

Upton, MA

# Water Quality Limited Waterbodies Requirements

*MS4 Permit Year 5*

*May 2023*

## BMP RETROFIT SITE INVESTIGATIONS

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Upton, MA

*MS4 Permit Year 5*

## **BMP RETROFIT SITE INVESTIGATIONS**

Prepared by: **BETA GROUP, INC.**

Prepared for: Town of Upton Department of Public Works

May 2023

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## 1.0 INTRODUCTION

This memorandum is a follow-up to the previous report sent on June 30, 2022 entitled Nutrient Source Identification Report (NSIR) in accordance with the 2016 MS4 General Permit requirements to meet water quality standards for discharges to certain water quality limited waters subject to additional requirements, Section 2.2.2 and Appendix H. Under these requirements, all permittee-owned properties identified in the NSIR that are within the drainage area of the impaired water or its tributaries are required to be reviewed for feasibility to implement Best Management Practices (BMPs) that will reduce the frequency, volume, and pollutant loads of stormwater discharges to and from the Town's MS4 system. In addition, the Town is required to plan and install a minimum of one structural BMP as a demonstration project within the drainage area of water quality limited water (in this case Phosphorus) with high load potential by the end of Year 6 of the permit (June 30, 2024).

This NSIR identified a list of Town owned properties that potentially could be retrofitted. Since providing this list, BETA added 4 additional locations for a total of nine sites considered in this investigation.

BETA conducted a site visit for each location in **Table 1** below on January 6, 2023 and February 2, 2023 to investigate suitability for BMP retrofit installation. **Section 2** provides a summary for each site visited, including a site map with conceptual design elements and major observations made in the field, and a tabulated field investigation form with site photographs.

Based on field observations, photographs and other data collected, existing stormwater infrastructure data, and current site uses, BETA ranked the viable sites from highest (1) to lowest feasibility in carrying out a demonstration project within the next year. Rank is based on the calculated total potential nitrogen load removal (in lb/yr) based on retrofit BMPs identified at each site. See **Table 1** below.

**Table 1 - Potential BMP Retrofit Locations**

Ranking	Property	Address	Within a or Tributary to Nutrient Impaired Watershed?	Potential BMPs	Access for Maintenance	Permitting Required	Total Potential Treatment Area (U.S. Acres)	Potential Nutrient Load Removal (lb/yr)	Estimated Costs (Low to High)	Planned Retrofit Installation Date	Comments
1	Lakeview Cemetery	71 North Main Street	Yes (Pratt Pond → Blackstone)	<ul style="list-style-type: none"> <li>• Infiltration Basin</li> <li>• Water Quality Swale</li> <li>• Vegetated Filter Strip</li> <li>• Sediment Forebay</li> </ul>	Yes	Yes (NOI)	10.57	3.52	\$88,100 - \$352,300	Future Redevelopment	Retrofitting the site with water quality swales along the North Main Street entrance to cemetery would provide treatment of stormwater runoff from both the main road as well as a significant portion of the western half of the cemetery property.
2	Town Hall	1 Main Street	Yes (Center Brook → Blackstone)	<ul style="list-style-type: none"> <li>• Infiltration Chamber/Pipe</li> <li>• Water Quality Swale</li> <li>• Bioretention (rain garden)</li> </ul>	Yes	No	3.62	2.30	\$57,600 – \$230,200	Future Redevelopment	Ideal BMP retrofit would be the installation of a subsurface leaching basin or infiltration chamber to treat flow from existing upstream drainage infrastructure on Warren Street.
3	Undeveloped Overflow Parking Lot	0 Grove Street	Yes (Center Brook → Blackstone)	<ul style="list-style-type: none"> <li>• Infiltration Basin</li> <li>• Sediment Forebay</li> <li>• Water Quality Swale</li> <li>• Vegetated Filter Strip</li> </ul>	Yes	Yes (NOI)	0.68	1.07	\$26,900 – \$107,500	Future Redevelopment	If Town plans to redevelop site into a formal public parking area, retrofitting property edge where paved waterway exists into a water quality swale or infiltration practice could provide treatment for half of Grove Street up to Main Street.
4	Maplewood Cemetery	Maple Avenue	Yes (West River → Blackstone)	<ul style="list-style-type: none"> <li>• Water Quality Swale</li> <li>• Infiltration trench</li> </ul>	Yes	Yes (NOI)	4.89	0.97	\$24,250 – \$97,000	Future Redevelopment	Cemetery land slopes down towards Maple Avenue and portion of runoff from Pleasant Street could be redirected to southern end of land property. Opportunity to install water quality swales along perimeter as noted in the site map.
5	Memorial School	69 Main Street	Yes (Center Brook → Blackstone)	<ul style="list-style-type: none"> <li>• Infiltration Trench</li> <li>• Leaching Catch Basin</li> <li>• Water Quality Swale (with check dams)</li> </ul>	Yes	No	1.02	0.93	\$23,200 – \$92,800	Future Redevelopment	Town may choose to retrofit southernmost parking lot area with subsurface leaching basin(s). Opportunity to install formal infiltration trench on northern edge of tennis courts. Eastern entrance could be formalized with water quality swale along northside of sidewalk.
6	Florence Circle Town Property	Adjacent to 4 Florence Circle	Yes (Center Brook → Blackstone)	<ul style="list-style-type: none"> <li>• Infiltration Basin</li> <li>• Wet Basin</li> </ul>	Yes	Yes (NOI)	1.39	0.53	\$13,200 – \$52,800	Future Redevelopment	Depending on soil confirmation, retrofitting may include either infiltration or wet basin. Town could maximize catchment area by installing catch basin on Pleasant Street to direct flows into basin.
7	VFW Post	15 Milford Street	Yes (Center Brook → Blackstone)	<ul style="list-style-type: none"> <li>• Water Quality Swale</li> <li>• Infiltration Basin</li> <li>• Infiltration Trench</li> <li>• Sediment Forebay</li> </ul>	Maybe (See Comments)	No	0.37	0.40	\$10,100 – \$40,300	Future Redevelopment	Site is technically owned by VFW, but Town athletic fields located within central portion of parcel. If Town can access this property, installation of a small infiltration trench or basin in open space on northside of property by entrance is recommended.
8	Upton Fire and EMS Headquarters	20 Church Street	Yes (Center Brook → Blackstone)	<ul style="list-style-type: none"> <li>• Infiltration Trench</li> <li>• Infiltration Basin</li> <li>• Water Quality Swale</li> <li>• Subsurface Leaching Basin</li> </ul>	Yes	No	0.47	0.28	\$7,000 – \$27,700	Future Redevelopment	Installation of subsurface leaching basins or infiltration basins by northwest or southeast corners of property would provide the highest potential for nutrient load removal. Other option is to retrofit sidewalk areas with infiltration trenches.

## 2.0 BMP RETROFIT SITE INVESTIGATION FINDINGS

### 2.1 LAKEVIEW CEMETERY

Land use at this cemetery is primarily devoted to gravesites; resultingly, limited opportunities exist for stormwater treatment. A naturalized swale collects roadway runoff along North Main Street and discharges onto the cemetery property – there is evidence of erosion and sedimentation in several locations. Inside the cemetery, erosion was observed along the shoreline of Pratt Pond, particularly in areas with steep slopes. The area between the shoreline roadway and the pond presents many opportunities for vegetation with a restoration seed mixture and stabilization. Additional opportunities for BMP retrofit installation include:

1. Formalizing the naturalized swale along North Main Street could provide treatment for the roadway runoff currently entering the cemetery. However, this may not be viable due to the existing mature trees, the utility pole, and the existing slope adjacent to the roadway. A linear infiltration practice could be installed along the west edge of the cemetery roads, but a small culvert would be needed to cross the main driveway. Erosion protection would be needed for any discharge into Pratt Pond.
2. The north driveway into the current brush stockpile area could be converted into an infiltration basin with a sediment forebay and vegetated filter strip. This would restrict access to the southern, east-west aligned driveway. The brush area, particularly the north driveway, currently receives stormwater runoff from the paved internal roadways north and northwest of the brush area.

***2.1.1 LAKEVIEW CEMETERY SITE MAP***

## 2.1.2 LAKEVIEW CEMETERY BMP RETROFIT OBSERVATIONS FORM

Site Name:	Lakeview Cemetery		
Address:	71 North Main Street	Date/Time:	January 26, 2023 10:20 AM
Inspector	Leya Strode, Matt Crowley		
Current Weather:	Overcast -- 45 °F		

## 2.1.2.1 BMP RETROFIT LOCATION MAP



## 2.1.2.2 OBSERVATION DETAILS

BMP Retrofit(s) Viable: Yes

Most Prevalent Soils:	A, B/D	Estimated Depth to Water (If Possible):	Test pit required
BMP Options:	Infiltration Basin, Water Quality Swale, Other	If "Other":	Vegetated filter strip, sediment forebay
Site Observation Notes:	Most of site was reserved for graves. Opportunities for BMP installation in rear at brush dump, where two gravel roadways lead down to a local low spot. Erosion from stormwater flowing along both roadways is evident; Town could install a grassed swale with check dams or an infiltration basin. Additional site constraints include steep slopes along Pratt Pond, where erosion was evident. Opportunities for a WQS or vegetated basin near dead tree along existing stormwater runoff channel; additional opportunity at existing riprap outlet protection for swale with basin overflowing to existing riprap. Significant channelized erosion noted along steep slope coming off North Main Street. Adjacent parcel has opportunity for swale and small infiltration basin along School St.		

**2.1.2.3 PHOTOS**

	<p>View to south of existing brush dump area.</p>
	<p>View to north from existing brush dump area.</p>

	<p>View to west-southwest from existing brush dump area.</p>
	<p>Eroded area along perimeter roadway leading to Pratt Pond.</p>

	White car is parked in area where opportunities exist for WQS ending in vegetated basin.
	Existing riprap outlet protection, facing northeast.

	Existing riprap outlet protection, facing southwest.
	Steep slope along North Main Street, looking south.

	<p>Channelized erosion entering site along North Main Street, with deposited sediment visible in background.</p>
	<p>Existing channelized erosion along School St, facing north.</p>

## **2.2 TOWN HALL**

Stormwater flow from the Town Hall parking lot and Warren Street is captured by two existing catch basins at the front and rear driveways. An existing discharge exits through the retaining wall along the south side of Warren Street into rip rap; overflows from this outlet are likely also captured by the existing catch basins. Existing retaining walls and steep slopes along Warren Street are prohibitive to installing swales on either side of the roadway.

The Town Hall roof is served by gutters in some areas, with at least one retrofitted leader discharging directly onto the ground and buried leaders in other areas. Some sections of roof did not have gutters; there is an opportunity here to install drip edges where the roof drip lines have eroded existing soil. These drip edges could then be routed to a leaching basin, although the presence of an existing HVAC pad may prevent a challenge to installation. Any downspouts discharging directly onto the ground could also be rerouted to a leaching basin but may require cutting of the existing asphalt walkway.

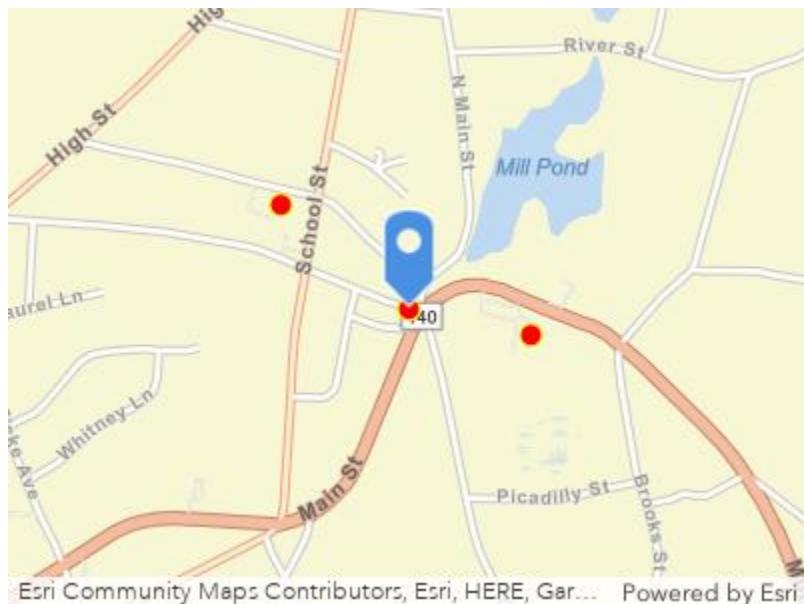
Other BMP retrofit opportunities include routing of parking lot catch basins to a leaching basin or other subsurface infiltration system. This may not be viable due to possible stream flow through the existing drainage manhole and numerous risers on adjacent utility pole.

**2.2.1 TOWN HALL SITE MAP**

## 2.2.2 TOWN HALL BMP RETROFIT OBSERVATIONS FORM

Site Name:	Town Hall		
Address:	1 Main Street	Date/Time:	January 26, 2023 9:00 AM
Inspector	Leya Strode, Matt Crowley		
Current Weather:	Cloudy -- 45 °F		

## 2.2.2.1 BMP RETROFIT LOCATION MAP



## 2.2.2.2 OBSERVATION DETAILS

BMP Retrofit(s) Viable: Yes

Most Prevalent Soils:	A	Estimated Depth to Water (If Possible):	Test pit required
BMP Options:	Infiltration Chamber/Pipe, Infiltration Basin, Water Quality Swale, Bioretention, Other	If "Other":	Rain garden
Site Observation Notes:	Parking lot slopes towards CB near driveway from all sides; additional CB upgradient WNW along blocked ROW. Large pipe deposits into riprap through retaining wall along south edge of blocked ROW. Some roof edges do not have gutters. Potential opportunities for small leaching basin in front of blue sign in front of parking lot, infiltration trench along drip edge around building, subsurface leaching system under lowest CB, or potentially WQS along upstream road.		

**2.2.2.3 PHOTOS**

	Existing catch basin at parking lot driveway, facing east.
	Existing catch basin 71-9, facing west.
	Roadway leading west from parking lot – opportunities for swales are limited given steep slopes and existing retaining walls.



Existing discharge through retaining wall into riprap.



Eroded soil beneath drip edge is beginning to scour existing concrete pad – opportunity to reroute to leaching basin. Equipment presents challenge to installing drip edge.



Existing downspout discharges to ground – opportunity to discharge to leaching basin, would require cutting and restoration of existing HMA path.

## **2.3 UNDEVELOPED OVERFLOW PARKING LOT**

Existing conditions on this parcel include a paved waterway flowing from Grove Street directly to Center Brook, capturing a large impervious catchment from Main Street and the eastern half of Grove St (see Attachment 1 for detail on catchment). Multiple low areas with shallow mud were observed near the east edge of the lot along Center Brook. Most of the surface of this parcel is compacted gravel.

Rerouting the existing paved waterway to a water quality swale with check dams along the south edge of the parcel would provide significant treatment of impervious stormwater runoff. The swale would then outlet to Center Brook with riprap outlet protection. Along the east edge of the parcel, an opportunity exists to install a shallow infiltration basin with a sediment forebay for pretreatment; overflow would flow to Center Brook through a stone spillway.

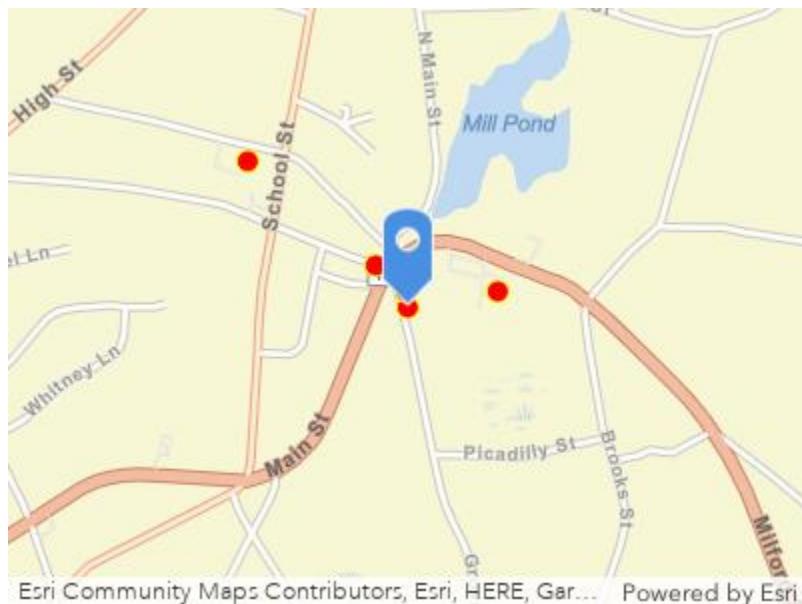
Restoration of a vegetated filter strip running along the east and south edges of the parcel would provide additional stormwater pretreatment. Existing compacted gravel would need to be excavated; tilling, loam addition, and installation of a restoration seed mixture would complete the restoration.

**2.3.1 UNDEVELOPED PARKING LOT SITE MAP**

## 2.3.2 UNDEVELOPED PARKING LOT BMP RETROFIT OBSERVATIONS FORM

Site Name:	Undeveloped Overflow Parking Lot		
Address:	0 Grove Street	Date/Time:	February 2, 2023 2:30 PM
Inspector	Leya Strode, Matt Crowley		
Current Weather:	Sunny -- 36 °F		

## 2.3.2.1 BMP RETROFIT LOCATION MAP



## 2.3.2.2 OBSERVATION DETAILS

BMP Retrofit(s) Viable: Yes

Most Prevalent Soils:	B	Estimated Depth to Water (If Possible):	Test pit required
BMP Options:	Infiltration Basin, Water Quality Swale, Other	If "Other":	Vegetated buffer, sediment forebay
Site Observation Notes:	Runoff from Main Street appears to run down Grove Street and into Center Brook over an existing paved waterway at the western edge of the property. This presents an opportunity for treatment through the installation of a water quality swale along the Brook. Other possibilities at this site include a sediment forebay and shallow infiltration basin along the eastern edge.		

**2.3.2.3 PHOTOS**

	<p>View of site from northwest corner, facing southeast.</p>
	<p>Stream and adjacent area, facing east towards Grove St.</p>

 A photograph showing a dry, shallow area of ground in the rear of a parking lot. The ground is covered in dry, brown grass and some fallen leaves. In the background, there are buildings, including a church with a steeple, and some bare trees under a clear blue sky.	Shallow area in rear of parking lot, facing northwest.
 A photograph of an existing paved waterway. The waterway is paved with asphalt and has a yellow "STOP AHEAD" sign on the left. In the background, there is a multi-story building on the left and a church with a steeple in the distance. The sky is clear and blue.	Existing paved waterway from Grove Ave, facing north.



Shallow area in rear of parking lot, facing southeast.

## **2.4 MAPLEWOOD CEMETERY**

Existing catch basins serve the interior of the cemetery and flow to ponds on the property. An area included in the parcel but outside the cemetery fence line near the intersection of Maple Avenue and Pleasant Street presents an opportunity to install a water quality swale along the east side of Maple Avenue running north from the intersection. Existing catch basins (including 93-14) at the intersection could be rerouted to increase catchment area and infiltration potential, and the swale could overflow to an existing inlet structure that flows underneath Maple Avenue.

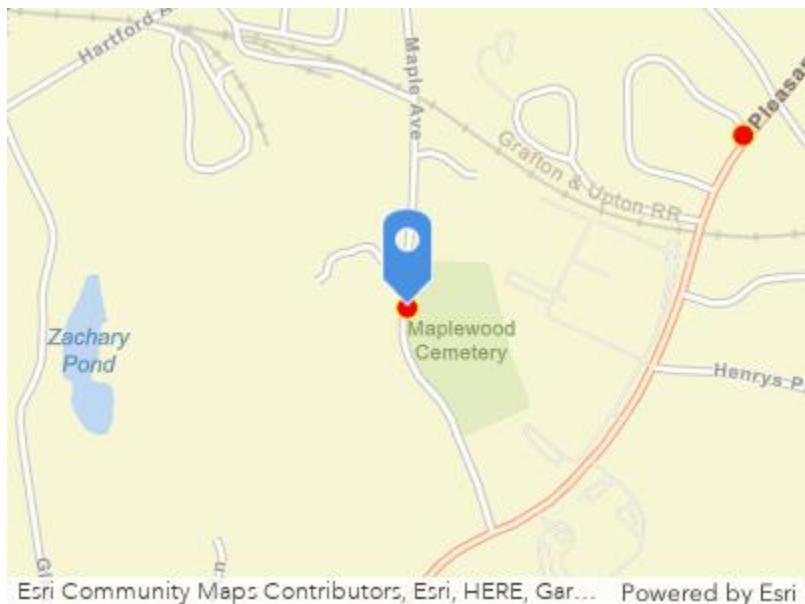
An additional inlet and catch basin structure (86-2) was observed north of this area along the cemetery fence line. Opportunities for BMP retrofits are limited in this area due to the cemetery fence and existing grading.

**2.4.1 MAPLEWOOD CEMETERY SITE MAP**

## 2.4.2 MAPLEWOOD CEMETERY BMP RETROFIT OBSERVATIONS FORM

Site Name:	Maplewood Cemetery		
Address:	47 Maple Avenue	Date/Time:	January 26, 2023 12:20 PM
Inspector	Leya Strode, Matt Crowley		
Current Weather:	Rainy -- 45 °F		

## 2.4.2.1 BMP RETROFIT LOCATION MAP



## 2.4.2.2 OBSERVATION DETAILS

BMP Retrofit(s) Viable: Yes

Most Prevalent Soils:	A	Estimated Depth to Water (If Possible):	Test pit required
BMP Options:	Water Quality Swale, Other	If "Other":	Vegetated swale with check dams
Site Observation Notes:	Graves preempt possibility of soil disturbance at interior of site. Unused corner of parcel outside of fenceline close to intersection of Pleasant Street and Maple Ave is not being used as cemetery. Opportunities to reroute catch basins 86-3 and 93-14 to water quality swale or swale with check dams running from the corner of Maple Avenue and Pleasant Street north along Maple Avenue terminating at existing inlet structure. Fence along Maple Avenue obstructs opportunity for swale running south to existing inlet structure.		

**2.4.2.3 PHOTOS**

	Existing catch basins drain into ponds in center of cemetery, facing southwest.
	Existing inlet structure facing south along Maple Avenue towards intersection of Maple Avenue and Pleasant Street.

	<p>Catch basin 93-14, facing north along Maple Ave.</p>
	<p>Impervious catchment of catch basin 93-14, facing northeast along Pleasant Street.</p>

 A photograph showing a road curving away from the viewer. The shoulder of the road is covered in fallen leaves. A metal guardrail is visible on the right side. A single tree stands on the left side of the road.	Facing south along Maple Ave.
 A photograph showing a road curving towards the viewer. The shoulder of the road is covered in fallen leaves. A metal guardrail is visible on the left side. A single tree stands on the right side of the road.	Facing north along Maple Ave.

	Existing catch basin 86-2 and inlet structure facing south along Maple Ave.
	Facing north along Maple Ave from existing inlet structure.

## 2.5 MEMORIAL SCHOOL

Existing conditions at this site include a network of catch basins for stormwater conveyance throughout parking lots and driveways to Fiske Avenue and Main Street. An additional catch basin is sited behind the school basketball courts. No evidence of existing BMPs or stormwater treatment exists on site.

Some BMP retrofit opportunities were found to be unviable due to poor soils, steep slopes, or existing grading. However, multiple viable options for the installation of retrofitted BMPs were found at Memorial School:

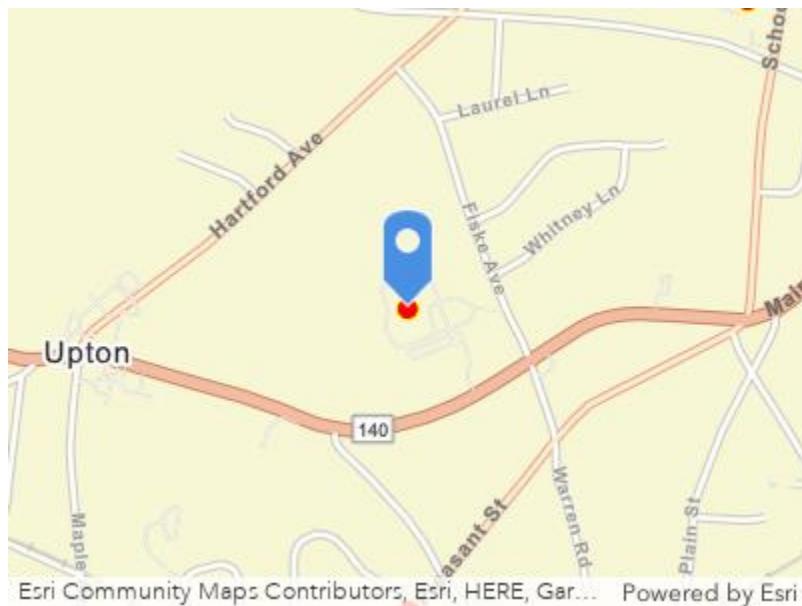
1. There is an opportunity to install a stone infiltration trench with a subdrain connected to the existing catch basin north of the school basketball courts. Ponding was observed on the court playing surface – installation of an infiltration trench along the north edge of the court would capture this water and allow it to infiltrate naturally. Any overflow would outlet to the connected catch basin.
2. Another opportunity exists along the north driveway that exists south of the school building. Currently, the sidewalk along the south parking lot contains 5 empty planting areas. Because the north driveway is banked towards the sidewalk, curbs could be cut to allow stormwater to flow to newly installed tree box filters.
3. The south parking lot channels stormwater flows to an existing catch basin at the east end of the lot. This catch basin currently flows north to a drainage manhole but could be redirected south to a leaching basin or series of leaching basins.
4. The newly constructed concrete patio and walkway present another opportunity for the installation of a stone infiltration trench. The presence of lumber indicates construction is ongoing; if a picnic shelter or other roof structure was constructed, a stone drip edge along the perimeter could also be installed.
5. The sidewalk leading from the school to Fiske Avenue has a slight pitch (0.5%) north and drains downhill towards the street. Existing vegetation along both edges of the sidewalk may be channeling stormwater along the sidewalk itself; there is an opportunity for installation of a water quality swale with check dams along the north edge of this sidewalk to reroute and infiltrate stormwater.

*2.5.1 MEMORIAL SCHOOL SITE MAP*

## 2.5.2 MEMORIAL SCHOOL BMP RETROFIT OBSERVATIONS FORM

Site Name:	Memorial School		
Address:	69 Main Street	Date/Time:	February 2, 2023 3:30 PM
Inspector	Leya Strode, Matt Crowley		
Current Weather:	Sunny -- 34 °F		

## 2.5.2.1 BMP RETROFIT LOCATION MAP



## 2.5.2.2 OBSERVATION DETAILS

BMP Retrofit(s) Viable: Yes

Most Prevalent Soils:	B, C	Estimated Depth to Water (If Possible):	Test pit required
BMP Options:	Infiltration Trench, Water Quality Swale, Leaching CB, Infiltration Basin	If "Other":	
Site Observation Notes:	Most of front parking lots are channelized to convey water directly to catch basins. Opportunities for retrofit include leaching subsurface systems fed by diverted catch basins, infiltration basins or swales along accessible path from Main Street, infiltration trenches along path from Fiske Ave or under drip edge of picnic area (currently under construction), and infiltration trench along north edge of basketball courts.		

**2.5.2.3 PHOTOS**

	South parking area, facing northeast.
	Existing catch basin that captures stormwater from south parking lot, facing south.

 A photograph showing a grassy field with a metal fence and a set of stairs in the background. A paved sidewalk leads towards a building on Main Street.	Accessible sidewalk to Main St, facing north.
 A photograph of a newly constructed concrete patio and walkway. The walkway is curved and leads to a paved patio area with several green picnic tables. The area is surrounded by trees and grass.	Newly constructed concrete patio and walkway, facing southeast.

	Sidewalk to Fiske Ave, facing east.
	Evidence of ponding along back of basketball courts, facing west.



Grade change and soil accumulation at north end of basketball court, facing west.

## 2.6 FLORENCE CIRCLE TOWN PROPERTY

Existing conditions on this undeveloped parcel include two outfalls, one (78-6) that discharges stormwater flow in the north corner to a wet area in the west corner that is retained by an outlet control structure and one (78-5) that was buried under leaves in the east corner of the parcel on the day of the site visit. It is unclear if the existing wet area was designed as a pond or is a natural wetland, although the wet area does appear in the 2005 Wetlands GIS layer published by MassDEP.

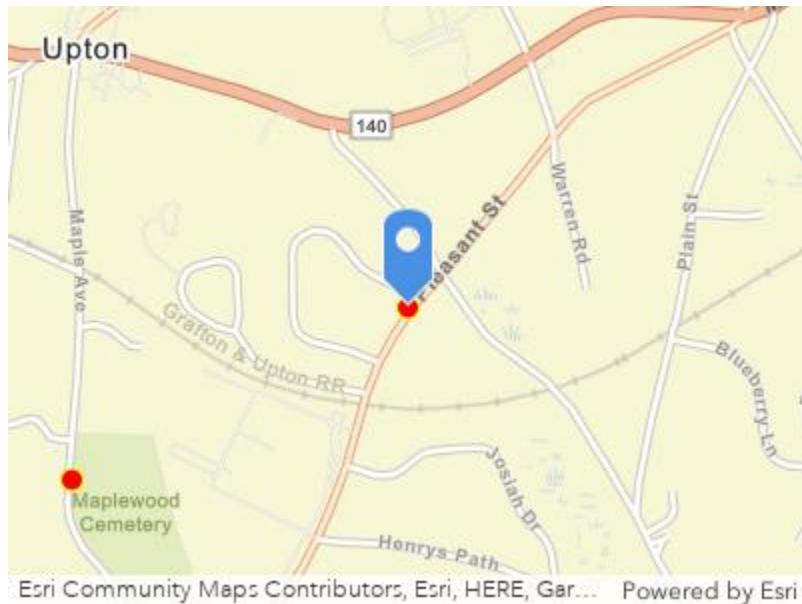
An infiltration basin at this site is likely not a good option due to observed standing water and ponding on the day of the site visit – any consideration of an infiltration basin would require a test pit and soil testing. The best option for installation of a BMP retrofit is a wet basin in the eastern corner of the parcel. This would involve installation of an additional catch basin at the northernmost corner of Pleasant Street and Florence Circle, as well as redirecting flows from the upstream Pleasant Street system to maximize catchment to the pond. Any overflow could outlet to the existing drainage channel or back into the closed system after downstream system capacity were considered.

**2.6.1 FLORENCE CIRCLE TOWN PROPERTY SITE MAP**

## 2.6.2 FLORENCE CIRCLE TOWN PROPERTY BMP RETROFIT OBSERVATIONS FORM

Site Name:	Florence Circle Town Property		
Address:	2 Florence Circle	Date/Time:	January 26, 2023 11:55 AM
Inspector	Leya Strode, Matt Crowley		
Current Weather:	Overcast -- 45 °F		

## 2.6.2.1 BMP RETROFIT LOCATION MAP



## 2.6.2.2 OBSERVATION DETAILS

BMP Retrofit(s) Viable: Yes

Most Prevalent Soils:	A, B/D	Estimated Depth to Water (If Possible):	Test pits required - soil was saturated with pools of standing water throughout the site
BMP Options:	Wet Basin	If "Other":	
Site Observation Notes:	Two outfall structures onsite from adjacent neighborhood (78-6 and 78-5). Outfall 78-6 formed a stream leading to a pond in the W corner of the parcel; an inlet control structure at the SE corner of the pond flowed to an outlet along Pleasant Street. Outfall 78-5 was clogged with leaves and difficult to see. Opportunity for a wet retention basin and installation of an inlet control structure at existing outlet.		

2.6.2.3 PHOTOS

	View of site facing W at corner of Florence Circle and Pleasant Street.
	Outfall 78-6, viewed facing E.

	Outfall 78-5, viewed facing E.
	Existing outlet; opportunity for installation of inlet control structure and wet basin.



Inlet control structure at W corner of parcel, facing W.

## **2.7 VFW Post**

Flow from a large, existing parking lot on site presents most of the opportunity for stormwater treatment. However, this site is not town-owned and any BMPs on site may not count towards the Town's nutrient removal obligations.

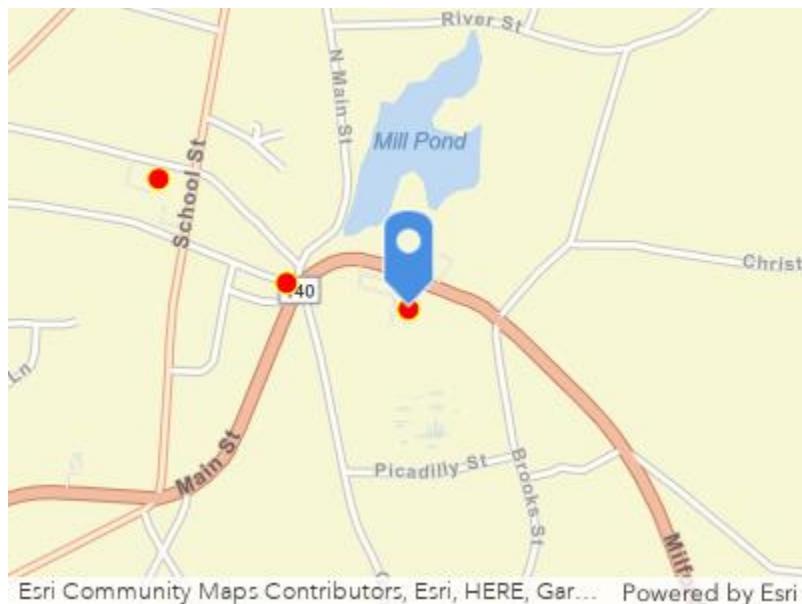
One option to capture stormwater flowing north from the existing parking lot would be installation of a linear sediment forebay and shallow infiltration pond or trench along the edge of pavement in the vegetated area along Milford Street, near the VFW flagpole. Another would be to convert the naturally channelized area leading to the rear ballfields into a water quality swale – this may not be desirable due to the lack of formalized access to the playing fields and snack shack.

*2.7.1 VFW POST SITE MAP*

## 2.7.2 VFW POST BMP RETROFIT OBSERVATIONS FORM

Site Name:	VFW Post & Parking Lot		
Address:	15 Milford Street	Date/Time:	January 26, 2023 9:45 AM
Inspector	Leya Strode, Matt Crowley		
Current Weather:	Overcast -- 45 °F		

## 2.7.2.1 BMP RETROFIT LOCATION MAP



## 2.7.2.2 OBSERVATION DETAILS

BMP Retrofit(s) Viable: **Yes**

Most Prevalent Soils:	A, B	Estimated Depth to Water (If Possible):	Test pit required
BMP Options:	Infiltration Basin, Water Quality Swale	If "Other":	
Site Observation Notes:	Precise site was slightly unclear - site address was for VFW-owned parcel with meeting house, ball fields, and snack shack with associated parking lot, but parcel ID was for adjacent town-owned property that is being developed as a new community center. Evidence of stormwater treatment onsite at community center (under construction at time of site visit) includes stormwater quality unit. VFW parcel included opportunities for a sediment forebay and shallow infiltration area near flagpole along Milford St, as well as an existing channelized area leading to ball fields that could be reconstructed as a WQS. Impediments may include a lack of formalized access to fields, and cutting off of access to concessions building. Need to investigate ownership further.		

**2.7.2.3 PHOTOS**

	<p>Facing southeast from VFW parking lot to sloping area that leads to ballfields - opportunity for WQS along existing channelized area.</p>
	<p>Facing east from VFW parking lot to area near flagpole - opportunity for shallow infiltration area with sediment forebay.</p>

## 2.8 UPTON FIRE AND EMS HEADQUARTERS

Existing conditions on this site include a subsurface BMP at Upton Fire Headquarters, which is presumed to treat flows from the parking lot, Fire Headquarters roof leaders, and an existing trench drain across the rear garage entrance. If the roof leaders do not discharge to the existing BMP, there may be an opportunity to direct them into a leaching basin located in pervious areas on the property. Additional investigation of as-builts and other Town documents would be required to verify connectivity.

At Upton Police Headquarters, an existing paved waterway captures water from the public parking lot and portions of the driveway from Warren Street. There does not appear to be a formal drainage system downstream of the waterway outlet. There is an opportunity here to redirect flows to a water quality swale which would outlet in a small infiltration area at the corner of Warren Street and School Street.

Additional opportunities for stormwater treatment on this parcel include:

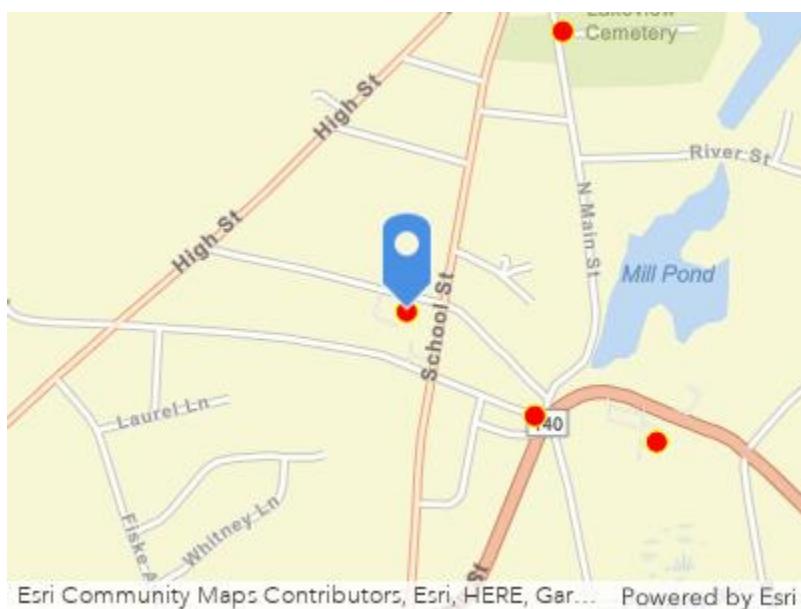
1. Installation of stone infiltration trenches along walkways leading to and around the Fire Headquarters building. Ponding and mud were observed during a visit to this site along walkways.
2. A leaching catch basin could be installed at the driveway entrance to Church Street; however, the catchment would be limited to a small northern section of the parking lot.

*2.8.1 UPTON FIRE AND EMS SITE MAP*

## 2.8.2 FIRE AND EMS HEADQUARTERS BMP RETROFIT OBSERVATIONS FORM

Site Name:	Fire and EMS Headquarters		
Address:	20 Church Street	Date/Time:	January 26, 2023 10:40 AM
Inspector	Leya Strode, Matt Crowley		
Current Weather:	Overcast -- 45 °F		

## 2.8.2.1 BMP RETROFIT LOCATION MAP



## 2.8.2.2 OBSERVATION DETAILS

BMP Retrofit(s) Viable: **Yes**

Most Prevalent Soils:	A, B	Estimated Depth to Water (If Possible):	Test pit required
BMP Options:	Infiltration Trench, Infiltration Basin, Water Quality Swale, Bioretention	If "Other":	
Site Observation Notes:	Site has existing subsurface BMP, likely linked to existing catch basins in large FD parking lot behind FD building. Unclear where existing roof drains and trench drains flow; existing downspouts are disconnected in front, likely as a result of vehicle impacts. Some drainage from driveway collecting at curb, but impervious catchment area is relatively small. Opportunity for rain garden on		

	north side of walkway leading to main FD entrance indicated by slope of walkway and existing saturated soil/ponding. Back parking area at police station flows towards grassed slope; opportunity for simple infiltration trench, WQS, or rain garden to capture stormwater runoff. In main police parking area, existing paved waterway deposits stormwater onto Warren St. Opportunity to divert paved waterway to WQS with infiltration area at corner of Warren St and School St and overflow curb cut.
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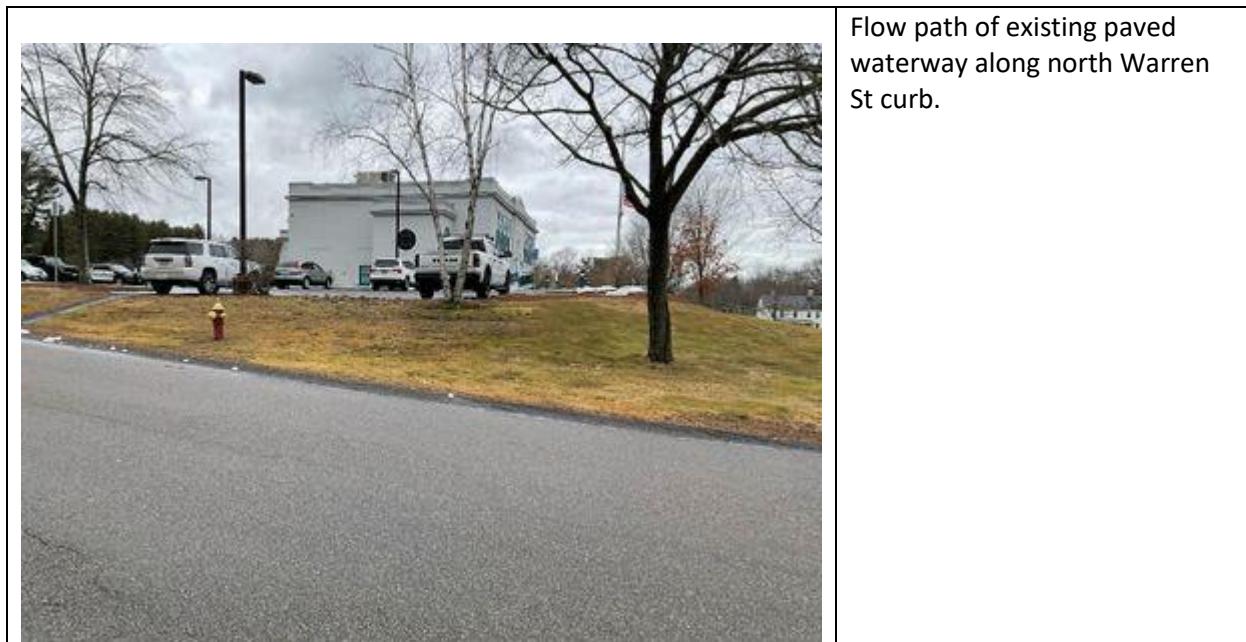
#### 2.8.2.3 PHOTOS

	Fire department parking lot driveway facing north towards Church Street.
	Fire department parking lot from Church Street, looking south.

	<p>Fire department building from Church Street, with view of downspouts.</p>
	<p>Disconnected downspout along fire department vehicle bay.</p>

	<p>Saturated low spot along walkway to main fire department building entrance from School Street.</p>
	<p>Back parking lot of police department, looking northwest.</p>

	Front police department parking lot, looking southwest.
	Existing paved waterway from south edge of police station front parking lot along Warren St.



Flow path of existing paved waterway along north Warren St curb.