MEMORANDUM

To: Melissa Manka, Town of Westford; Dan Albrecht, CCRPC
From: Evan P. Fitzgerald, CPESC, CFM and Joe Bartlett, CFM
Re: Westford Town Green Stormwater Problem Area Scoping Study
Date: October 30, 2019

1.0 Introduction

Fitzgerald Environmental Associates (FEA) was contracted by the Chittenden County Regional Planning Commission (CCRPC) to assist the Town of Westford with the scoping of stormwater and drainage concerns on and around the Town Green. The Town Green is an important and year-round community asset for the Town of Westford. Stormwater runoff from the Green and the adjacent paved road (VT Route 128) and gravel roads (Common Road and Brookside Road) is directed to three small tributary channels, all draining to the Browns River. The Green frequently has saturated soil conditions impacting recreational and educational uses. Past work by the Town to address poor drainage on the Green included the installation of drainage infrastructure beneath the green in the 1990's, although the extent and location of the drainage system was never formally mapped. Recently Town officials have observed sinkholes on the Green which may be related to the drainage system, although no subsurface investigations have been completed to date to verify this.

This scoping project has two primary objectives: 1) identify opportunities to reduce roadway runoff impacts to water quality in the Browns River; and 2) identify potential drainage improvements on and around the Green while considering future expansion plans being considered by the Town.

2.0 Desktop Review of Existing Mapping

FEA completed a desktop GIS review of LiDAR elevation data, soils, parcel data, and relevant stormwater infrastructure and drainage mapping. Soils mapping for the area shows heavy and rocky loam soils with shallow depth to bedrock and/or perched water table on the United Church of Westford property. The Town Green is mapped as a heavy silt loam with shallow depth to groundwater. A detailed stormwater infrastructure inventory has not been completed for the Town, however sketch maps and photographs provided by the Town described an underdrain system installed within the Green. The sketch maps provided by the Town also indicated stormwater runoff patterns uphill of the Green on Brookside Road and around the library.

3.0 Field Tour

FEA completed a field tour on September 12, 2019 with representatives from the Town, CCPRC, and EcoSolutions LLC. The group toured the Green and surrounding properties to discuss drainage and water quality concerns. Specific stormwater and drainage concerns discussed during the tour are listed below:

- Excessive sub-surface flow and seepage flowing eastward toward the Green and originating from the United Church of Westford Property
- Proposed general store and additional parking at the intersection of Common Road and Brookside Road

- Runoff and erosion along Brookside Road leading to the Green
- Saturated soil concerns near the swings
- Road runoff concentrating along Common Road
- The Town Green underdrain system and spring melt sink holes
- The shallow drop inlets collecting runoff from Route 128 east of the Green that are connected to the underdrain system on the Green
- Erosion in the channel northeast of the Green receiving runoff from Route 128 and the underdrain system
- Runoff to the drainage culvert near the Library partially bypasses and continues east, causing flooding and erosion issues at the Library entrance and along the east side of the Library. The deeply recessed drainage feature is also a safety hazard.
- Ongoing gully erosion down the driveway between the Town Offices and the Library

4.0 Opportunities for Stormwater Treatment and Drainage Improvement

The field-mapped stormwater infrastructure and drainage features and potential improvements are shown on the attached site map (Sheet 1). Six (6) specific project areas are identified and described below.

Project Area 1

Description

A 0.16 acre paved area drains to the deeply recessed culvert inlet near the library entrance. Sediment accumulation along the edge of pavement on Route 128 is restricting flow to the culvert. Runoff bypassing this feature continues east to the driveway between the Library and Town offices. The steep drop to the 18” culvert encroaches on the road shoulder and the parking lot and is a safety hazard along the access path to the library. The existing grade slopes slightly downward to the library entrance causing ponding and icing at the base of the ramp. Excess runoff along the front of the Library and additional runoff from Route 128 cause rilling and gully erosion across and down the steep driveway between the Library and Town Offices.

Preliminary Recommendations

Based on preliminary observations we recommend installing a deep-sump catch basin with a surface drain (Project Area 1a on map). The catch basin will receive runoff from the 15” culvert to the south and from surface runoff upslope. The catch basin would tie into the existing 18” outlet pipe draining west to the wetland. Minor grading adjustments should be implemented to address ponding at the library entrance. These drainage improvements will significantly reduce runoff volumes to the driveway between the Library and Town Offices. The frequency and severity of erosion along this driveway should be reduced, however we recommend installation of a stabilized swale (with stone or permanent turf reinforcement mats) to convey runoff along the western edge of the driveway (see Project Area 1b on map). The driveway has an approximate width of 15 feet, leaving room to fit a 3-4 foot wide swale while maintaining a drive width of approximately 12 feet. Alternatively, if the erosion and maintenance problems persist after these improvements, the Town could consider other options to avoid this stormwater problem. This could include abandoning this access and making this area a green space to absorb and infiltrate stormwater runoff.


Deeply recessed culvert inlet at the library entrance (left). Runoff along the front of the library causes gully erosion across and along the driveway between the Library and Town Offices (right).

Project Area 2

Description

An underdrain system was installed under most of the Town Green in the 1990's. The exact location of the trunk line and tributary lines are unknown. No maintenance has been performed on the system and according to Town officials numerous sink holes form around the edge of the Green following spring melt. The sink holes may be forming at the ends of the drainage lines, potentially indicating failed filter fabric or pipe caps that are allowing soil to enter the system. In addition, surface runoff from a catch basin on Route 128 (Project Area 4) is piped to the underdrain system. This is a significant sediment source that is likely reducing the effectiveness of the system, i.e., sediment entering from Route 128 drainage could be clogging the underdrain system.

Preliminary Recommendations

The underdrain system needs to be mapped and checked for blockages or leaks. Potential options we discussed with the group during our September 12th meeting included a camera system to scope the pipes or a smoke test. If the system is found to be plugged or broken, a partial or full replacement may be required.

Project Area 3

Description

An 18" corrugated metal culvert collecting runoff from the Town Green underdrain system and surface drainage along Route 128 discharges to an incised and eroding channel flowing north to the Browns River. The outlet end of the pipe appears to be corroded and in poor condition. The erosion in the swale is moderate to severe, exceeding 4-5 feet on the banks in some locations and extending approximately 100 feet to the north of the outlet.

Preliminary Recommendations

Implementation of Project 4 will significantly reduce flows to this channel. Installation of a series of stone check dams is recommended in the outlet channel to slow flows during storm events, prevent further incision, and reduce bank erosion.


Outlet of 18” culvert in poor condition (left) and erosion in swale to Browns River (right)

Project Area 4

Description

A shallow catch basin on Route 128 drains a 0.45-acre watershed including most of the Red Brick Meeting House property. The catch basin is filled with coarse sand and gravel to the top of the outlet culvert, draining west to another shallow catch basin located on the east side of the Green. This catch basin is also filled with sediment and is connected directly to the underdrain system.

Preliminary Recommendations

Both catch basins need to be cleaned out and the eastern catchbasin (VTrans ROW) could be replaced with a deep-sump catch basins to improve sediment retention. The western catch basin in the Green should be retrofitted to cap the existing outlet thereby disconnecting this flow from the underdrain system. Installation of a new outlet culvert from this catch basin would convey all runoff southwest to the grassed swale along the parking area.


Catch basin along Route 128 (left) and grassed swale that could receive redirected runoff (right)

Project Area 5

Description

Much of Common Road lacks proper stormwater drainage leading to secondary ditch formation and rill erosion along both sides of the road. The northern half of the road, including the park and ride drain to a grassed swale leading to an 18" culvert under Common Road and into a wetland connected to the Browns River. An elevated shoulder along the northern side of Common Road causes concentrated runoff along the road edge of Common Road in an easterly direction toward the cross-culvert. The south side of the road has intermittent grader berms limiting sheet flow down the grassed slope to an existing grass swale on adjacent private property.

Preliminary Recommendations

Grader berms and elevated shoulders should be removed to facilitate sheet flow off of the road surface. A grassed swale could be installed along the northern side of the road to collect runoff and convey flow east to the 18" cross-culvert. Alternatively, Town Staff and Officials have suggested the Town Common underdrain system could be extended to the south to collect surface and shallow groundwater from this area. However, this approach is not recommended given the known problems in the existing drainage system, and the unknown hydraulic capacity of the system to handle additional flow. An upgraded drainage system with adequate capacity could make this option viable.

A swale and turnout east of the driveway for the proposed general store are recommended to direct runoff to an existing grassed swale south of Common Road. The western portion of the road is expected to be paved as part of the construction of the general store. Paving the remainder of Common Road would provide immediate water quality benefits and reduce long-term maintenance requirements for the Town.

The grassed area west of the park and ride adjacent to the cross-culvert inlet present an opportunity to install a stormwater gravel wetland or under-drained bioretention system treating runoff from over 1 acre of drainage area including half of Common Road, including approximately ½ acre of impervious surface.

Looking east at elevated grass shoulder along Common Road (left) and looking west at 18" culvert inlet beneath Common Road, the potential location for a stormwater retrofit practice (right).

Project Area 6

Description

The area near the swings is frequently saturated, limiting recreational use.

Preliminary Recommendations

Installation of a curtain drain system would reduce soil saturation. The drainage system could be tied into the proposed grassed swale along the north side of Common Road or continue under the road and outlet to the grassed swale along the south side of the road.

5.0 Summary of Next Steps

Some of the problem areas and potential solutions have a narrow scope and could potentially be addressed with Town resources and/or by the Town Highway Department, while others are more complicated and will involve more investigation and design work. More complex projects demonstrating a clear water quality benefit are likely eligible for VTANR Clear Water funding and may be facilitated through CCRPC's block grant. Below is a summary of the projects identified, the relative complexity and cost of the work, responsible parties and project partners, and potential funding sources.

Project	Scope Complexity	Ballpark Cost Range	Responsible Party (Potential Partners)	Potential Funding
1	Low	<$5K	Town Highway Dept. or Contractor (VTrans)	Town
2	Moderate to High	<$5K scoping*	Town Common Committee	Town Common Fund
3	Moderate	$10-20K	Developer/Contractor (VTrans; CCRPC)	Clean Water Funding, Private Funds
4	Moderate	$5-10K	VTrans or Contractor (Town)	Town, VTrans, Town Common Fund
5	High	$10-30K	Town Common Committee (CCRPC)	Town Common Fund, Clean Water Funding
6	Low	<$5K	Town Common Committee	Town Common Fund

* includes scoping/investigations only; drainage system retrofit/replacement costs would likely be significantly higher