

## Town of Southampton - Preliminary Analysis of Municipal Properties for Stormwater Retrofit Inventory

**TO:** Town of Southampton Stormwater Management Program Files  
**FROM:** Tracy Adamski, AICP, Emily Tully, and Kristin Dippold, Tighe & Bond  
**COPY:** Randall Kemp, Town of Southampton Highway Superintendent  
**DATE:** June 2021

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### Background

Per Section 2.3.6.d of the United States Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) General Permits for Stormwater Discharges from Small Municipal Separate Storm Sewer Systems in Massachusetts (referred to herein as "2016 Small MS4 General Permit"), within four years from the effective date of the permit, permittees are required to identify a minimum of five permittee-owned properties that could be potentially modified or retrofitted with best management practices (BMPs) designed to reduce the frequency, volume, and pollutant loads of stormwater discharges to and from its MS4 through the reduction of impervious area.

Southampton has two Town-owned or controlled properties within the designated MS4 area with existing impervious area. Parcel 44\_8\_B on Pequot Road has a small building housing the water supply interconnection with Holyoke Water Works and associated driveway; the total amount of existing impervious area is 0.08 acres. Parcel 44\_51 on Bluemer Road has 0.04 acres of existing impervious area associated with an old Fire Department building and short driveway (Figure 1).



**Figure 1.** Water supply interconnection building and driveway on Pequot Road (left) and old Fire Department building and driveway on Bluemer Road (right) (October 2019).

According to communication from EPA Region 1, a retrofit inventory can focus on any areas the town has control over (like roads or rights-of way). As the two Town-owned parcels within the designated MS4 area have limited impervious area and opportunities for installation of stormwater BMPs, roadway improvement projects within the designated MS4 area were prioritized for analysis of potential for stormwater BMP retrofits.

The following memorandum summarizes a preliminary desktop screening of Town-owned roadways and rights-of-way (ROWs) with potential for stormwater BMP retrofits based on retrofit criteria described in the 2016 Small MS4 General Permit, amount of existing impervious cover, physical site characteristics, and planned capital improvements projects, and provides a summary of retrofit types and considerations, including compliance with the nitrogen-removal requirements associated with the Long Island Sound Total Maximum Daily Load (TMDL).

## **Desktop Screening of Town-Owned Sites with Potential for Stormwater BMP Retrofits**

Tighe & Bond has performed a desktop analysis using the Town's GIS data to assess municipal properties for potential modification or retrofits with BMPs based on criteria outlined in Section 2.3.6.d of the 2016 Small MS4 General Permit. In accordance with Section 2.3.6.d of the 2016 Small MS4 General Permit, Tighe & Bond considered properties with significant impervious cover within the urbanized area that could be modified or retrofitted with a stormwater BMP to reduce stormwater quantity and/or improve quality. MS4 infrastructure that could be readily modified or retrofitted (such as outfalls and conventional stormwater conveyances including swales and detention practices) were also considered. Conservation land and land without impervious areas were removed from consideration.

Tighe & Bond included consideration of schedules for planned capital improvements to storm and sanitary sewer infrastructure and paving projects, current storm sewer level of service, and control of discharges to water quality limited waters, first or second order streams, and/or drinking water supply sources.

To analyze the favorability of implementing BMP designs throughout the Town of Southampton using data in GIS, Tighe & Bond used the following process:

- Step 1: A GIS-based, desktop screening and preliminary ranking to identify and prioritize potential locations for BMP retrofits
- Step 2: Comprehensive review of results of desktop screening and preliminary ranking, including review of information collected during site visits to further evaluate feasibility, collect information, and identify other site conditions that would impact implementation
- Step 3: Finalize a preliminary top 10 list of municipally owned sites for future retrofit feasibility analysis.

The full Desktop Screening Table is included as Attachment 1 and a figure showing the locations of the roadways to consider for stormwater BMP retrofits is provided as Attachment 2.

## **Preliminary Retrofit Inventory Results**

Based on the results of the desktop analysis, discussions with the Town, and the requirements of the 2016 Small MS4 General Permit, Tighe & Bond has developed a list of roadways to prioritize for future retrofit feasibility analysis, provided in Table 1 below.

**TABLE 1**

Roadways for Future Retrofit Feasibility Analysis

| <b>Name</b>       | <b>Location</b>                            | <b>Reason to Prioritize</b>                              |
|-------------------|--------------------------------------------|----------------------------------------------------------|
| Pomeroy Meadow Rd | Northeast of intersection with Glendale Rd | Proximity to Manhan River (MA34-11)                      |
| Brickyard Rd      | Southeast of intersection with College Hwy | Proximity to Manhan River (MA34-11)                      |
| County Rd         | Near intersection with Plain St            | Eastern boundary of MS4 designated area with Easthampton |
| Pequot Rd         | South of intersection with Whiteloaf Rd    | Proximity to Pequot Pond (MA32055)                       |
| Bluemers Rd       | West of intersection with County Rd        | Proximity to Pequot Pond (MA32055)                       |

## Potential Stormwater BMP Retrofit Options

The following section describes potential stormwater BMP retrofit options. Site-specific considerations such as scale of the project, performance goals, planned physical capital projects, and financing opportunities will need to be taken into account to select specific stormwater retrofits or modifications for each property. Additionally, as the Town of Southamptton is located within the Connecticut River subwatershed of the Long Island Sound, the Town is subject to the requirements of Appendix H of the 2016 Small MS4 General Permit, which require retrofits to be designed to enhance nitrogen removal.

Retrofits can be classified by the amount of subwatershed area they treat. Storage retrofits treat drainage areas ranging from five to 500 acres. By contrast, on-site, nonresidential retrofits normally treat less than five acres of contributing drainage area, and frequently less than one.<sup>1</sup> Preferred practices per the EPA fact sheet on stormwater retrofits<sup>2</sup> include those that provide for increased infiltration, evapotranspiration, and rainwater harvesting, such as infiltration basins and trenches, bioretention systems, rain gardens, and swales, as well as retrofitting existing BMPs like dry detention basins to maximize pollutant removal.

Storage and on-site retrofits represent two different approaches to attain treatment storage and involve different design and assessment methods (Table 2). Generally, storage retrofits are a more cost-effective approach to meet most subwatershed objectives, although both retrofit approaches may be needed to get the desired level of subwatershed treatment.

**TABLE 2**

Two Different Approaches to Retrofitting

| <b>Storage Retrofits</b>                       | <b>On-Site Retrofits</b>                                                            |
|------------------------------------------------|-------------------------------------------------------------------------------------|
| Serve 5 to 500 acres                           | Serve 0.1 to 5 acres                                                                |
| Moderate cost per impervious acre treated      | High cost per impervious acre treated                                               |
| Impractical in ultra-urban areas               | Practical in ultra-urban areas                                                      |
| Permitting can be extensive                    | Few permits are needed                                                              |
| Can address all stormwater control targets     | Only provide recharge and water quality control                                     |
| Use extended detention, wet pond, and wetlands | Rely on bioretention, filtering, infiltration, swales and other treatment practices |

<sup>1</sup> Virginia Stormwater Management Handbook, Chapter 7 July 2013 7-19

<sup>2</sup> U.S. EPA, Stormwater Retrofit Techniques for Restoring Urban Drainages in Massachusetts and New Hampshire, Small MS4 Permit Technical Support Document, April 2011

**Storage Retrofit Classification.** Potential ways to add storage retrofits based on location are described in detail in Table 3. Most storage retrofits rely on some combination of extended detention, wet pond, constructed wetland or bioretention for stormwater treatment.

**TABLE 3**

Most Common Storage Retrofit Locations in a Subwatershed

| Where to Look                   | How to Get Storage                                                                                                                                                                                                                                                                                                                                                                             |
|---------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Add Storage to Existing Basins  | Add water quality treatment storage to an existing basin that lacks it by excavating new storage on the pond bottom, raising the height of the embankment, modifying riser elevations/dimensions, converting unneeded quantity control storage into water quality treatment storage and/or installing internal design features to improve performance                                          |
| Storage Above Roadway Culverts  | Provide water quality storage immediately upstream of an existing road culvert that crosses a low gradient, non-jurisdictional channel. Additional storage is created by adding wetland and/or extended detention treatment behind a new embankment just upstream of the existing roadway embankment.                                                                                          |
| New Storage Below Outfalls      | Flows are split from an existing storm drain or ditch and are diverted to a stormwater treatment area on public land in the stream corridor. Works best for storm drain outfalls in the 12- to 36- inch diameter range that are located near large open spaces, such as parks, golf courses and floodplains.                                                                                   |
| Storage in Conveyance Systems   | Investigate the upper portions of the existing stormwater conveyance system to look for opportunities to improve the performance of existing swales, ditches and non-jurisdictional channels. This can be done either by creating in-line storage cells that filter runoff through swales and constructed wetlands or by splitting flows to off-line treatment areas in the drainage corridor. |
| Storage in Road Rights-of-Way   | Direct runoff to a depression or excavated stormwater treatment area within the right-of-way of a road, highway, transport or power line corridor. Prominent examples include highway cloverleaf, median and wide right of way areas.                                                                                                                                                          |
| Storage Near Large Parking Lots | Provide stormwater treatment in open spaces near the down-gradient outfall of large parking lots (5 acres plus).                                                                                                                                                                                                                                                                               |

**On-Site Retrofit Classification.** On-site retrofits are classified based on the type or location of impervious area they treat, such as individual rooftops, small parking lots, streets, stormwater hotspots and other small impervious areas. Several common potential on-site retrofit locations are described in Table 4. On-site retrofits treat the quality and/or reduce the volume of runoff generated by small urban source areas and rely on bioretention, filtering, infiltration, swales or rooftop treatment. On-site retrofits are an effective strategy in urban subwatersheds that lack space for storage retrofits, and can also provide excellent opportunities to improve public awareness and involvement.

**TABLE 4**  
Common On-Site Retrofit Locations

| Where                              | How                                                                                                                                                                                               |
|------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Retrofits Appropriate for Roadways |                                                                                                                                                                                                   |
| Individual Streets                 | Look for opportunities with the street, its right of way, cul-de-sacs and traffic calming devices to treat stormwater runoff before it gets into the street storm drain network.                  |
| Little Retrofits                   | Convert or disconnect isolated areas of impervious cover and treat runoff in an adjacent pervious area using low tech approaches such as a filter strip.                                          |
| Other Retrofits for Consideration  |                                                                                                                                                                                                   |
| Small Parking Lots                 | Insert stormwater treatment within or on the margins of small parking lots (less than five acres). In many cases, the parking lot is delineated into a series of smaller on-site treatment units. |
| Hardscapes/Landscapes              | Reconfigure the plumbing of high visibility urban landscapes, plazas and public spaces to treat stormwater runoff with landscaping and other urban design features.                               |
| Underground                        | Provide stormwater treatment in an underground location where no surface land is available for surface treatment. Use this as a last resort at dense ultra-urban sites.                           |

**Nitrogen Removal BMPs.** As the Town is located within the Connecticut River watershed and Long Island Sound drainage basin, the Town is subject to the requirements of the Long Island Sound Total Maximum Daily Load (TMDL) for Nitrogen as described in Appendix F, part B.I. of the 2016 Small MS4 General Permit. Per Appendix F, part B.I.1.c., the retrofit inventory shall include consideration of structural BMP installation for nitrogen removal. Attachment 1 to Appendix H describes the method to calculate BMP nitrogen load and nitrogen load reductions for structural BMPs, and also provides a table that classifies structural BMPs in terms of nitrogen reduction and a chart showing total estimated nitrogen removal for those practices, as provided below.

**TABLE 5**  
Approaches to Retrofitting

| Structural BMPs                                           | Classification            |
|-----------------------------------------------------------|---------------------------|
| Infiltration Trench                                       | Runoff Reduction (RR)     |
| Infiltration Basin or other Surface Infiltration Practice | Runoff Reduction (RR)     |
| Bioretention Practice                                     | Runoff Reduction (RR)     |
| Gravel Wetland System                                     | Stormwater Treatment (ST) |
| Porous Pavement                                           | Runoff Reduction (RR)     |
| Wet Pond or Wet Detention Basin                           | Stormwater Treatment (ST) |
| Dry Pond or Detention Basin                               | Runoff Reduction (RR)     |
| Water Quality Swale                                       | Runoff Reduction (RR)     |

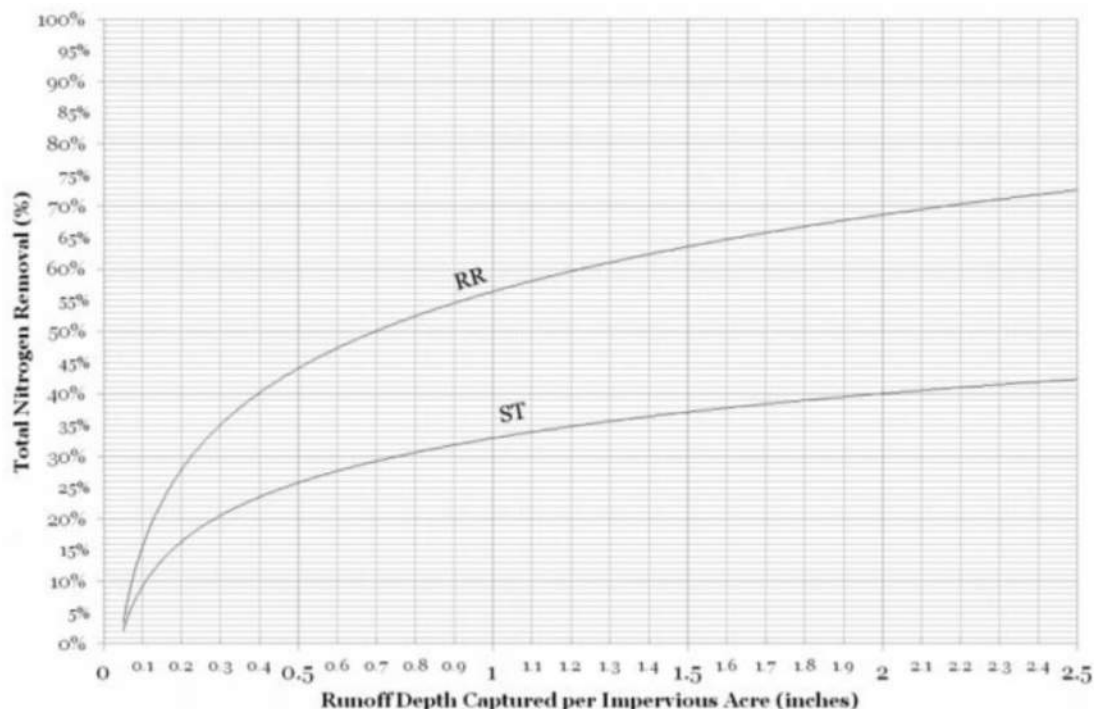


**FIGURE 1.** Total Nitrogen Removal for RR and ST Practices (from Attachment 1 to Appendix H)

The Town is required to install a minimum of one structural BMP targeting a catchment with high nitrogen load potential as a demonstration project within six years of the permit effective date.

## Next Steps

Tighe & Bond has completed retrofit scoping and the desktop retrofit analysis and narrowed the potential retrofit locations down to roadways. The next steps in the retrofit process involve evaluation and ranking of retrofit BMP design concepts based on ability to disconnect impervious cover on-site, pollutant reduction requirements including targeting catchments with high nitrogen load potential, feasibility and performance, cost including long-term operations and maintenance, opportunities for public use and education, and community support.

More detailed site information will need to be collected to design and site the retrofit BMPs, including site-specific soil and water table conditions and current and future site uses and associated potential pollutant loading. The results of the Nitrogen Source Identification Report to be completed within four years of the permit effective date will inform the identification of potential catchments with high nitrogen loading.

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# ATTACHMENT 1

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| Parcel_ID | Parcel_Address   | Name                               | Existing Impervious Area (Acres) | Access                       | Subsurface Geology                                                               | Wetlands (Acres) | Proximity to Aquifers (distance in miles) | Opportunities for Public Use and Education | Discharge to WQ Impaired Water |
|-----------|------------------|------------------------------------|----------------------------------|------------------------------|----------------------------------------------------------------------------------|------------------|-------------------------------------------|--------------------------------------------|--------------------------------|
| 44_9_C    | 0 PEQUOT RD REAR |                                    | 0                                | Limited Access via Pequot Rd | Swamp and Marsh Postglacial Deposits                                             | 4.4              | Within High Yield Aquifer                 | None, wetland area                         | Pequot Pond                    |
| 44_8_B    | PEQUOT RD        |                                    | 0.08                             | Access via Pequot Rd         | Coarse Glacial Stratified Deposits, Swamp and Marsh Postglacial Deposits         | 1.4              | Within High Yield Aquifer                 | None, water supply interconnection         | Pequot Pond                    |
| 44_9_B    | 0 PEQUOT RD REAR |                                    | 0                                | Limited Access via Pequot Rd | Swamp and Marsh Postglacial Deposits                                             | 0.3              | Within High Yield Aquifer                 | None, wetland area                         | Pequot Pond                    |
| 44_51     | BLUEMER RD       |                                    | 0.04                             | Access via Bluemer Rd        | Coarse Glacial Stratified Deposits, Swamp and Marsh Postglacial Deposits         | 0.1              | Within High Yield Aquifer                 | None, old Fire Department building         | Pequot Pond                    |
| 8_36      | 7 MEADOW LN      | Nancy Whittemore Conservation Area | 0                                | Access via Meadow Ln         | Alluvium Postglacial Deposits, Glaciolacustrine Fine Glacial Stratified Deposits | 12.8             | Within Medium Yield Aquifer               | None, no public access                     | Manhan River                   |

Legend

Conservation Properties

No Existing Impervious Area

Top Sites

N/A

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## **ATTACHMENT 2**

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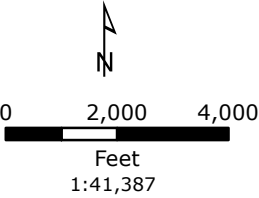
ATTACHMENT 2  
RETROFIT INVENTORY

Legend

Southampton Parcels

- Municipally Owned Parcels within UA
- Municipally Owned Parcels
- Town of Southampton Parcels
- Town Boundary
- MS4 Regulated Area (2010 Census)
- MS4 Regulated Area (2000 Census)
- Streams
- Ponds and Lakes

LOCUS MAP



NOTES

- Based on MassGIS Color Orthophotography (2013)
- Based on Southampton Standardized Assessors' Parcels (2020)

MS4 Annual Report  
Southampton, MA

June 2021

**Tighe&Bond**  
Engineers | Environmental Specialists

