring/studies	annual MS4 stormwater reports	Report progress in Annual MS4 Stormwater Report.	(2)
4.4	Submit Annual MS4 Stormwater Report	annually 90 days from effective date	Prepare Annual MS4 Stormwater Report.	(5)

	Requirements specific to discharges to waters with approved TMDLs (see Appendix F)
	Requirements specific to discharges to impaired waters without an approved TMDL (see Appendix H)

Planning Level Estimate for Permit Compliance:	**$225,000 - $310,000**
w/20% Contingency:	**$270,000 - $370,000**

(1) Cost included as part of completing Notice of Intent and developing written Stormwater Management Plan.
(2) Cost included as part of preparing Annual MS4 Stormwater Report.
(3) Budget $10,000 to $15,000 to review all regulatory mechanisms and make recommendations on how to modify the regulations for compliance.
(4) Budget $10,000 to $15,000 the first year to conduct all employee training required under the permit, and budget $5,000 to $7,500 in subsequent years of the permit.
(5) The City will perform some or all of the work using existing City staff and resources.

Section 5:

Localized Flooding

Newton, MA – Stormwater Infrastructure Improvement Plan
Assessment of Flooding Locations

Location: South Meadow Brook at Dedham Street

Problem: The drain manhole at the intersection of Dedham Street and Cannon Street overflows during heavy rain events. The 12-inch storm drain on Dedham Street empties into the culvert at South Meadow Brook/Dedham Street. There are homes on Bound Brook Road and Heatherland Road that abut the section of South Meadow Brook downstream of this culvert that are considered repetitive loss properties. The property at #229 Dedham Street also floods.

Information Available: The 12-inch storm drain on Dedham Street was previously televised by the City.

Information Needed: The City plans to re-televise the 12-inch storm drain to confirm whether there is a possible restriction where the Dedham Street storm drain empties into the culvert. It looks like the pipe diameter may reduce to less than 12-inches before it discharges at the culvert. The outfall to the culvert is PVC pipe. However, the drain manhole directly upstream of the culvert did not show any evidence of PVC pipe.

Anticipated Tasks:

1) Confirm which properties on Bound Brook Rd and Heatherland Rd are impacted during heavy rain events.
2) Review television inspection videos of the 12-inch storm drain on Dedham Street.
3) Identify the catchment area tributary to the 12-inch storm drain on Dedham Street. Confirm whether the 12-inch storm drain has adequate hydraulic capacity to handle flow from the contributing drainage area by modeling the catchment area.
4) Examine potential culvert restriction at Upland Avenue, and potential channel restrictions between Dedham Street and Upland Avenue.
5) Evaluate the portion of South Meadow Brook downstream of Upland Avenue. Additional stream maintenance and dredging may be needed to ensure that the section of South Meadow Brook downstream of Upland Avenue can adequately handle flows once improvements are made to the sections of South Meadow Brook further upstream.
6) Perform survey to confirm the invert of the culverts at South Meadow Brook (upstream) and Upland Avenue (downstream).
7) Design and construct potential piping repairs/upgrades of the Dedham Street storm drain.
8) Perform stream improvements of South Meadow Brook between Dedham Street and Upland Avenue. As much as 18" of sediment was found in selected locations along the brook. Complete channel improvements including potential dredging.
9) Perform stream improvements to the portion of South Meadow Brook downstream of Upland Avenue as needed.

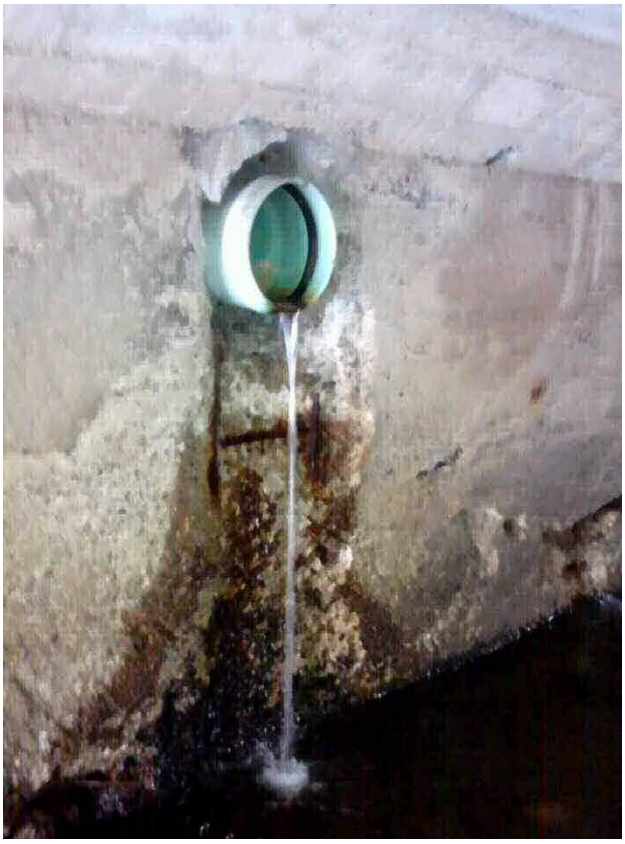
Estimated Cost:

Engineering & Construction: $750,000

Photos:

Drain Manhole on Dedham Street Upstream of Dedham Street Culvert

Downstream Side of Dedham Street Culvert



12” Outfall from Storm Drain on Dedham Street Discharging at Dedham Street Culvert

Photo Taken on 4/29/14

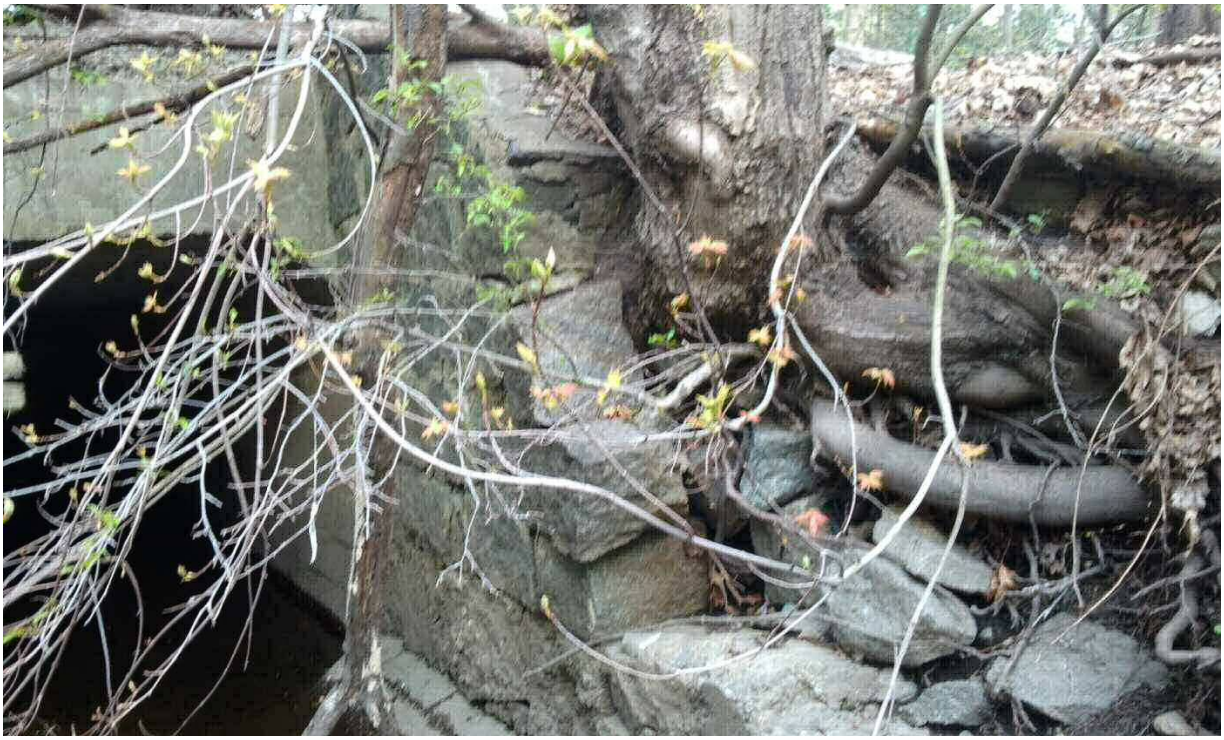
Prior Precipitation:

4/26/14 – 0.22 in.
4/27/14 – 0.06 in.
4/28/14 – 0.00 in.
4/29/14 – 0.00 in.

Rear Yard of #229 Dedham Street Abutting South Meadow Brook (Silt Socks Shown Along Fence)

South Meadow Brook Between Dedham & Upland – Looking Downstream (18” of sediment in streambed)

Upstream Side of Upland Ave. Culvert



Root Intrusion at Wingwall on Right Side of Upland Avenue Culvert Looking Downstream

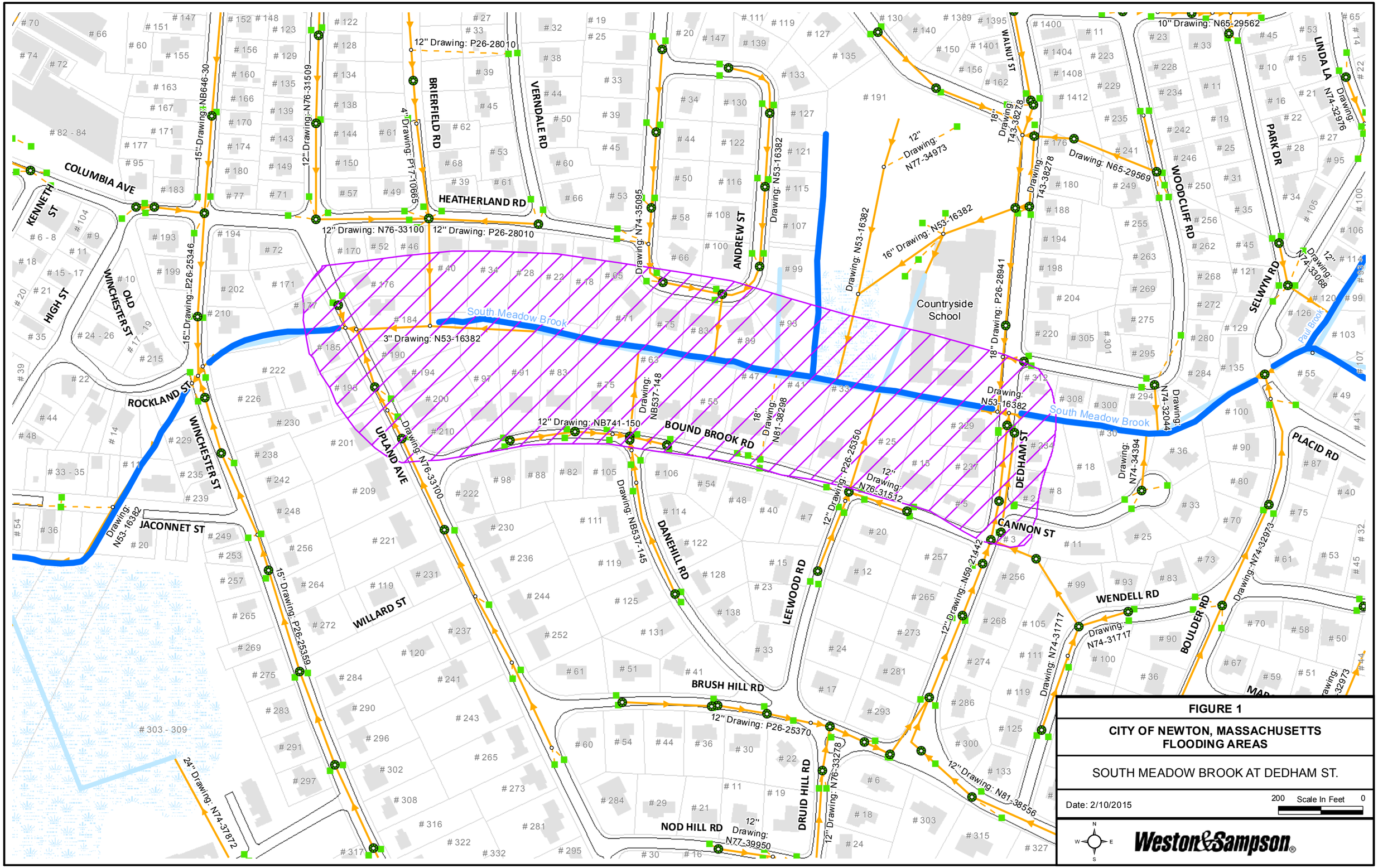


FIGURE 1

CITY OF NEWTON, MASSACHUSETTS
FLOODING AREAS

SOUTH MEADOW BROOK AT DEDHAM ST.

Date: 2/10/2015

200 Scale In Feet 0

Weston&Sampson

Newton, MA – Stormwater Infrastructure Improvement Plan
Assessment of Flooding Locations

Location: Wayne Road near Saw Mill Brook

Problem: There is an outfall on Wayne Road that discharges to Saw Mill Brook. This outfall is silted in. Wayne Road is flat. During intense rains, Wayne Road floods. The outfall discharging to Saw Mill Brook needs to be channelized. The downstream culverts on Saw Mill Brook, which are located in Boston, are also a potential restriction as they are believed to be undersized.

Information Available: N/A

Information Needed: Confirmation is needed regarding the extent of flooding in this area. Television inspection of the drainage system is needed to confirm that drainage can flow properly. Survey needs to be performed to confirm drainage invert elevations and profile along proposed channel route to Saw Mill Brook.

Anticipated Tasks:

1) Observe area during a rain event.
2) Confirm whether any properties on Wayne Road flood during heavy rain events or whether flooding is confined to the street.
3) Clean catch basins on Wayne Road and televise the storm drain on Wayne Road to confirm that drainage can flow properly without obstructions.
4) The outfall at Wayne Road was 75% submerged and filled with sediment. Water was stagnant. This area is heavily overgrown. A channel needs to be established from the outfall towards Saw Mill Brook.
5) Perform survey to confirm invert elevations for drainage on Wayne Road, including the invert of the outfall, and to confirm profile along proposed channel route to Saw Mill Brook.
6) Channelize a pathway from the outfall at Wayne Road to Saw Mill Brook.
7) Make repairs to the headwall for the Wayne Road outfall.

Estimated Cost:

Engineering & Construction: $250,000

Photos:

Wayne Road Outfall

Close-up of Failing Headwall at Wayne Road Outfall

Downstream of Wayne Road Outfall

Looking South on Wayne Road

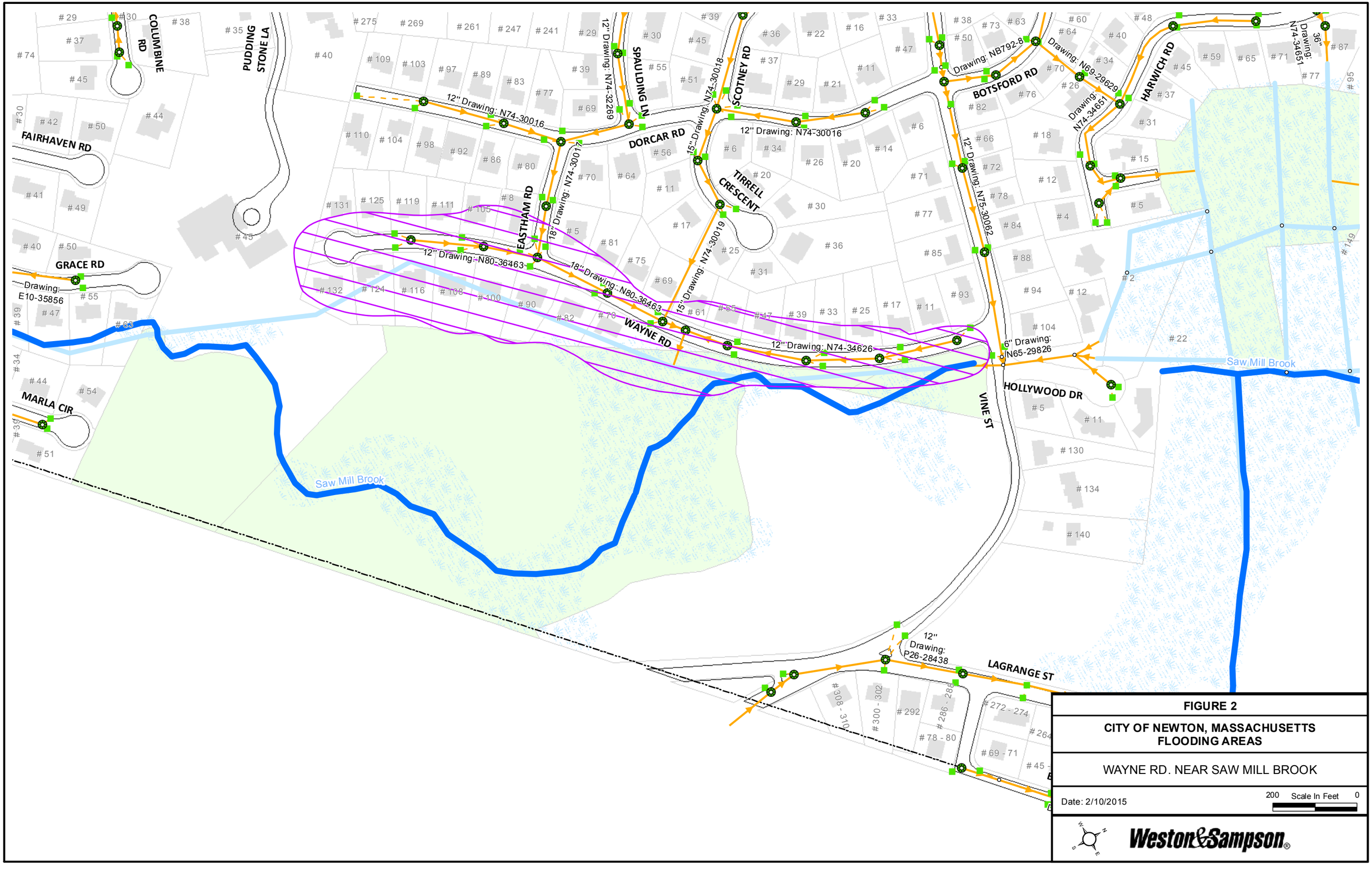


FIGURE 2

CITY OF NEWTON, MASSACHUSETTS
FLOODING AREAS

WAYNE RD. NEAR SAW MILL BROOK

Date: 2/10/2015

200 Scale In Feet 0

Weston&Sampson®

Newton, MA – Stormwater Infrastructure Improvement Plan
Assessment of Flooding Locations

Location: Harvard Street between Madison Avenue & Newtonville Avenue

Problem: There is a low spot on Harvard Street between Madison Avenue & Newtonville Avenue which floods. This low spot is located at the double catch basins, which are situated directly on top of the storm drain.

Information Available: Storm Drain record drawings are available for this area.

Information Needed: Obtain additional information regarding the extent of flooding in this area.

Anticipated Tasks:

1) Observe area during a rain event.
2) Obtain additional information regarding historical flooding in this area.
3) Clean catch basins on Harvard Street. Catch basins are filled with debris and do not appear to have sumps.
4) Televise the storm drain on Harvard Street to confirm pipe condition and ensure that drainage can flow properly.
5) Review record drawings and identify catchment area tributary to the 12-inch storm drain on Harvard Street. Confirm whether the 12-inch storm drain has adequate hydraulic capacity to handle flow from the contributing drainage area by modeling the catchment area.

Estimated Cost:

Engineering & Construction: $350,000

Photos:

Looking South on Harvard St.

Looking Towards Double Catch Basins on West Side of Harvard St.

Looking North on Harvard St.

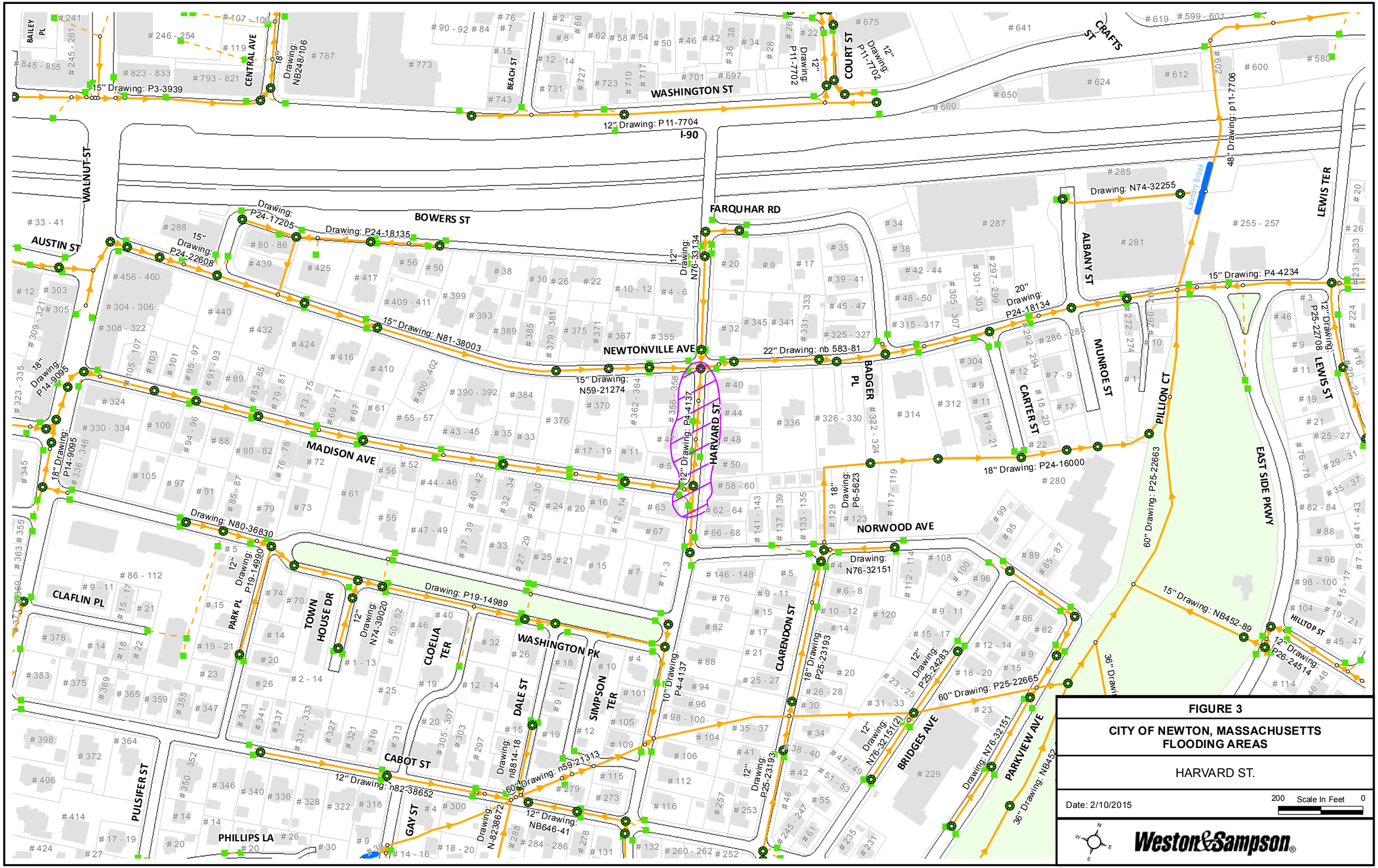


FIGURE 3

CITY OF NEWTON, MASSACHUSETTS
FLOODING AREAS

HARVARD ST.

Date: 2/10/2015

200 Scale In Feet 0

Weston&Sampson®

Newton, MA – Stormwater Infrastructure Improvement Plan
Assessment of Flooding Locations

Location: Flooding on Quinobequin Road between Irwin and Carleton Roads

Problem: Homes along Quinobequin Road between Irwin Road and Carlton Road, and the backyards of homes along Rokeby Road experience flooding. These homes are located within the flood plain.

Information Available: Television inspection was completed on the section of storm drain that collects flow from Rokeby Road and conveys it to an outfall off of Quinobequin Road via an easement.

Information Needed: The television inspection video of the storm drain off of Rokeby Road needs to be obtained from the City.

Anticipated Tasks:

1) Observe area during a rain event.
2) Identify all properties along Quinobequin Road and Rokeby Road that experience flooding.
3) Review television inspection video of the section of storm drain that collects flow from Rokeby Road and conveys it to an outfall off of Quinobequin Road via an easement.
4) Add additional catch basins at the intersection of Carlton Road and Rokeby Road to intercept existing flow that is bypassing existing catch basins in this area and heading down Rokeby Road. Add curbing on Rokeby Road to prevent water from running off the road and flooding adjacent properties.

Estimated Cost:

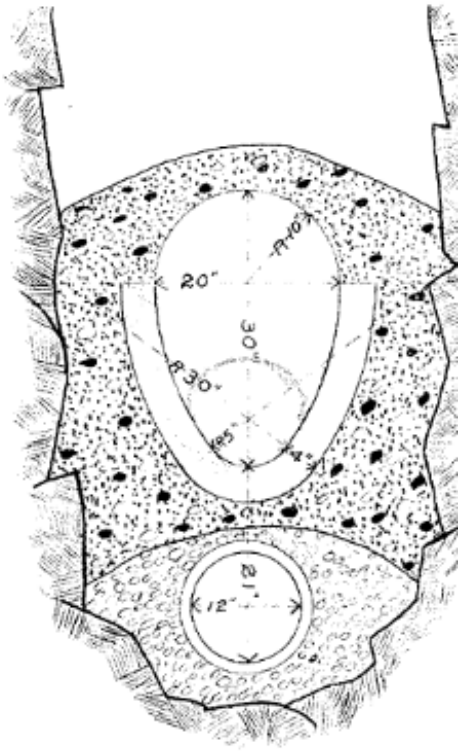
Engineering & Construction: $200,000

Photos:

Wet Area at Empty Lot at #342 Quinobequin Road

Intersection of Rokeby Road and Carlton Road

At Dead End Looking West on Rokeby Road



Cross Section of Abandoned 20”x30” Sewer Interceptor with 12” Underdrain on Quinobequin Road

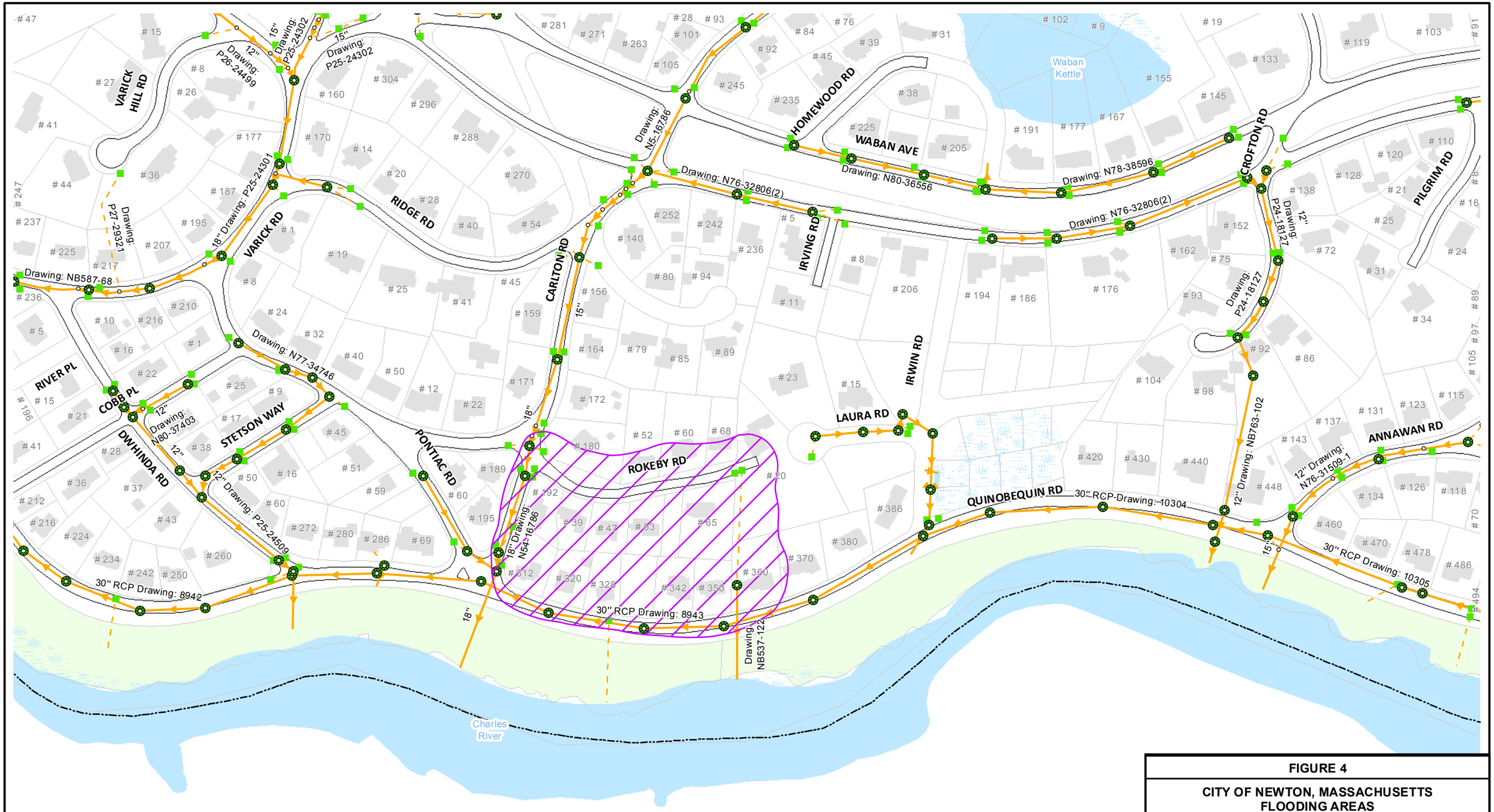


FIGURE 4

CITY OF NEWTON, MASSACHUSETTS
FLOODING AREAS

QUINOBEQUIN RD BETWEEN IRWIN AND CARLTON

Date: 2/10/2015

200 Scale In Feet 0

Weston&Sampson®

Newton, MA – Stormwater Infrastructure Improvement Plan
Assessment of Flooding Locations

Location: Quinobequin Road

Problem: The abandoned 20"x30" sewer interceptor on Quinobequin Road discharges to the "underdrain side" of the vault at Quinobequin Pump Station. The 12" underdrain pipe leaves the vault, and continues past the Quinobequin Pump Station to an underdrain outfall to the Charles River. When the interceptor was abandoned in place, sewer services were extended from the 20"x30" interceptor to homes along Quinobequin Road for potential future use by these properties as a drain connection. There is currently one property with a sump pump connected to the 20" x 30" sewer interceptor. The 12" underdrain is believed to be collapsed somewhere between the Quinobequin Road Pump Station and the outfall. The feasibility of using the 20" x 30" sewer interceptor and the 12" underdrain as a storm drain needs to be evaluated.

Information Needed: Confirmation regarding which properties along Quinobequin Road have sump pumps and/or driveway drains and where they discharge, and how many properties might use a rehabilitated underdrain outfall.

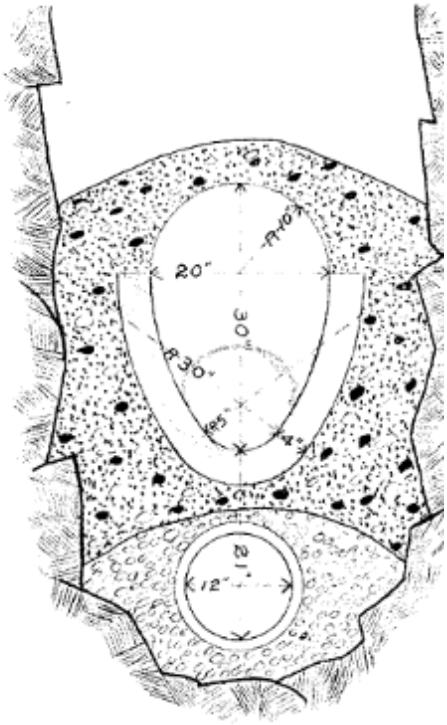
Anticipated Tasks:

1) Identify all properties along Quinobequin Road that have sump pumps and driveway drains that are either connected to the sanitary sewer or whose discharge location is suspect or unknown.
2) Determine the feasibility of connecting sump pumps and driveway drains from properties along Quinobequin Road to the existing 20" x 30" sewer interceptor. Only #386 Quinobequin has connected their sump pump to the interceptor to date. Perform survey to confirm the elevation of the 20"x30" sewer interceptor and the elevation of neighboring properties along Quinobequin Road, and plot all elevation data.
3) Inspect and evaluate the condition of the existing underdrain downstream of the chamber at the Quinobequin Road Pump Station, to which the existing 20"x30" interceptor connects. The inspection should start at the underdrain outfall (the underdrain outfall discharge will first need to be located) to the Charles River, and continue towards the vault at the pump station. If the camera cannot proceed, then a reverse set up should be completed where inspection of the underdrain starts at the vault at the Quinobequin Road Pump Station.
4) Inspect and evaluate the condition of the 20"x30" interceptor.
5) Create an inventory of defects within both the 20" x30" interceptor and the 12" underdrain. Identify all locations where the underdrain has collapsed and where repairs are needed in the 20" x30" interceptor and the 12" underdrain.
6) Evaluate the feasibility of repairing the 12" underdrain and 20"x30" interceptor to create a suitable drain conduit and outfall.

Estimated Cost:

Evaluation: $50,000

Photos:



Cross Section of Abandoned 20”x30” Sewer Interceptor with 12” Underdrain on Quinobequin Road

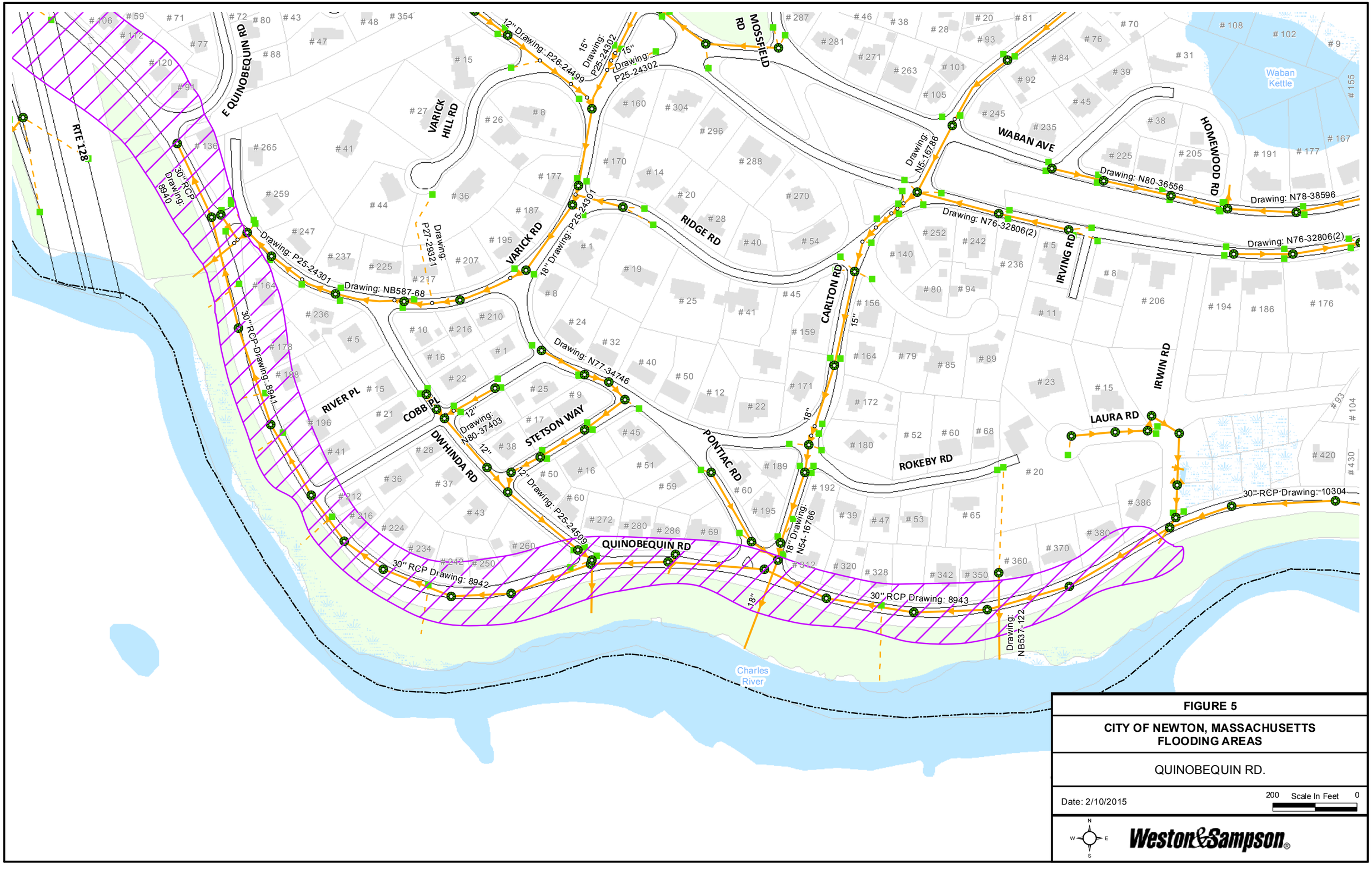


FIGURE 5

CITY OF NEWTON, MASSACHUSETTS
FLOODING AREAS

QUINOBEQUIN RD.

Date: 2/10/2015

200 Scale In Feet 0

Weston&Sampson®

Newton, MA – Stormwater Infrastructure Improvement Plan
Assessment of Flooding Locations

Location: Hammond Brook

Problem: The 12-inch underdrain for the adjacent 20-inch sewer interceptor is leaking through the retaining wall along Hammond Brook. The retaining wall is also failing at various locations. If the underdrain can be day lighted at this location, it presents an opportunity for substantial infiltration reduction upstream.

Information Available: N/A

Anticipated Tasks:

1) The underdrain was observed leaking into Hammond Brook at two locations. The City should sample underdrain flow at these two locations to confirm whether the flow is contaminated.
2) If the underdrain flow is not contaminated, an underdrain outfall discharge point should be established to Hammond Brook.

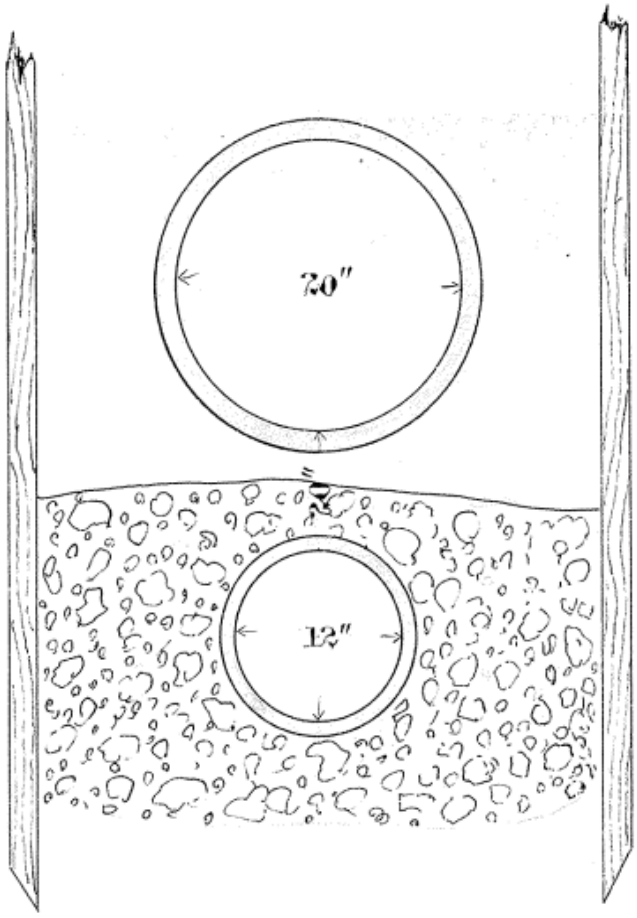
Estrimated Cost:

Engineering & Construction: $200,000

Photos:

Underdrain Leaking into Hammond Brook

Sinkhole Near Hammond Brook from Underdrain Flow



Cross Section of 20” Sewer Interceptor with 12” Underdrain Running Parallel to Hammond Brook

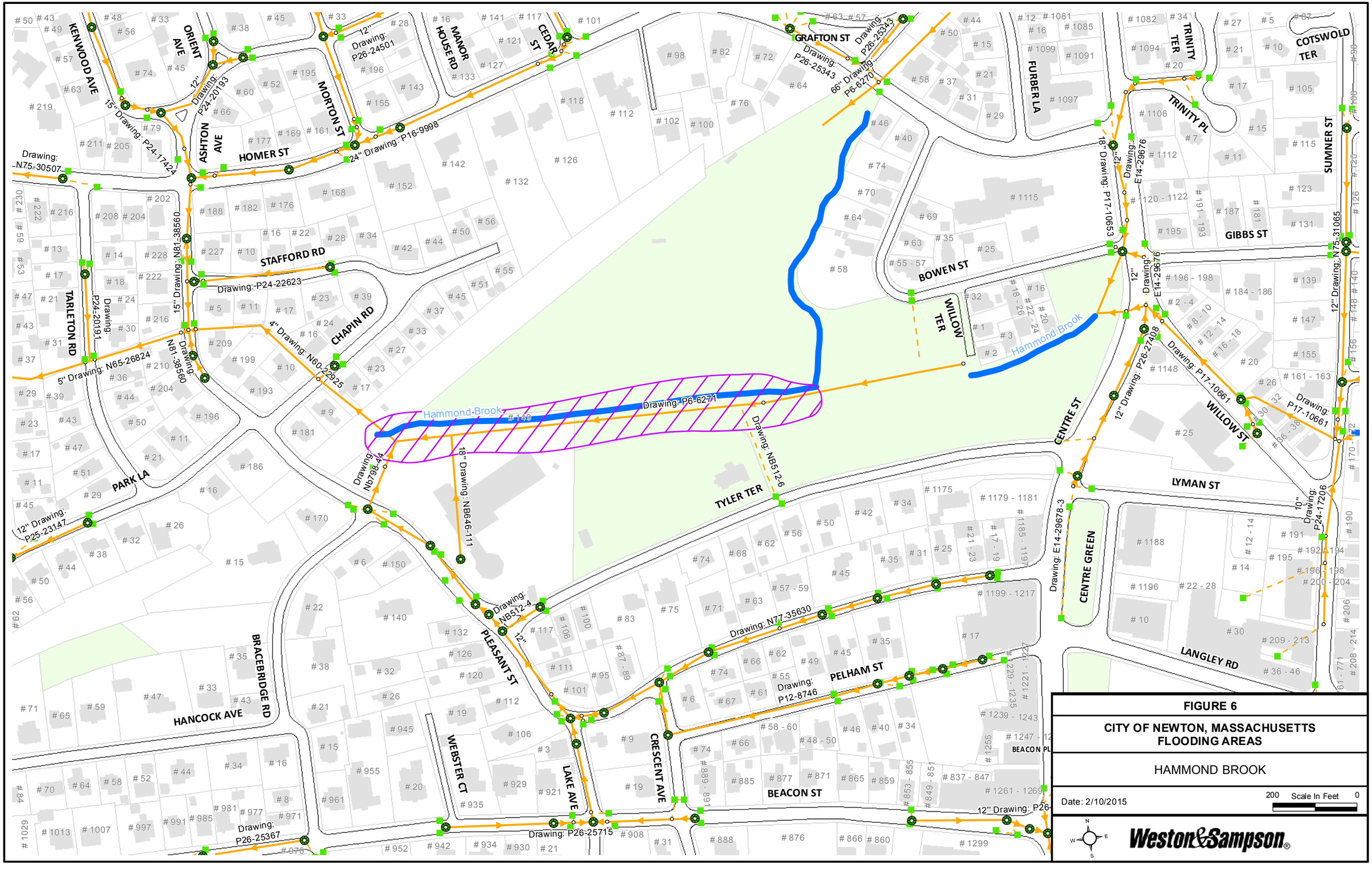


FIGURE 6

CITY OF NEWTON, MASSACHUSETTS
FLOODING AREAS

HAMMOND BROOK

Date: 2/10/2015

200 Scale In Feet 0

Weston&Sampson

Newton, MA – Stormwater Infrastructure Improvement Plan
Assessment of Flooding Locations

Location: Beaconwood Road at Cold Spring Brook

Problem: The backyards of homes on Beaconwood Road flood, but the area surrounding these homes is a wetlands area. One comment received from an owner on Beaconwood Road states that: "The reason we hold the city responsible for flooding at Beaconwood Rd during intense rainfall events is that the drainage of cold spring is inadequately engineered for several reasons, the most important being that the culvert that goes under the Zervas school is improperly laid, that is the pipe invert is too high so that does not flow readily under most moderate rainfall conditions. Simply stated, the water backs up and floods the area around Beaconwood as it cannot flow away as rapidly as it could if the stream and pipe was better engineered, and the big culvert was properly positioned."

Information Available: N/A

Information Needed: Survey needs to be performed to confirm elevations of the brook and associated storm drainage infrastructure.

Anticipated Tasks:

1) Observe area during a rain event.
2) Prior to any stream improvements to Cold Spring Brook, a survey should be performed to confirm elevations of the Brook and associated culverts upstream near Beaconwood Road, at the culvert inlet near the Zervas School and downstream at the drain manhole on Beethoven Avenue. There is a small channel that runs near Beaconwood Road conveying flow from the wetlands area surrounding Beaconwood Road to Cold Spring Brook. The channel was flowing during the site visit. This channel starts at a small culvert that runs under the footpath located off of Beaconwood Road. A substantial amount of sediment was also observed at the culvert inlet at the Zervas School.
3) There are a large number of fallen trees along Cold Spring Brook, as well as a build-up of sediment which could be preventing flow near Beaconwood Road from reaching the Zervas School culvert. Stream improvements to Cold Spring Brook are recommended.

Estimated Cost:

Engineering & Construction: $100,000

Photos:

Culvert Under Footpath Near Beaconwood Road

Inlet to 66-inch Culvert Underneath the Zervas School

Rear Yard of #76 Beaconwood Road

Rear Yard of #62 Beaconwood Road Looking Towards the Road

Fallen Trees Along Cold Spring Brook

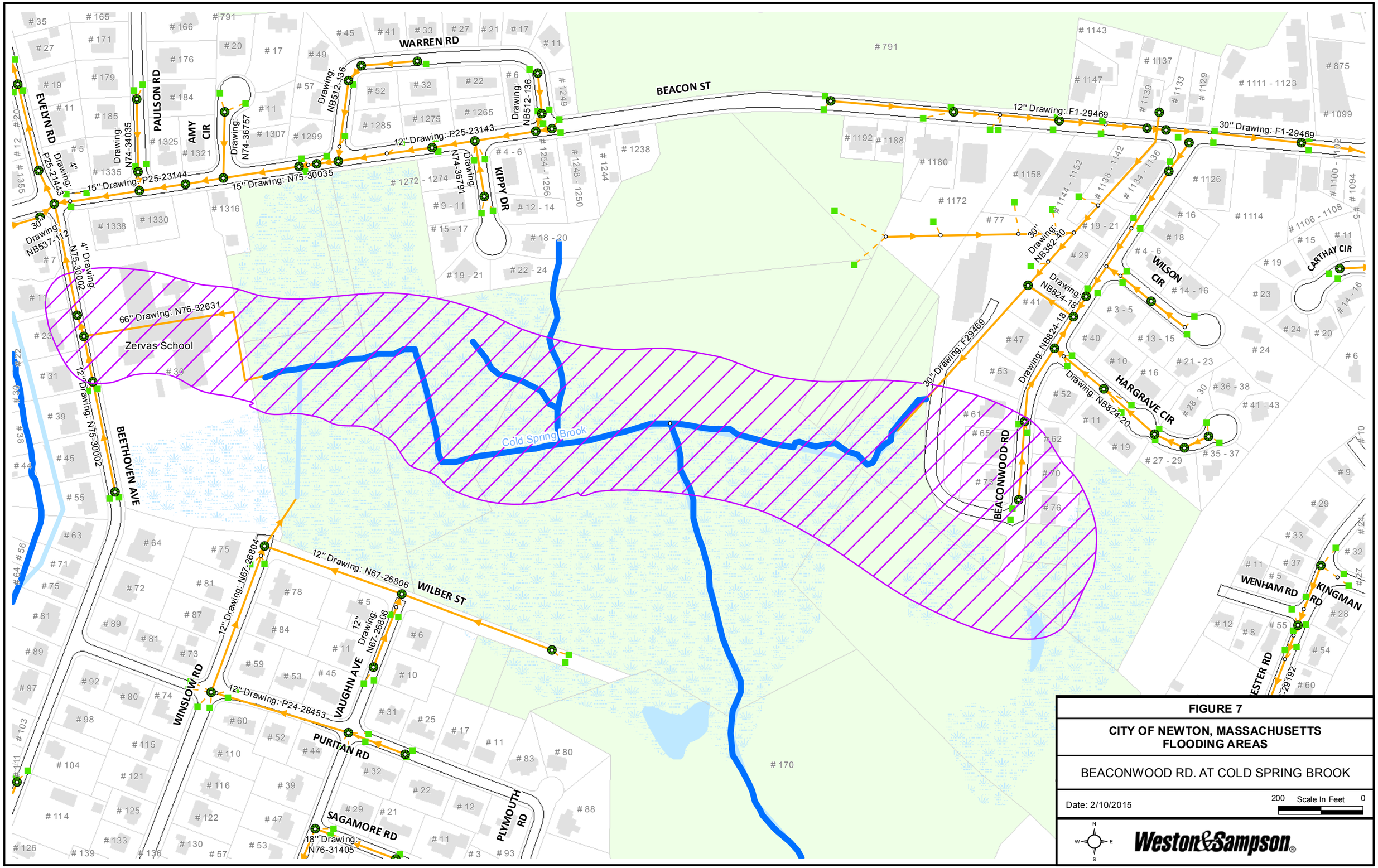


FIGURE 7

CITY OF NEWTON, MASSACHUSETTS
FLOODING AREAS

BEACONWOOD RD. AT COLD SPRING BROOK

Date: 2/10/2015

200 Scale In Feet 0

Weston&Sampson®

Newton, MA – Stormwater Infrastructure Improvement Plan
Assessment of Flooding Locations

Location: Judkins Street near Pellegrini Park

Problem: There is flooding on Jenison Street and Judkins Street. There is one catch basin located at the corner of Judkins Street and Jenison Street. This catch basin collects sheet flow from these two streets and conveys it to a 24-inch storm drain located at Pellegrini Park via a 6-inch drainage pipe located within an easement known as Judkins Path. This 6-inch pipe was television inspected and found to have roots.

Information Available: Television inspection video of the 6-inch drainage pipe going through the Judkins Path easement is available for review.

Information Needed: Television inspection video of the 6-inch drainage pipe going through the Judkins Path easement needs to be obtained from the City. Survey of existing drainage infrastructure is also needed.

Anticipated Tasks:

1) Observe area during a rain event.
2) Complete a survey to document existing conditions.
3) The existing 6-inch drain pipe appears to go underneath the tennis courts at Pellegrini Park. Examine feasibility of pipe bursting to avoid disturbance to the tennis courts.
4) Evaluate the feasibility of rerouting the drainage piping via the street as opposed to going through the easement.

Estimated Cost:

Engineering & Construction: $500,000

Photos:

Catch basin located at the intersection of Judkins Street and Jenison Street

Looking Northeast down Judkins Path Easement

Looking Southwest at Judkins Path Easement

6-inch Drain Pipe Connection at Manhole at Pellegrini Park

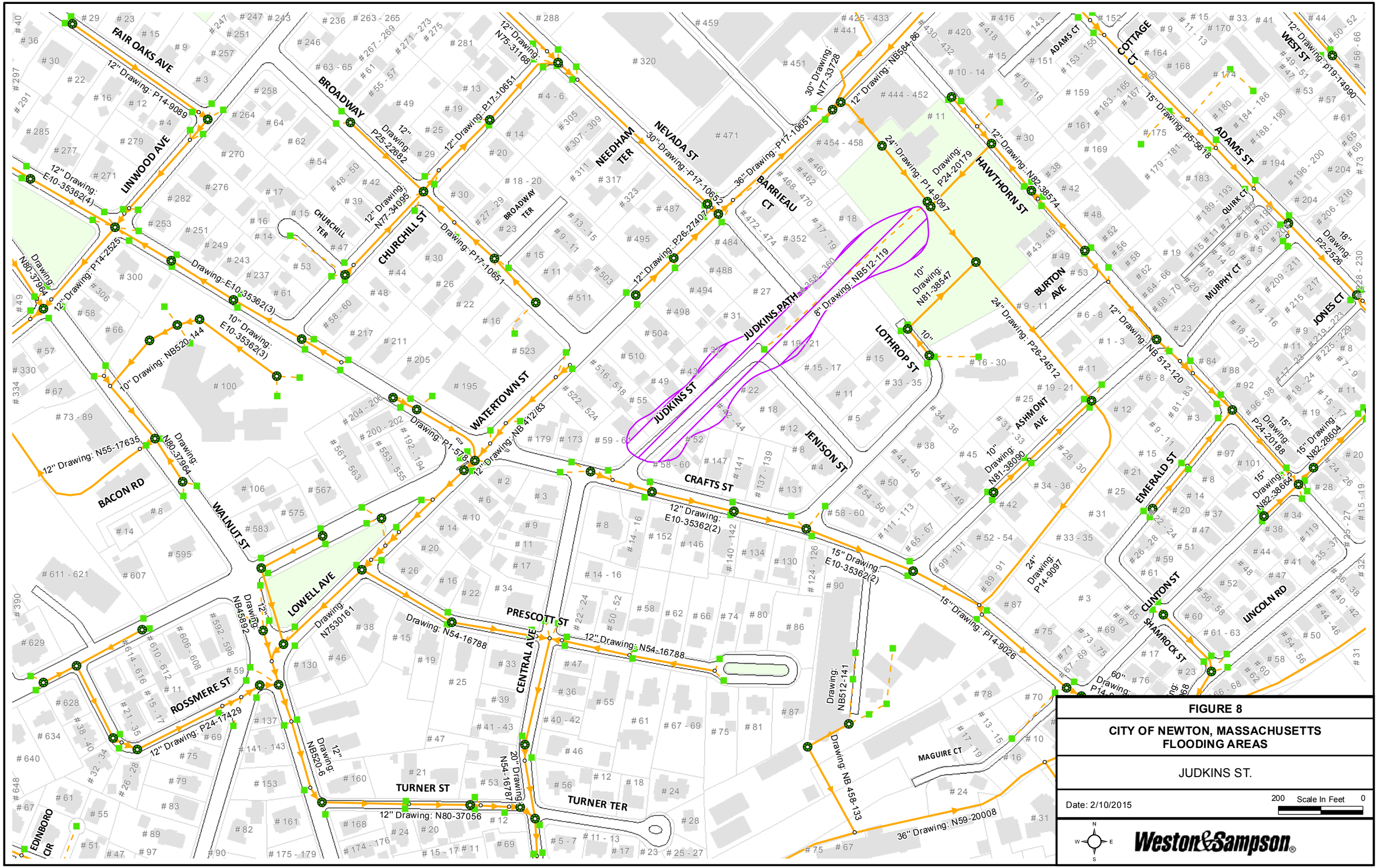


FIGURE 8

CITY OF NEWTON, MASSACHUSETTS
FLOODING AREAS

JUDKINS ST.

Date: 2/10/2015

200 Scale In Feet 0

Weston&Sampson

Newton, MA – Stormwater Infrastructure Improvement Plan
Assessment of Flooding Locations

Location: Harwich Road at Saw Mill Brook

Problem: Homeowners on Harwich Rd have historically complained about backyard flooding. The outfall for a 15" RCP drain at the end of Harwich Rd is silted in. The end of the pipe is not visible. City crews have cleaned out the drain as far as they can. The area may need to be dredged; however it is located next to wetlands and leads to the beginning of Saw Mill Brook.

Information Available: N/A

Information Needed: Confirmation is needed from the City regarding which properties flood. Survey is needed to document existing conditions.

Anticipated Tasks:

1) Observe area during a rain event.
2) Obtain confirmation from the City regarding which homes experience routine flooding.
3) There are three outfalls located off of Harwich Road that discharge to the wetlands area adjacent to Saw Mill Brook. All three of these outfalls need to have an avenue to reach the wetlands for storage and treatment. The outfall that runs between #5 and #15 Harwich Road could not be located in the field. The 12-inch outfall that runs between #139 and #149 Harwich Road was completely submerged, but visible. The 36-inch outfall between #77 and #87 Harwich Road discharges in a depression at a lower elevation than the surrounding ground surface therefore flow pools at the pipe outlet.
4) Clean Saw Mill Brook. Most of Saw Mill Brook was found to be overgrown, with portions of the brook completely inaccessible due to overgrowth and fallen trees.
5) Complete a survey to document existing conditions. As part of the survey, the following data should be collected: inverts at each of the three outfalls and elevation data for Harwich Road street drainage. In addition, enough information should be collected to determine how much sediment needs to be removed adjacent to each of the outfalls in order to ensure proper drainage, and that flows reach Saw Mill Brook.

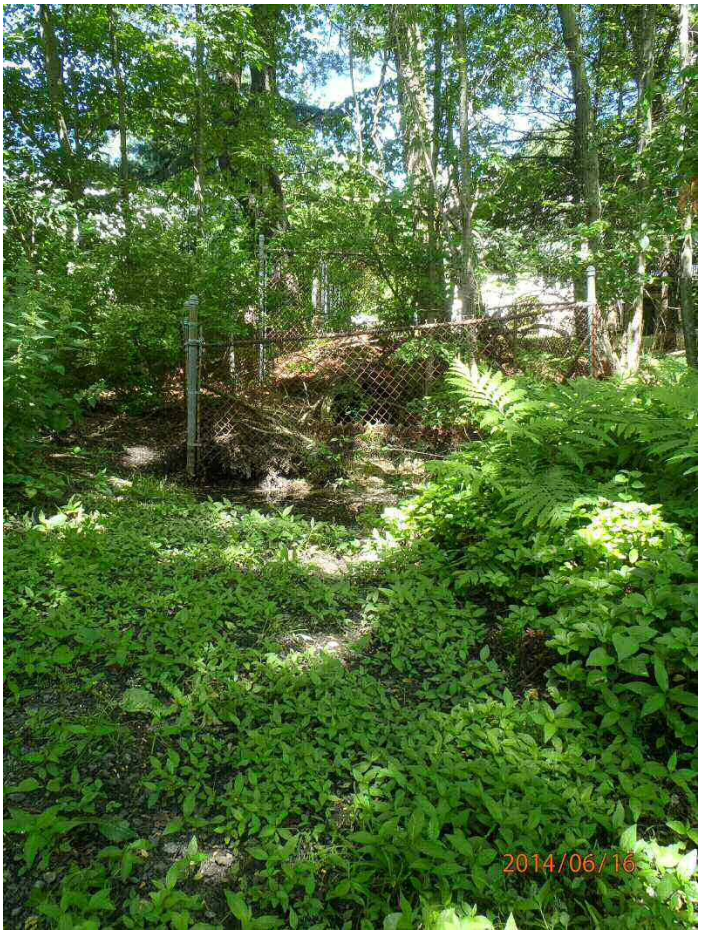
Estimated Cost:

Engineering & Construction: $100,000

Photos:

12-inch Submerged Outfall between #139 and #149 Harwich Road

36” Outfall Off Harwich Road



Looking Upstream Towards 36-inch Outfall at Harwich Road

Looking Downstream from 36-inch Outfall at Harwich Road

Channel Near 12-inch Outfall at #149 Harwich Road

Upstream Side of Culvert for Saw Mill Brook Under Hollywood Drive

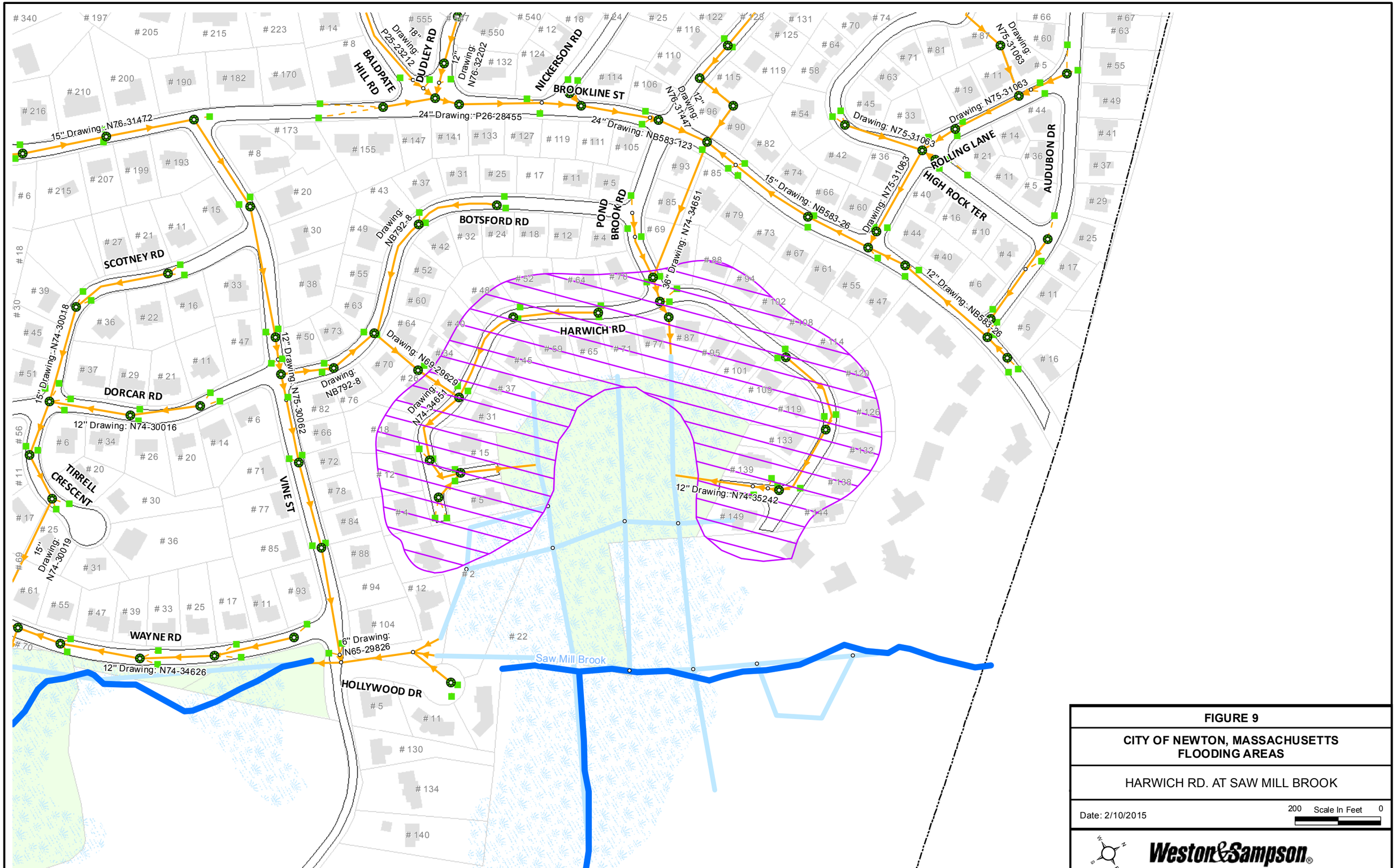


FIGURE 9

CITY OF NEWTON, MASSACHUSETTS
FLOODING AREAS

HARWICH RD. AT SAW MILL BROOK

Date: 2/10/2015

200 Scale In Feet 0

Weston&Sampson®

Newton, MA – Stormwater Infrastructure Improvement Plan
Assessment of Flooding Locations

Location: Oldham Road at Cheesecake Brook

Problem: There is a double catch basin at the low spot in Oldham Road. A drain from this catch basin runs alongside 60 Oldham Road and outfalls to Cheesecake Brook. The double catch basins surcharge during heavy storms.

Information Available: Memo from Martha Horn dated August 25, 2006.

Information Needed: All drainage on Oldham Road and Chesterfield Road needs to be televised. Survey is needed to document existing conditions.

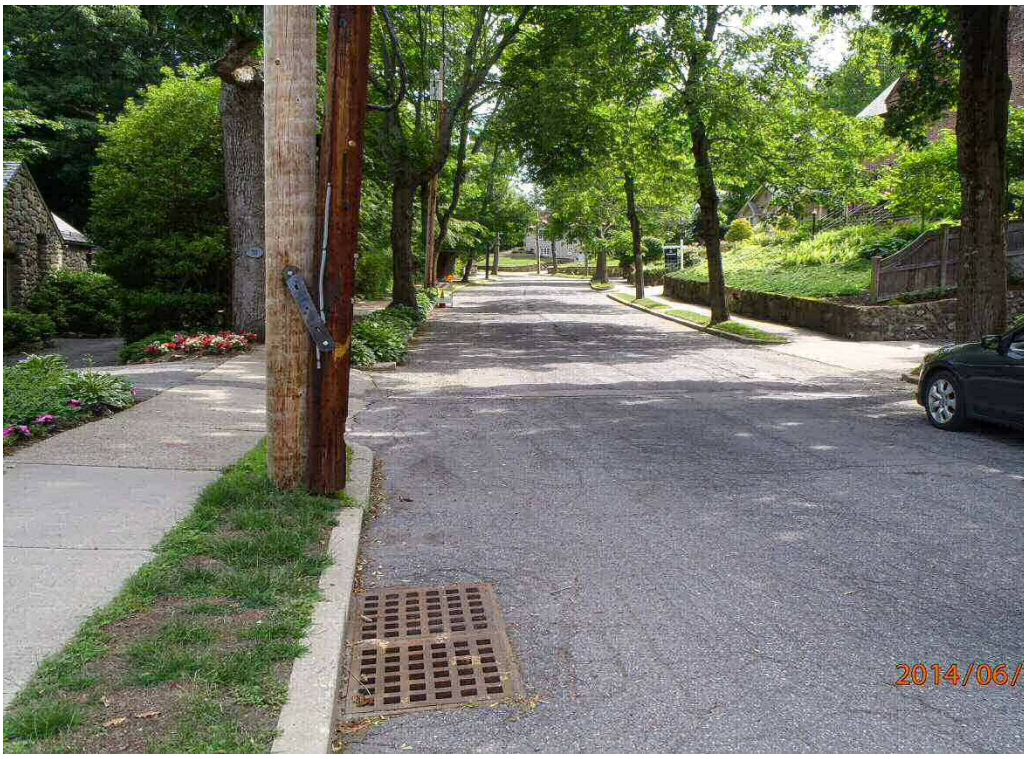
Anticipated Tasks:

1) Observe area during a rain event.
2) Clean all catch basins along Oldham Road and Chesterfield Road.
3) Televise all drainage on Oldham Road and Chesterfield Road tributary to the outfall near #60 Oldham Road.
4) Survey existing drainage on Oldham Road and points along Cheesecake Brook behind Oldham Road, including the invert at the culvert.
5) Add catch basins at selected locations to intercept flow. It appears that some flow may be bypassing existing catch basins, and the double catch basins near #60 Oldham Road are being overloaded. Runoff appears to be bypassing the catch basin located in front of #16 Chesterfield Road. The catch basin in front of #52 Oldham Road is recessed and needs to be repaired.
6) Dry weather flow was observed coming into the double catch basins at #60 Oldham Road from the north and should be sampled by the City. There was no rain in the 72 hours preceding the observation.
7) Design improvements to the channel and culvert for the portion of Cheesecake Brook located behind #70 Oldham Road where the Oldham Road outfall discharges.

Estimated Cost:

Engineering & Construction: $450,000

Photos:



At Double Catch Basins Looking North on Oldham Road

Looking Southwest Towards the Intersection of Oldham Road and Chesterfield Road

At Cheesecake Brook Culvert Behind #70 Oldham Road Looking Downstream

Cheesecake Brook Looking Upstream – Outfall from Oldham Road to the Left

In Front of #60 Oldham Road Looking Northeast Towards Oldham & Chesterfield

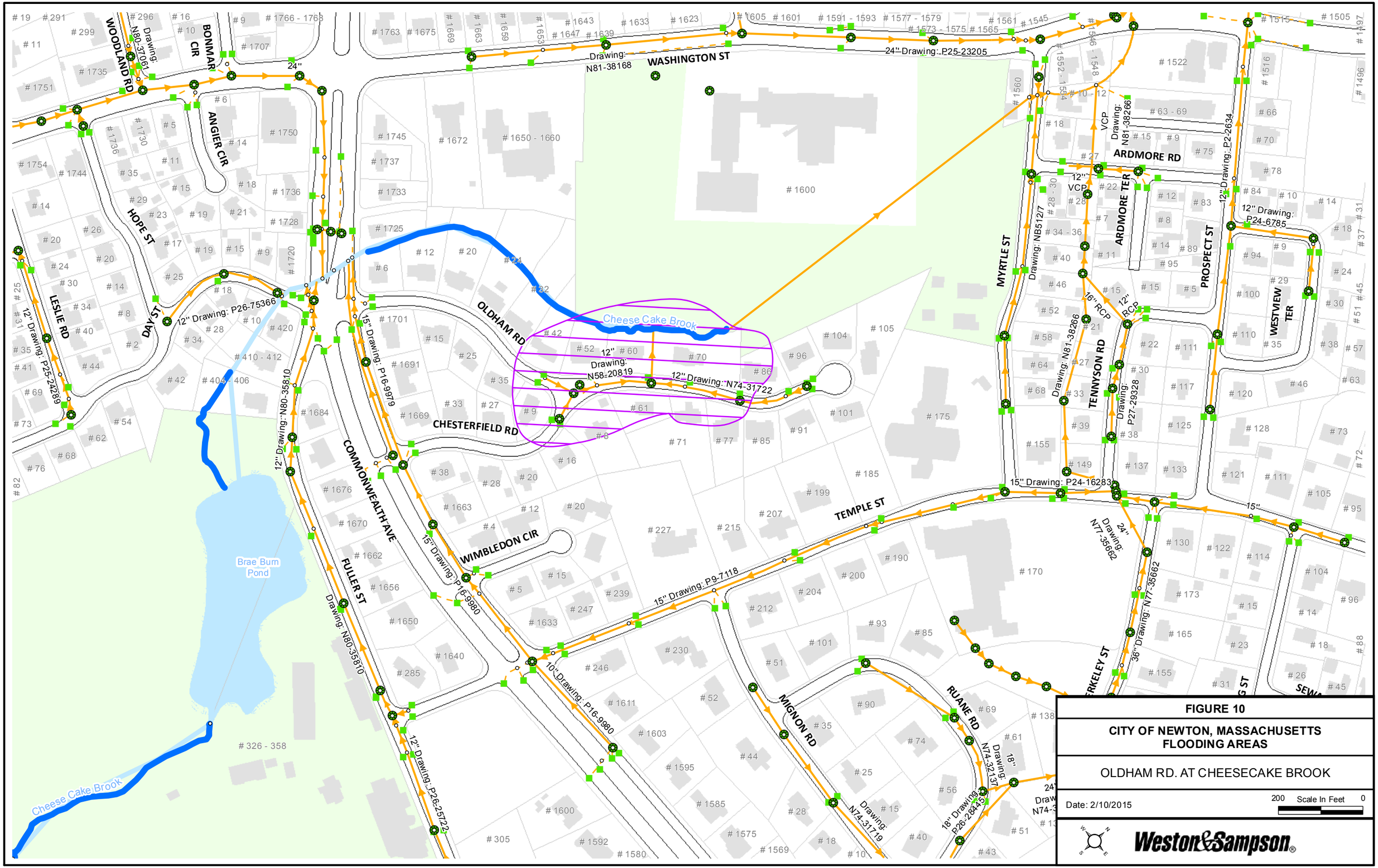


FIGURE 10

CITY OF NEWTON, MASSACHUSETTS
FLOODING AREAS

OLDHAM RD. AT CHEESECAKE BROOK

Date: 2/10/2015

200 Scale In Feet 0

Weston&Sampson

Stormwater Infrastructure Improvement Plan Prioritization - Localized Flooding Projects

Newton, MA

								CONSEQUENCE OF FAILURE CATEGORIES & WEIGHTS - 0 (No Impact) to 10 (High Impact)								
								Weight	Weight	Weight	Weight	Weight	Weight			
								10.0	10.0	9.0	6.0	6.0	4.0			
Project Type	**Project**	**Project Description / Justification**	**Drainage Basin**	**Map Sheet**	**Estimated Project Cost**	**Current SIIP Project Placement**	**Overall Condition 0: Worse to 10: Best**	**Impact to Public Health & Safety**	**Potential for Property Damage**	**Cost of Deferred Maintenance**	**Number of People Impacted**	**Impacts to Traffic**	**Impact on City Development Priorities**	**Likelihood of Failure**	**Conseq. Factor**	**Risk Factor**	**Opportunity for Natural Drainage Enhancement**
Localized Flooding	**South Meadow Brook at Dedham Street - Design & Construction**	Improvements to the drainage system on Dedham Street. / The property at #229 Dedham Street and properties on Bound Brook Road & Heatherland Road flood during heavy rain events. Drain manholes on Dedham Street overflow.	11	4	$ 750,000	Year 1	1	10	10	3	8	8	0	**0.90**	**7.18**	**64.6**	
Localized Flooding	**Beaconwood Road at Cold Spring Brook - Design & Construction**	Design of drainage improvements at Beaconwood Road/Cold Spring Brook. / Properties on Beaconwood Road flood during heavy rain events.	77	3 & 4	$ 100,000	Year 11	4	7	7	8	5	3	10	**0.60**	**6.67**	**40.0**	**GREEN+**
Localized Flooding	**Harwich Road at Saw Mill Brook - Design & Construction**	Drainage improvements at Harwich Road & Saw Mill Brook. / Backyards of homes along Harwich Road experience flooding.	101	5	$ 100,000	Year 13	4	7	8	7	5	3	0	**0.60**	**5.80**	**34.8**	**GREEN+**
Localized Flooding	**Wayne Road Near Saw Mill Brook - Design & Construction**	Improvements to the drainage system on Wayne Road. / Wayne Road floods during heavy rain events.	101	5	$ 250,000	Year 13	4	6	7	7	3	3	0	**0.60**	**5.09**	**30.5**	**GREEN+**
Localized Flooding	**Hammond Brook - Design & Construction**	Establish underdrain outfall discharge point to Hammond Brook. / Existing underdrain for the lined 20" sewer interceptor adjacent to Hammond Brook is leaking into the brook and the brook retaining wall is failing.	77	4	$ 200,000	Year 18	5	4	6	10	7	0	0	**0.50**	**5.16**	**25.8**	
Localized Flooding	**Oldham Road at Cheesecake Brook - Design & Construction**	Improvements to the drainage system on Oldham Road. / Catch basins on Oldham Road surcharge during heavy rain events and cause street flooding & runoff onto #60 Oldham Road.	68	1	$ 450,000	Year 19	5	5	7	5	3	3	0	**0.50**	**4.47**	**22.3**	**GREEN+**
Localized Flooding	**Quinobequin Road Between Irwin & Carleton Roads - Design & Construction**	Improvements to the drainage systems on Carlton Road and Rokeby Road. / The backyards of properties on Rokeby Road and Quinobequin Road flood during heavy rain events.	28, 28A & 29	3	$ 200,000	Year 21	4	3	4	3	3	3	0	**0.60**	**2.96**	**17.7**	
Localized Flooding	**Judkins Street Near the Hawthorne Playground - Design & Construction**	Improvement to the drainage system at the Hawthorne Playground/Judkins Path. / Flooding occurs on Jenison Street & Judkins Street. The existing 6-inch storm drain at the Hawthorne Playground is undersized and filled with roots.	77	2	$ 500,000	Year 22	6	5	4	6	3	3	0	**0.40**	**4.00**	**16.0**	
Localized Flooding	**Harvard Street Between Madison Avenue & Newtonville Avenue - Design & Construction**	Improvements to the drainage system on Harvard Street. / Harvard Street floods during heavy rain events.	77	2	$ 350,000	Year 22	6	5	4	3	5	5	0	**0.40**	**3.93**	**15.7**	

Stormwater Infrastructure Improvement Plan
Newton, MA

Localized Flooding Projects – Risk Factor Analysis

1. ***South Meadow Brook at Dedham Street (Year 1)***

   Drain Manholes at the intersection of Dedham Street/Cannon Road and Dedham Street/Bound Brook pop off and overflow during heavy rain events causing a significant public safety hazard.

   The Countryside School is located in close proximity to the flooding area. Water flows onto the sidewalk during heavy rain events and freezes posing a hazard to children walking to school.

   There have been 78 claims for 16 flooding events with losses totaling $379,957. This includes properties bordering South Meadow Brook between Parker and Winchester Streets. If we look at only properties on Dedham Street that are in the vicinity of the Countryside School, there have been 4 claims for 4 flooding events with losses total $12,991.

   Water overflows catch basins on Dedham Street and floods the property at #229 Dedham Street causing damage to the side yard and the interior lower level of the house.

   Impacts include properties on Dedham Street, Bound Brook Road, and Heatherland Road; children attending the Countryside School; and vehicular and pedestrian traffic on Dedham Street.

   Dedham Street is a busy street with the school bringing additional traffic.

2. ***Beaconwood Road at Cold Spring Brook (Year 11)***

   There have been 3 claims for 3 flooding events with losses totaling $20,523.

   Backyards of homes on Beaconwood Road flood.

   A wetlands area surrounds the homes on Beaconwood Road.

   A small channel runs near Beaconwood Road conveying flow from the wetlands area surrounding Beaconwood Road to Cold Spring Brook. The channel starts at a small culvert that runs under the footpath located off of Beaconwood Road. The channel is obstructed and sediment removal is needed.

   A substantial amount of sediment was observed at the culvert inlet at the Zervas School.

   There are a large number of fallen trees along Cold Spring Brook as well as sediment build-up.

   There are walking trails along Cold Spring Brook, which could be impacted if conditions at Cold Spring Brook continue to deteriorate.

   The condition of the culvert running under the Zervas School needs to be evaluated and may need to be rehabilitated.

   Impacts include properties on Beaconwood Road, students at the Zervas School and the general public using the trails and walking paths in the vicinity of Cold Spring Brook.

   If the culvert at the Zervas School needs to be rehabilitated, traffic on Beethoven Avenue could be impacted.

3. ***Harwich Road at Saw Mill Brook (Year 13)***

Homeowners on Harwich Road experience backyard flooding.

There have been 4 claims for 3 flooding events with losses totaling $16,366.

Outfall for a 15-inch storm drain at the end of Harwich Road is silted in, and is not functioning properly. City crews have cleaned out the drain as far as they can. There are two additional outfalls (12" and 36") that are not functioning properly. The 12" outfall is visible but submerged and the 36" outfall discharges in a depression at a lower elevation than the surrounding ground surface preventing proper discharge of area runoff.

Sediment removal is needed at each outfall to direct flow to the adjacent wetlands area and Saw Mill Brook.

Saw Mill Brook is overgrown with portions of the brook completely inaccessible due to overgrowth and fallen trees.

Sedimentation at the outfalls and of Saw Mill Brook will gradually increase localized flooding if improvements are not constructed.

4. ***Wayne Road near Saw Mill Brook (Year 13)***

There have been 2 claims for 2 flooding events with losses totaling $13,058.

Flooding appears to be mostly confined to the street, but does impact the backyards of a few homes along Wayne Road.

There is an outfall to Saw Mill Brook on Wayne Road that is 75% submerged and filled with sediment. A channel needs to be established to direct flow to Saw Mill Brook.

Saw Mill Brook is overgrown with portions of the brook completely inaccessible due to overgrowth and fallen trees.

Sedimentation at the outfall and of Saw Mill Brook will gradually increase localized flooding if improvements are not constructed.

5. ***Hammond Brook (Year 18)***

There has been 1 Claim for 1 Flooding Event with losses totaling $387.

The underdrain from the adjacent sewer interceptor is obstructed and is leaking into Hammond Brook. The retaining wall for Hammond Brook is failing at this location. Conditions will continue to deteriorate and the retaining wall may collapse if the underdrain is not repaired.

This area is located within Newton Centre Park where there are a number of playgrounds. It is also located in close proximity to the Mason Rice Elementary School.

6. ***Oldham Road at Cheesecake Brook (Year 19)***

There have been 0 Claims/$0 Losses on Oldham Road.

Flooding from Oldham Road runs onto the property at #60 Oldham Road. This is the only property impacted.

It appears that flow is bypassing existing upstream catch basins and the double catch basins near #60 Oldham Road are being overloaded. Additional catch basins should be added to accommodate the flow.

Improvements are also needed to the Cheesecake Brook channel and culvert in the vicinity of the Oldham Road outfall. There are playing fields in proximity to this section of the brook.

7. ***Quinobequin Road between Irwin & Carleton Roads (Year 21)***

There have been 5 Claims for 1 Flooding Event with losses totaling $22,734.

Homes along Quinobequin Road between Irwin and Carleton Roads, and the backyards of homes along Rokeby Road experience flooding. Flooding seems to be most severe at #342 Quinobequin Road and #65 Rokeby Road. #342 Quinobequin Road is located in the flood plain.

Additional catch basins at the intersection of Carlton Road and Rokeby Road could be added to intercept flow that is bypassing existing catch basins in this area and draining down Rokeby Road. Curbing on Rokeby Road could be added to prevent road runoff from reaching adjacent properties.

8. ***Judkins Street near the Hawthorne Playground (Year 22)***

Flooding is confined to the street on Jenkins Street and Jenison Street.

There have been 0 Claims/$0 Losses on Judkins Street and Jenison Street.

Drainage from Jenkins Street and Jenison Street is conveyed to a 24" storm drain located on the Hawthorne Playground via a 6-inch drainage pipe located within an easement known as Judkins Path. The existing 6-inch pipe is full of roots.

There are tennis courts near the Hawthorne Playground which may be impacted if the storm drain under the tennis courts fails and has to be replaced.

9. ***Harvard Street between Madison Avenue & Newtonville Avenue (Year 22)***

There have been 0 Claims/$0 Losses on Harvard Street.

There is a low spot on Harvard Street which floods. Flooding is confined to the street.

There is steady traffic on this street, which could be impacted during flooding conditions.

Pipe on Harvard Street may be undersized. Tributary drainage area should be modeled to determine whether pipe has adequate hydraulic capacity.

Section 6:

Stream Improvements

Newton, MA
Stormwater Infrastructure Improvement Plan
Stream Improvements - Cost Assessment for Recommended Improvements

Stream	Cost Assessment			Total Cost
	Quantity	Unit Cost	Repair Cost	
Brunnen Brook				
Sediment Removal (cy)	611	$125	$76,389	
Debris Removal (trees, leaves, etc) (lf)	1,100	$25	$27,500	$132,000
Cut Back Overgrowth (lf)	1,100	$25	$27,500	
Repair Retaining Walls (sf)	-	-	-	
Cheesecake Brook (Braeburn Pond to Culverted Section Behind Oldham Rd)				
Sediment Removal (cy)	242	$125	$30,208	
Debris Removal (trees, leaves, etc) (lf)	1,305	$25	$32,625	$228,000
Cut Back Overgrowth (lf)	500	$25	$12,500	
Repair Retaining Walls (sf)	-	-	-	
Rebuild Retaining Walls (cy)	217	$700	$152,098	
Cheesecake Brook (Culverted Section at Watertown St to Cross St)				
Sediment Removal (cy)	417	$125	$52,083	
Debris Removal (trees, leaves, etc) (lf)	1,200	$25	$30,000	$657,000
Cut Back Overgrowth (lf)	-	-	-	
Repair Retaining Walls (sf)	7,500	$30	$225,000	
Rebuild Retaining Walls (cy)	500	$700	$349,650	
Cheesecake Brook (Cross St to Watertown St)				
Sediment Removal (cy)	528	$125	$65,972	
Debris Removal (trees, leaves, etc) (lf)	1,520	$25	$38,000	$864,000
Cut Back Overgrowth (lf)	-	-	-	
Repair Retaining Walls (sf)	7,600	$30	$228,000	
Rebuild Retaining Walls (cy)	759	$700	$531,468	
Cheesecake Brook (Watertown St to Charles River)				
Sediment Removal (cy)	1,278	$125	$159,722	
Debris Removal (trees, leaves, etc) (lf)	-	-	-	$737,000
Cut Back Overgrowth (lf)	-	-	-	
Repair Retaining Walls (sf)	15,640	$30	$469,200	
Rebuild Retaining Walls (cy)	153	$700	$107,226	
Cold Spring Brook				
Sediment Removal (cy)	2,963	$125	$370,370	
Debris Removal (trees, leaves, etc) (lf)	4,000	$25	$100,000	$571,000
Cut Back Overgrowth (lf)	4,000	$25	$100,000	
Repair Retaining Walls (sf)	-	-	-	
Country Club Brook				
Sediment Removal (cy)	-	-	-	
Debris Removal (trees, leaves, etc) (lf)	-	-	-	$0
Cut Back Overgrowth (lf)	-	-	-	
Repair Retaining Walls (sf)	-	-	-	
Cranberry Brook				
Sediment Removal (cy)	444	$125	$55,556	
Debris Removal (trees, leaves, etc) (lf)	800	$25	$20,000	$96,000
Cut Back Overgrowth (lf)	800	$25	$20,000	
Repair Retaining Walls (sf)	-	-	-	

Stream	Cost Assessment			Total Cost
	Quantity	Unit Cost	Repair Cost	
Edmands Brook				
Sediment Removal (cy)	463	$125	$57,870	
Debris Removal (trees, leaves, etc) (lf)	1,600	$25	$40,000	$190,000
Cut Back Overgrowth (lf)	1,600	$25	$40,000	
Repair Retaining Walls (sf)	750	$30	$22,500	
Rebuild Retaining Walls (cy)	41	$700	$28,875	
Hahn Brook				
Sediment Removal (cy)	833	$125	$104,167	
Debris Removal (trees, leaves, etc) (lf)	500	$25	$12,500	$150,000
Cut Back Overgrowth (lf)	1,300	$25	$32,500	
Repair Retaining Walls (sf)	-	-	-	
Rebuild Retaining Walls (cy)	-	-	-	
Hammond Brook (Upstream of Glen Ave near the MBTA Green Line Tracks)				
Sediment Removal (cy)	1,426	$125	$178,241	
Debris Removal (trees, leaves, etc) (lf)	3,850	$25	$96,250	$371,000
Cut Back Overgrowth (lf)	3,850	$25	$96,250	
Repair Retaining Walls (sf)	-	-	-	
Rebuild Retaining Walls (cy)	-	-	-	
Hammond Brook (From Homer St & Centre St to Pleasant St, Chelsey Rd to Sumner St)				
Sediment Removal (cy)	-	-	-	
Debris Removal (trees, leaves, etc) (lf)	4,100	$25	$102,500	$819,000
Cut Back Overgrowth (lf)	3,050	$25	$76,250	
Repair Retaining Walls (sf)	12,000	$30	$360,000	
Rebuild Retaining Walls (cy)	400	$700	$279,720	
Hyde Brook				
Sediment Removal (cy)	-	-	-	
Debris Removal (trees, leaves, etc) (lf)	675	$25	$16,875	$313,000
Cut Back Overgrowth (lf)	675	$25	$16,875	
Repair Retaining Walls (sf)	4,050	$30	$121,500	
Rebuild Retaining Walls (cy)	225	$700	$157,343	
King Brook				
Sediment Removal (cy)	-	-	-	
Debris Removal (trees, leaves, etc) (lf)	200	$25	$5,000	$10,000
Cut Back Overgrowth (lf)	200	$25	$5,000	
Repair Retaining Walls (sf)	-	-	-	
Lacy Brook				
Sediment Removal (cy)	-	-	-	
Debris Removal (trees, leaves, etc) (lf)	-	-	-	$10,000
Cut Back Overgrowth (lf)	400	$25	$10,000	
Repair Retaining Walls (sf)	-	-	-	
Laundry Brook				
Sediment Removal (cy)	-	-	-	
Debris Removal (trees, leaves, etc) (lf)	350	$25	$8,750	$156,000
Cut Back Overgrowth (lf)	-	-	-	
Repair Retaining Walls (sf)	2,750	$30	$82,500	
Rebuild Retaining Walls (cy)	92	$700	$64,103	
Paul Brook				
Sediment Removal (cy)	-	-	-	
Debris Removal (trees, leaves, etc) (lf)	600	$25	$15,000	$18,000
Cut Back Overgrowth (lf)	100	$25	$2,500	
Repair Retaining Walls (sf)	-	-	-	

Stream	Cost Assessment			Total Cost
	Quantity	Unit Cost	Repair Cost	
Runaway Brook				
Sediment Removal (cy)	-	-	-	
Debris Removal (trees, leaves, etc) (lf)	-	-	-	$145,000
Cut Back Overgrowth (lf)	-	-	-	
Repair Retaining Walls (sf)	2,100	$30	$63,000	
Rebuild Retaining Walls (cy)	117	$700	$81,585	
Saw Mill Brook (Upstream Sections North & East of Hollywood Drive)				
Sediment Removal (cy)	1,593	$125	$199,074	
Debris Removal (trees, leaves, etc) (lf)	2,150	$25	$53,750	$307,000
Cut Back Overgrowth (lf)	2,150	$25	$53,750	
Repair Retaining Walls (sf)	-	-	-	
Rebuild Retaining Walls (cy)	-	-	-	
Saw Mill Brook (Downstream of Vine Street)				
Sediment Removal (cy)	-	-	-	
Debris Removal (trees, leaves, etc) (lf)	3,200	$25	$80,000	$354,000
Cut Back Overgrowth (lf)	2,400	$25	$60,000	
Repair Retaining Walls (sf)	4,000	$30	$120,000	
Rebuild Retaining Walls (cy)	133	$700	$93,240	
South Meadow Brook (Upstream of Dudley to Brandeis Road)				
Sediment Removal (cy)	278	$125	$34,722	
Debris Removal (trees, leaves, etc) (lf)	2,100	$25	$52,500	$140,000
Cut Back Overgrowth (lf)	2,100	$25	$52,500	
Repair Retaining Walls (sf)	-	-	-	
Rebuild Retaining Walls (cy)	-	-	-	
South Meadow Brook (Parker Street to Dedham Street)				
Sediment Removal (cy)	-	-	-	
Debris Removal (trees, leaves, etc) (lf)	300	$25	$7,500	$15,000
Cut Back Overgrowth (lf)	300	$25	$7,500	
Repair Retaining Walls (sf)	-	-	-	
Rebuild Retaining Walls (cy)	-	-	-	
South Meadow Brook (Dedham Street to the Charles River)				
Sediment Removal (cy)	2,139	$125	$267,361	
Debris Removal (trees, leaves, etc) (lf)	2,750	$25	$68,750	$678,000
Cut Back Overgrowth (lf)	400	$25	$10,000	
Repair Retaining Walls (sf)	6,250	$30	$187,500	
Rebuild Retaining Walls (cy)	206	$700	$144,375	
Stearns Brook				
Sediment Removal (cy)	148	$125	$18,519	
Debris Removal (trees, leaves, etc) (lf)	400	$25	$10,000	$29,000
Cut Back Overgrowth (lf)	-	-	-	
Repair Retaining Walls (sf)	-	-	-	
Strongs Brook				
Sediment Removal (cy)	-	-	-	
Debris Removal (trees, leaves, etc) (lf)	-	-	-	$92,000
Cut Back Overgrowth (lf)	-	-	-	
Repair Retaining Walls (sf)	1,500	$30	$45,000	
Rebuild Retaining Walls (cy)	67	$700	$46,620	

Stream	Cost Assessment			Total Cost
	Quantity	Unit Cost	Repair Cost	
Thompsonville Brook				
Sediment Removal (cy)	685	$125	$85,648	
Debris Removal (trees, leaves, etc) (lf)	1,850	$25	$46,250	$150,000
Cut Back Overgrowth (lf)	700	$25	$17,500	
Repair Retaining Walls (sf)	-	-	-	
Total Project Construction/Cleaning Cost:			**$7,232,000**	
Design/Permitting (Assume 20%)			**$1,446,400**	
Construction Oversight (Assume 5%)			**$361,600**	
Environmental Controls (10%)			**$723,200**	
Total Project Cost			**$9,763,200**	
20% Contingency			**$1,952,640**	
Total Project Cost (w/20% Contingency)			**$11,715,840**	

Sediment Removal	14,047	cy	$1,760,000
Debris Removal	34,550	lf	$863,750
Cut Back Overgrowth	26,000	lf	$641,000
Repair Retaining Wall	65,000	sf	$1,925,000
Rebuild Retaining Wall	3,000	cy	$2,037,000

Section 7:

Culvert Evaluation/Rehabilitation

CULVERT PROJECT LIST

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Bulloughs Pond	Commonwealth Avenue (Route 30)	8' Wide Brick Arch Culvert with Stone Walls at the North End 7' x 5' Concrete Box at the South End	250 ft +/-	 North End of Culvert  South End of Culvert	There are areas of surface spalls on the southeast wingwall at the north end. The wingwalls at the south end of the culvert consist of stacked stones with mortar joints. The stones are in fair condition with some mortar missing among the masonry joints.	FST (2008)	$0
Cheesecake Brook	Commonwealth Avenue	Concrete Box Culvert with Stone Masonry Wing Walls.	455 ft +/-	  South End of Culvert  North End of Culvert	Some spalling and cracks in the headwall at the north end of the culvert. Large cracks in the east wing wall at the south end. Steel grate at south end is rusted and bent.	W&S (2014)	$0
Cheesecake Brook	Behind #70 Oldham Road (South End Inlet Only Exposed)	Concrete Box Culvert (Culvert could not be fully evaluated due to high water level)	5,085 ft +/- (Inlet to Watertown Street outlet below)	 South End of Culvert 	The steel grate is offset from the culvert opening. There is 20" sediment at the culvert inlet. The culvert is partially submerged and the retaining wall adjacent to culvert needs work.	W&S (2014)	$0
Cheesecake Brook	Watertown Street – West Culvert (East End Outlet Only Exposed)	12.5' Wide Rectangular Culvert with Stone Masonry Walls and Granite Roof	5,085 ft +/- (Outlet to #70 Oldham Road Inlet above)	  East End of Culvert	The stone masonry walls are in fair to poor condition with large areas of missing mortar and loose stones. The south wall at the east end of the culvert is bulging approximately 1’ to 2’ outward with loose large stones	FST (2008) W&S (2014)	$150,000

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Cheesecake Brook	Dunstan Street	13' Wide Rectangular Culvert with Stone Masonry Walls and Granite Roof	45 ft +/-	    East End of Culvert West End of Culvert	The stonewalls are in fair to poor condition with large areas of missing mortar and loose stones. The south wall at the west end of the culvert is bulging about 1' to 2' outward with loose large stones. There is a large vertical crack in the granite at mid-span of the east fascia.	FST (2008) W&S (2014)	$150,000
Cheesecake Brook	Cross Street	14' Wide Rectangular Culvert with Stone Masonry Walls, Steel Beams, and Brick Roof	40 ft +/-	  East End of Culvert West End of Culvert 	Stone masonry walls have some missing mortar and loose stones. A large stone has fallen out of the south wall at the east end of the culvert. The east and west fascias have stone caps that are supported by steel beams. The east fascia beam is extremely deteriorated especially at the ends of the beam. The west fascia beam is not as bad, although it has severe deterioration at the south end.	FST (2008) W&S (2014)	$250,000
Cheesecake Brook	Parson Street	15' Wide Rectangular Culvert with Stone Masonry Walls, Steel Beams, and Brick Roof	37 ft +/-	  East End of Culvert West End of Culvert	The stonewalls are in fair to poor condition with some missing mortar and loose stones. The east and west fascias have stone caps that are supported by steel beams. The steel beams have considerable rust and section loss.	FST (2008) W&S (2014)	$250,000
Cheesecake Brook	Eddy Street	14' Wide Rectangular Culvert with Stone Masonry Walls and Steel Beam Supported Roof	65 ft +/-	  East End of Culvert West End of Culvert	Stone masonry walls have some missing mortar. The east and west fascias have stone caps that are supported by steel beams. These steel beams have considerable rust and section loss with the bottom flange mostly missing.	FST (2008)	$150,000

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Cheesecake Brook	Watertown Street – East Culvert	14' Wide Stone Masonry and Brick Arch Culvert	60 ft +/-	  South End of Culvert  North End of Culvert	There are some missing bricks, stones, and mortar within the culvert. There is some missing mortar on the exterior sides of the culvert.	FST (2008) W&S (2014)	
Cheesecake Brook	Crafts Street	14' Wide Stone Masonry and Brick Arch Culvert	50 ft +/-	   North End of Culvert  South End of Culvert	There are some missing bricks, stones, and mortar within the culvert. There is some missing mortar on the exterior sides of the culvert.	FST (2008) W&S (2014)	
Cheesecake Brook	North Street	14' Wide Stone Masonry and Brick Arch Culvert	52 ft +/-	   North End of Culvert  South End of Culvert	There are some missing bricks, stones, and mortar within the culvert. There is some missing mortar on the exterior sides of the culvert.	FST (2008) W&S (2014)	

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Cold Spring Brook	Homer Street	10' x 5' Concrete Box Culvert	Unknown (estimated at least over 1,000 ft)	  North End of Culvert	Map cracks in the concrete wingwalls with efflorescence.	FST (2008)	
Cold Spring Brook	Beaconwood Road - West End of Culvert - Outlet Only	Appears to be a Concrete Box Culvert (Culvert is Completely Submerged and Could Not be Fully Evaluated)	880 ft +/- (from MH at Beacon Street between #1139 and #1133)	  West End of Culvert	Culvert could not be fully assessed due to water level; sediment depth could not be determined due to water level.	W&S (2014)	
Cold Spring Brook	At Zervas School - East End of Culvert - Inlet Only	66" Diameter Concrete Pipe Culvert	555 ft +/- (to MH at #23 Beethoven Ave)	  East End of Culvert	Concrete deterioration at top of culvert at joints; rebar exposed; 12" of sediment at culvert.	W&S (2014)	
Lacy Brook/Country Club Brook	Nahanton Street	54" Diameter Concrete Pipe Culvert	48 ft +/-	 North End of Culvert  South End of Culvert 	At the north end, stones are loose in the headwall. At the south end, there is minor spalling of the concrete and some minor cracks in the headwall.	FST (2008) W&S (2014)	

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Country Club Brook	Wells Avenue	6' Diameter Concrete Pipe Culvert on North End - 6' x 4' Concrete Box Culvert on South End	525 ft +/-	 North End of Culvert  South End of Culvert	Grate was added by the City after inspection by FST to prevent beaver access.	FST (2008) W&S (2014)	-
Edmands Brook	West End on Boston College Property; East End at Centre Street	West End - 48" Diameter Concrete Pipe Culvert; East End - 36" Diameter Concrete Pipe Culvert w/ Stone Headwall	830 ft +/-	 West End of Culvert  East End of Culvert	East end of culvert is mostly submerged; steel grate is rusted.	W&S (2014)	
Edmands Brook	Private Roadway on Boston College Property	48" Diameter Concrete Pipe Culvert	105 ft +/-	 West End of Culvert East End of Culvert	Minor spalling at west end of culvert	W&S (2014)	Boston College Property

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Edmands Brook	Colby Street	24" Diameter Concrete Pipe Culvert	50 ft +/-	 West End of Culvert   East End of Culvert	Retaining wall at headwall at west end of culvert needs repair/rebuilding	W&S (2014)	
Edmands Brook	Edmands Brook Outlet at Dam Spillway	???	Unknown		Steel grate is rusted and bent; concrete spalling at headwall	W&S (2014)	

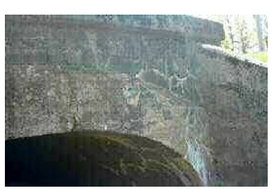
Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Edmands Brook	Edmands Brook Inlet at Westchester Road	Box Culvert with Stone Headwall	170 ft +/- (from MH on Westchester Road)	 North End of Culvert	-	W&S (2014)	-
Hahn Brook	Dudley Road	36" Diameter Concrete Pipe Culvert at East End; 3' x 3' Concrete Box Culvert at West End - Both have stone headwalls	200 ft +/-	 West End of Culvert   East End of Culvert	At the west end, the stones in the headwall and wingwalls are loose and repointing is needed. At the east end, there are minor cracks in the stone headwall.	FST (2008) W&S (2014)	$150,000

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Hahn Brook	Culvert Inlet at the End of Hahn Brook near Newton North High School	Concrete Pipe Culvert	320 ft +/- (to connection at South Meadow Brook)	   South End of Culvert	Cracks w/ efflorescence visible at concrete walls at culvert; stone walls need work	W&S (2014)	
Hammond Brook	South of Suffolk Road - Culvert Goes Under the Green Line Train Tracks - Partial Access Only to North End of Culvert (Outlet) & No Access to South End	Stone Headwall	60 ft +/-	 Nortth End of Culvert	Due to access issues and proximity to the green line train tracks, the size and material of the culvert, and its condition could not be assessed.	W&S (2014)	-

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Hammond Brook	South of Suffolk Road - Located under Walking Path	36" HDPE Pipe Culvert with Stone Headwall	10 ft +/-	 Nortth End of Culvert  South End of Culvert 	-	W&S (2014)	-
Hammond Brook	South of Suffolk Road - Located under Walking Path	24" Corrugated Metal Pipe Culvert with Stone Headwall	30 ft +/-	 East End of Culvert  West End of Culvert  	Both stone headwalls could use some repointing and the CMP culvert is rusted.	W&S (2014)	$50,000

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Hammond Brook (Woodman Stream)	Suffolk Road - Outlet Only	30' Concrete Pipe w/ Stone Headwall (Culvert or Outfall?)	Unknown	 	Some cracks visible in the stone headwall.	W&S (2014)	-
Hammond Brook	Clovelly Road/Suffolk Road - Inlet only	Could not obtain information regarding culvert size and material.	775 ft +/- (inlet to Clovelly Road/Old English Road outlet below)		Could not obtain information regarding culvert conditon.	W&S (2014)	-
Hammond Brook	Clovelly Road/Old England Road - Outlet Only	5' Wide Concrete Box Culvert w/ Stone Headwall	775 ft +/- (outlet to Clovelly Road/Suffolk Road inlet above)	 	Some minor concrete spalling visible at culvert. Stones around culvert could use repointing.	W&S (2014)	
Hammond Brook	Hammond Pond Parkway – North Culvert	The East End is an 8' Wide Concrete Box Culvert with concrete headwall and straight wingwalls. The West End is a 6' Wide Concrete Box Culvert with concrete headwall and straight wingwalls	250 ft +/-	   East End of Culvert  West End of Culvert	At the east end, there is a 5” wide by 2” deep spall that runs almost the full length of the wingwalls along their top corner. The concrete walls are spalled at the top edge for the full length of wall. There is a large crack in the headwall at the edge of the opening.	FST (2008) W&S (2014)	$150,000

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Hammond Brook	Hammond Pond Parkway – South Culvert	The East End is a Concrete Box Culvert of unknown size. The West End is a 24" Diameter Concrete Pipe Culvert with concrete wingwalls that are parallel to the headwall.	100 ft +/-	  East End of Culvert   West End of Culvert	Approximately 12" of sediment observed at the east end of the culvert. The exposed concrete at the east end of the culvert is heavily scaled. A crack is visible within the interior of the 24" pipe on the west end.	FST (2008) W&S (2014)	
Hammond Brook	West of Hammond Pond Parkway North of the Green Line	Stone Culvert & Headwall	35 ft +/-	 East End of Culvert  West End of Culvert	None	W&S (2014)	-
Hammond Brook	East of Glen Avenue & North of the Green Line (Outlet Only Exposed)	24" Concrete Pipe Culvert with Stone Headwall & Wingwalls	Unknown		Stones are loose and could use repointing.	W&S (2014)	-
Hammond Brook	East of Glen Avenue & Under the Green Line Tracks (Could Only Inspect Outlet Due to Access Issues)	36" Concrete Box Culvert with Stone Walls	230 ft +/- (distance only measured under train tracks)	 	Stones are loose and could use repointing.	W&S (2014)	-

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Hammond Brook	Glen Avenue (Inlet Only Exposed)	24" Diameter Concrete Pipe Culvert	1,840 ft +/- (inlet to Chelsey Road outlet below)	  East End of Culvert	None	FST (2008) W&S (2014)	-
Hammond Brook	Behind #19 Chelsey Road (Outlet Only Exposed)	Arch Culvert with Headwall & Wingwalls Made of Granite Blocks; Bottom Half of Culvert Consists of Stone Retaining Wall	1,840 ft +/- (outlet to Glen Ave inlet above)	 	Some cracks/missing mortar visible in the bottom stone section of the culvert	W&S (2014)	
Hammond Brook	Sumner Street (Inlet Only Exposed)	12' Wide x 5' High Concrete Arch Culvert with Brick Walls & Brick Floor	715 ft +/- (inlet to Centre Street outlet below)	  East End of Culvert	The concrete has minor cracks with moderate scaling. The northeast and southeast wingwalls are vertical stone masonry walls that have minor vegetation growing in the joints. Trash rack has some debris that needs to be removed.	FST (2008) W&S (2014)	
Hammond Brook	Centre Street (Outlet Only Exposed)	10' Wide x 4.5' High Concrete Arch Culvert with Brick Walls	715 ft +/- (outlet to Sumner Street inlet below)	   West End of Culvert	There are spalls and hairline cracks with efflorescence on the concrete arch and headwall. The wingwalls are in fair condition with some missing mortar. (Damage to concrete cap on wingwall due to adjacent trees, which have been cut down. - This may have been repaired. Confirm with City.) Approx. 6" of sediment in the culvert to be removed.	FST (2008) W&S (2014)	

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Hammond Brook	West of Centre Street Near Willow Terrace (East End) & Tyler Terrace (West End) - Goes Under Tennis Courts	10' Wide x 5' High Box Culvert with Stone Masonry Walls & Concrete Top	365 ft +/-	   East End of Culvert  West End of Culvert	Headwall shows some spalling/concrete deterioration. Tree growing out of stone masonry wall near east end of culvert that needs to be removed. Cracks visible in stone masonry wall. 6" of sediment in the culvert along with rocks and debris inside culvert.	W&S (2014)	
Hammond Brook	Homer Street (Outlet Only Exposed)	60" Diameter Brick Concrete Culvert with Stone Masonry Headwall	675 ft +/- (from MH on Commonwealth Ave)	  South End of Culvert	Few bricks and some mortar/stone missing at culvert.	W&S (2014)	
Hammond Brook	Chapin Road (Inlet Only Exposed Behind #17 Chapin Road Near Mason Rice School)	Circular Culvert with Headwalls & Wingwalls Made of Granite Blocks	2,705 ft +/- (to City Hall Pond)	 South End of Culvert 	Trask rack needs cleaning.	W&S (2014)	

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Hyde Brook	Behind Franklin Street (Inlet Only Exposed)	48" Circular Brick Culvert with a Concrete Headwall	260 ft +/- (to MH on Frankln Street)	 	Trash rack needs cleaning. Tree is growing on top of the culvert, which needs to be removed. Interior of culvert looks good.	W&S (2014)	
Laundry Brook	Dexter Road	20' Wide Rectangular Culvert with Precast Concrete Deck Beams & Granite Walls	50 ft +/-	 South End of Culvert  North End of Culvert	None	FST (2008) W&S (2014)	Repair Costs included under Hull Street for Laundry Brook.
Laundry Brook	Walnut Street (by Dexter Road)	10' Wide x 10' High Brick Arch Culvert with Stone Masonry Walls	48 ft +/-	 East End of Culvert   West End of Culvert 	Some bricks missing near the middle of the culvert. There are trees at the culvert that should be cut down to prevent damage to the culvert. There is some damage to the north stone masonry wall below one of the storm drains.	FST (2008) W&S (2014)	Estimated culvert repair costs based on 2001 Laundry Brook Culvert Inspection Report prepared by Woodard & Curran. Costs escalated to 2014.

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Laundry Brook	Hull Street (Inlet Only Exposed)	10' Wide x 6' High Concrete Box Culvert w/ Stone Masonry Walls	Unknown	  South End of Culvert	The trash rack needs to be cleaned. There are some cracks in the stone masonry walls. It looks like improvements previously recommended by FST have been completed, including replacement of the trash rack and repair of the granite blocks above the headwall.	FST (2008) W&S (2014)	$1,140,000
Laundry Brook	Pulsifer Street (Outlet Only Exposed)	10' Wide x 6' High Concrete Box Culvert w/ Stone Masonry Walls	Unknown	  East End of Culvert	This end of the culvert has some spalling of the concrete and some missing mortar in the wingwalls, especially around the water line.	FST (2008) W&S (2014)	Repair Costs included under Hull Street for Laundry Brook.
Laundry Brook	Gay Street (Inlet Only Exposed)	10' Wide x 6' High Concrete Box Culvert w/ Stone Masonry Walls	Unknown	 West End of Culvert 	This end of the culvert has some spalling concrete and missing mortar in the stone masonry walls especially around the water line.	FST (2008) W&S (2014)	Repair Costs included under Hull Street for Laundry Brook.
Paul Brook	Boylston Street (Route 9) (Outlet Only Exposed)	5' x 3' Concrete Box Culvert	860 ft +/- (from MH on Jackson Street)	    South End of Culvert	Heavy deterioration of south concrete headwall and large spall on south fascia at top of culvert opening. Large vertical crack in the east wall near the south end.	FST (2008) W&S (2014)	$50,000

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Paul Brook	Hagen Road	2 - 60" Diameter Double Barrel Concrete Pipe Culverts	100 ft +/-	   North End of Culvert  South End of Culvert	Large tree growing behind and over the top of the southeast wingwall that could crack the wall as the tree grows. Minor cracks with light efflorescence on the north headwall. The concrete walls at the south end of the culvert have minor cracks.	FST (2008) W&S (2014)	
Paul Brook	Haynes Road	2 - 60" Diameter Double Barrel Concrete Pipe Culverts	46 ft +/-	   North End of Culvert  South End of Culvert	Minor cracks with light efflorescence on the north headwall. Fence on the north headwall is bent with some rust and has one post dislodged. (May have been repaired since FST inspection). The concrete walls at the south end of the culvert have minor cracks with efflorescence at the fence post locations. The south fence has some rust, is partly hanging over the edge of the culvert and needs to be repaired. There is a minor spall in the southwest wingwall.	FST (2008) W&S (2014)	

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Paul Brook	Olde Field Road	2 - 60" Diameter Double Barrel Concrete Pipe Culverts	50 ft +/-	  West End of Culvert  East End of Culvert	Some mortar missing around the stones at the east end of the culvert. There is a large tree growing on top of the southeast wingwall and along the southwest wingwall.	FST (2008) W&S (2014)	

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Paul Brook	Great Meadow Road	2 - 60" Diameter Double Barrel Concrete Pipe Culverts	52 ft +/-	   East End of Culvert  West End of Culvert	Some debris at east end of culvert. Previous repairs to wall at west end of culvert.	FST (2008) W&S (2014)	-
Paul Brook	Parker Street	12' Wide x 6' High Concrete Box Culvert	200 ft +/-	   West End of Culvert  East End of Culvert	The west end has minor cracks with efflorescence. There is approx. 2' of sand and debris buildup inside the west end of the culvert along the north wall that obstructs some flow. There is 1' to 2' of sand and debris buildup inside the east end of the culvert along the south wall that obstructs some flow.	FST (2008) W&S (2014)	-
Paul Brook	Mildred Road	2 - 60" Diameter Double Barrel Concrete Pipe Culverts	50 ft +/-	 East End of Culvert  West End of Culvert	There is some spalling and deterioration of the concrete. The stone masonry walls have some mortar missing or some stones that are loose, moved or missing. There is some debris at the east end of the culvert that needs to be removed.	FST (2008) W&S (2014)	

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Runaway Brook	First Culvert Upstream Near Washington Street - West End of Culvert - Outlet Only Visible (on Woodland Country Club Golf Course)	36" Diameter Concrete Pipe Culvert	885 ft +/- (from MH on Washington Street)	  West End of Culvert	Some cracks visible in the headwall. The concrete is eroded along the interior of the pipe.	W&S (2014)	$150,000
Runaway Brook	On Woodland Country Club Golf Course	36" Diameter Concrete Pipe Culvert	185 ft +/-	  East End of Culvert  West End of Culvert	West end has minor cracks in the headwall. The concrete is eroded along the interior of the pipe. East end has more substantial cracks in the headwall. Retaining wall adjacent to the culvert needs repair on both sides.	W&S (2014)	$150,000
Runaway Brook	Grove Street - On Woodland Country Club Golf Course - Inlet Only Exposed	Twin 24" Diameter Concrete Pipe Culverts to Grove Street & then 60" Diameter to Charles River	1,065 ft +/-	  West End of Culvert	Culvert in good conndition. No sediment inside of the culvert, but there is approx. 5" of sediment before the culvert.	W&S (2014)	-

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Saw Mill Brook	Boylston Street (Route 9) (South End Outside of City Limits)	36"+/- Diameter Concrete Pipe Culvert	Unknown (1,000 ft +)	 North End of Culvert	None	FST (2008)	Outside of City Limits
Saw Mill Brook	Lagrange Street	5' Wide Concrete Box Culvert	50 ft +/-	  South End of Culvert  North End of Culvert	2” to 3” deep spalls on outside face of north end of the culvert. Large crack/spall inside the culvert on the east wall near the north end of the culvert. Large sediment buildup outside north end of the culvert. There was severe overgrowth in front of the south end making it difficult to fully evaluate, although the FST report indicated that the concrete was in good conditoon.	FST (2008) W&S (2014)	$150,000
Saw Mill Brook	Vine Street	10' Wide Concrete Box Culvert	400 ft +/-	   South End of Culvert  North End of Culvert	At the south end, there is a crack in the headwall at the intersection of the southwest wingwall and the headwall. At the north end, the top of the northwest wingwall has a 3” deep spall that runs the full length and thickness of the wall. There is also minor scour at the base of the northwest wingwall foundation.	FST (2008) W&S (2014)	$150,000

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Saw Mill Brook	Marla Circle	12' Wide Concrete Box Culvert	50 ft +/-	 East End of Culvert  West End of Culvert	Very minor concrete spalling.	FST (2008) W&S (2014)	-
South Meadow Brook	Dudley Road	Box Concrete Culvert - East End 60" Concrete Culvert West End	150 ft +/-	   East End of Culvert  West End of Culvert	Loose, falling stones & exposed rebar observed at the east end of the culvert. West end of the culvert looks to be in good shape. Culvert transitions from a box culvert to a circular culvert.	W&S (2014)	$150,000
South Meadow Brook	East End Near Brandeis Road & West End Near Parker Street	60" Concrete Culvert East End Concrete Box Culvert West End	4,330 ft +/-	 East End of Culvert   West End of Culvert	At the East End, there is a large, deep crack in the culvert headwall along with additional minor cracks. At the West End, there are some minor cracks and some minor concrete deterioration.	W&S (2014)	$150,000

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
South Meadow Brook	Dedham Street (Walnut Street)	12' Wide Concrete Box Culvert	54 ft +/-	   East End of Culvert  West End of Culvert	Cracks visible at the East End. Severe cracks and concrete deterioration visible on the West End. Heavy spalling visible on the southwest wingwall. Concrete is eroding within the culvert and rebar is visible in certain locations. Chain link fence along the east sidewalk is bent and damaged.	FST (2008) W&S (2014)	$150,000
South Meadow Brook	Upland Avenue	Concrete Box Culvert	250 ft +/-	   East End of Culvert  West End of Culvert	At the East End and West End, there are some minor cracks and some minor concrete deterioration. Approx. 1-ft of sediment is built up along the south side of the East End that needs to be removed. There is a tree growing at the north wingwall of the east end of the culvert that is displacing the stones and should be removed. The wall needs to be repaired. Approx. 6" of sediment is built up along the north side of the West End that needs to be removed.	FST (2008) W&S (2014)	$150,000
South Meadow Brook	Winchester Street	14' Wide Concrete Box Culvert	59 ft +/-	   East End of Culvert  West End of Culvert	There is some spalling of concrete on the west headwall. There is minor scaling of the concrete on the east headwall. All 4 wingwalls have some spalling. Concrete is eroded along the walls inside the culvert. There is 6" to 12" of sediment in the culvert.	FST (2008) W&S (2014)	$150,000

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
South Meadow Brook	Needham Street	14' Wide Concrete Box Culvert at East End and Twin Concrete Box Culverts at West End	190 ft +/-	 East End of Culvert   West End of Culvert	The trash rack at the east end of the culvert needs to be cleaned. There is significant deterioration at the west end. Rebar is exposed.	FST (2008) W&S (2014)	$150,000
South Meadow Brook	Tower Road	Twin Concrete Box Culverts at North End Twin Concrete Box Culverts at South End	270 ft +/-	 North End of Culvert   South End of Culvert	Debris in front of culvert at North End. Light cracks visible in wingwall at North End. Concrete deterioration at headwall at South End. At South End, cracks visible at northeast wingwall. Up to 12" of sediment within the culvert.	W&S (2014)	$150,000

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
South Meadow Brook	South of Tower Road to Oak Street	Concrete Box Culvert at North End - Inlet Only Exposed - Outlet at Oak Street	1240 ft +/-	 North End of Culvert  South End of Culvert	The southwest wingwall of the north end culvert is failing and needs repair. Trash rack needs cleaning at north end. Trash rack is bent in some locations. Approx. 6" of sediment within the culvert.	W&S (2014)	$250,000
South Meadow Brook	Oak Street	9' Brick Arch Culvert with Stone Masonry Walls	30 ft +/- (distance of roadway)	 North End of Culvert  South End of Culvert	The metal fence at the arch shaped opening on the north side of Oak Street does not completely cover the opening and should be replaced for safety reasons. The culvert has some missing mortar around the brick and granite blocks on the inside of the culvert. There is a large crack in the southeast stone masonry wingwall with evidence of some wall movement. There is some mortar missing in the southeast stone masonry wingwall.	FST (2008) W&S (2014)	$150,000
Strong's Brook	On Newton Commonwealth Golf Course near Strong's Pond	Twin 18" Diameter Cast Iron Pipe Culverts at North End with Concrete Headwall; 36" Diameter Concrete Pipe Culvert at South End w/ Stone Headwall	35 ft +/-	 North End of Culvert  South End of Culvert	At north end, concrete head wall has some cracks & pipes are rusted, some separation visible between the pipes and the concrete headwall; at south end, there are some minor cracks in the stone headwall.	W&S (2014)	$150,000

Body of Water	Street	Culvert Description	Culvert Length	Photos	Deficiencies	Source	Repair/Construction Cost
Strong's Brook	On Newton Commonwealth Golf Course near Philmore Road	Concrete Box Culvert	25 ft +/-	 	Culvert is collapsed; rebar exposed; retaining wall in vicinity of culvert is also collapsed	W&S (2014)	$300,000
Strong's Brook	On Newton Commonwealth Golf Course near Montrose Street	24" Diameter Concrete Pipe Culvert - Outlet Only to Strong's Brook	305 ft +/- (from behind #10 Dolphin Road)	 	Crack visible in culvert pipe	W&S (2014)	$150,000
							$5,140,000

Culvert Inspection/Evaluation	$1,600,000
Construction Cost for Known Culvert Repairs	$4,000,000
Construction Cost for Laundry Brook Culvert Repairs	$1,140,000
Construction Cost Allowance for Unknown Pipe Culvert Point Repairs	$850,000
Construction Cost Allowance for Unknown Road Width Culvert Replacements	$800,000
Construction Cost Allowance for Unknown Road Width Culvert Repairs	$750,000
Design Costs (15% of Total Construction Cost)	$1,140,000
Construction Services Cost (20% of Total Construction Cost)	$1,510,000
Subtotal	$11,790,000
Contingency (20% of All Costs Except Culvert Inspection/Evaluation & Sediment Removal)	$758,000
Total Estimated Cost of Culvert Evaluations/Repairs:	**$12,548,000**

(1) Assumes the work would be completed under 4 separate projects of equal size. $400,000 per project.
(2) Costs taken from recommendations provided within the 2001 Laundry Brook Culvert Inspection Report & adjusted to 2014 (W&C).
(3) Approximately 100,000 lf of pipe culvert/storm drain >18" is recommended for inspection. Assumes $25,000 point repair every 3,000 feet.
(4) There are 24 road width culverts for inspection. Assumes replacement of 2 culverts at $400,000 each.
(5) There are 24 road width culverts for inspection. Assumes repair of 5 culverts at $150,000 each.