



# Wallingford Elementary School Stormwater Retrofit

## Final Design Report

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## Disclaimer

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The intent of this report is to present the data collected, evaluations, analysis, designs, and cost estimates under a contract between the Rutland Natural Resources Conservation District (NRCD) and Watershed Consulting Associates, LLC (Watershed Consulting).

## Project Overview

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The Rutland NRCD, with support from the Town of Wallingford, applied for and received funding for the final design of a stormwater retrofit opportunity located within the parcel boundaries of the Wallingford Elementary School. The objective of this design is to improve water quality and reduce flooding in Wallingford and the greater Lake Champlain Basin. The final design was developed by Watershed Consulting in partnership with Lakeside Environmental Group (LEG) and Trafton Engineering Associates. It consists of a gallery of stormwater infiltration chambers buried beneath the grass recreational field to the west of the school. The drainage area includes the school roof, as well as the paved parking areas and walkways adjacent to the school. The system will also intercept runoff from an existing stormwater conveyance network in the State's right of way (ROW) on School Street. Signed commitments by the Town of Wallingford and the landowner, the Mill River Unified Union School District, can be in Appendix A.



## Background

### Problem Definition

In February of 2019, Watershed Consulting finalized the stormwater master plan (SWMP) for the Town of Wallingford, Vermont. The purpose of the master plan was to complete a thorough review of the water quality issues in the Town and identify potential stormwater retrofit projects to improve water quality and reduce flooding in Wallingford and the greater Lake Champlain Basin. As part of this effort, Watershed identified a number of high-priority projects in the Town, including a project at the Wallingford Elementary School.

### Existing Site Conditions

The Wallingford Elementary School, located at 126 School St, Wallingford, VT, sits on a 0.17-acre parcel owned and operated by the Mill River Unified Union School District (Figure 1). The school grounds were once home to the high school decades ago before it was replaced by the elementary school in 1951. A new building replaced the existing school in 1969.



Figure 1: Project location

The school is situated in a “Neighborhood Commercial” (NC) zoning district and is neighbored by private homes residential homes to the east and west. On the northern border of the property is School St. It is a segment of Vermont Route 140 and thus operated by the state as a state highway. On the southern border of the property is Roaring Brook. Much of the southern portion of the parcel is located within the river corridor of the brook. This also corresponds with AE (1% annual chance of flooding) FEMA flood hazard areas (Figure 2).

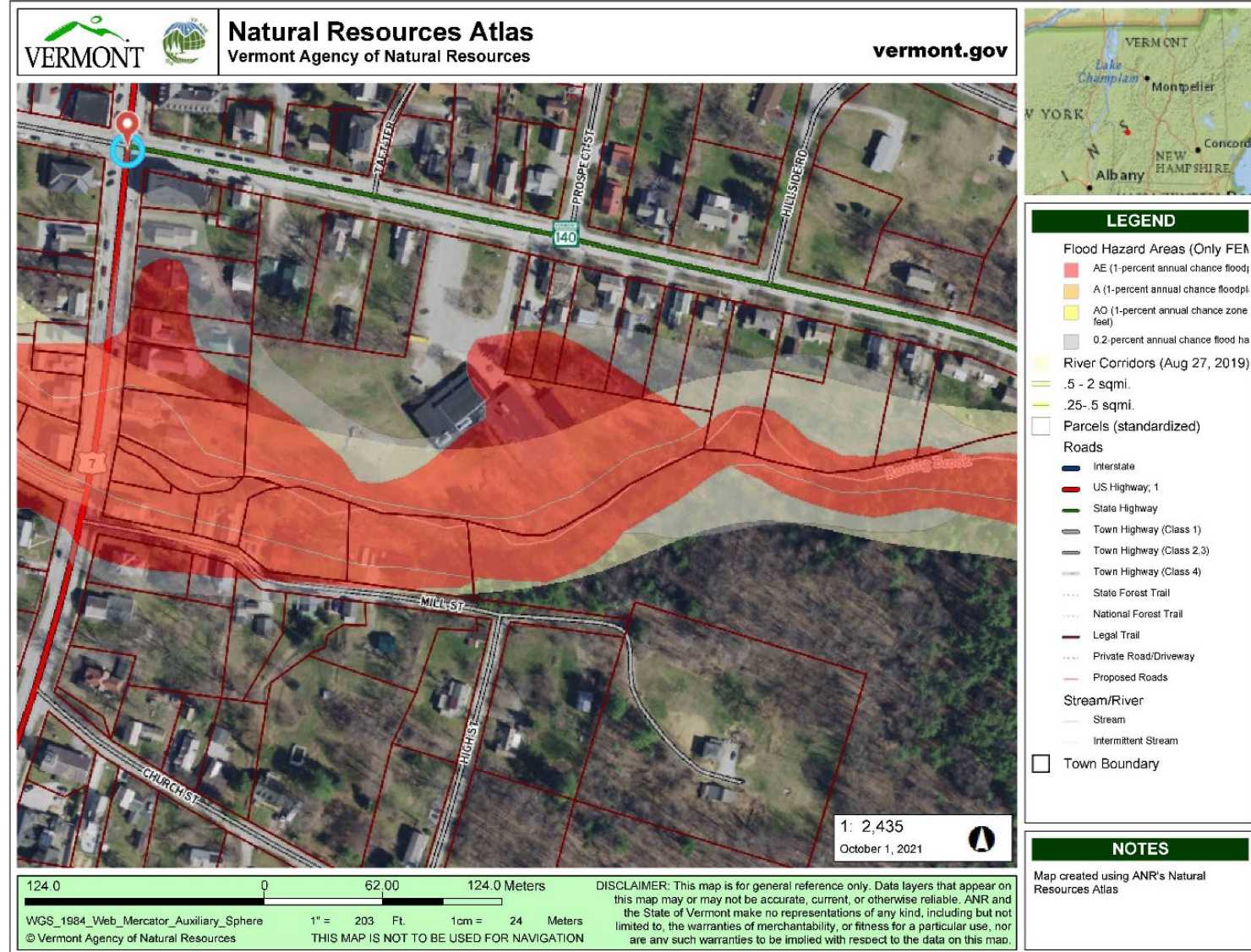


Figure 2. State of Vermont river corridor and FEMA flood hazard areas.



Land-cover on the school grounds and greater drainage area is mixed. There is an open field to the west of the school building and a forest to the east. Impervious land cover in the drainage area is dominated by roofs, roads, driveways and a large parking lot to the north of the school (Figure 3).



Figure 3. Parking lot north of school

On April 27<sup>th</sup>, 2021, Watershed Consulting conducted a soils investigation in the field to the northwest of the school building on the edge of the field (Figure 4). The test pit was dug to a depth of 96-in. From 0 to 10-in, sandy loam was identified. From 10 to 96-in, a loamy, fine sand was identified. The hydrologic group classification of these soils was “A”. A constant head permeameter test (i.e. infiltration test) conducted at a depth of 62-in determined an infiltration rate of the soils to be 6.01in/hr.



Figure 4. Soils investigation (left) and sample of soil at a depth of 10-in (right).



## Proposed Stormwater Treatment Practices

### Summary

The project proposes a gallery of 61 stormwater infiltration chambers buried beneath the grass recreational field to the west of the school. The infiltration chambers have been designed to fully infiltrate the Water Quality volume (WQv) (1.0", 24-hour) from the 20.85-acre drainage area, 22.65% of which is comprised of impervious cover (Figure 5). Larger storms will bypass the system via an overflow pipe to Roaring Brook. The drainage area includes the school roof, as well as the paved parking areas and walkways adjacent to the school. The system will also intercept runoff from an existing stormwater conveyance network in the State's right of way (ROW) on School Street. The extent of runoff intercepted from the School Street conveyance system will be moderated by a diversion weir within a catch basin in the ROW. Larger storms should bypass via this overflow. The plans and details can be found in Appendix B.

Hydrologic and hydraulic modeling was conducted with the software HydroCAD to properly size the proposed chamber system and ensure that it can treat the WQv. Limitations of the modeling software only allowed for modeling of a 60-chamber system rather than the 61 that is proposed. A summary report of the modeling can be found in Appendix C, along with a summary provided by StormTech of the chamber storage volume.

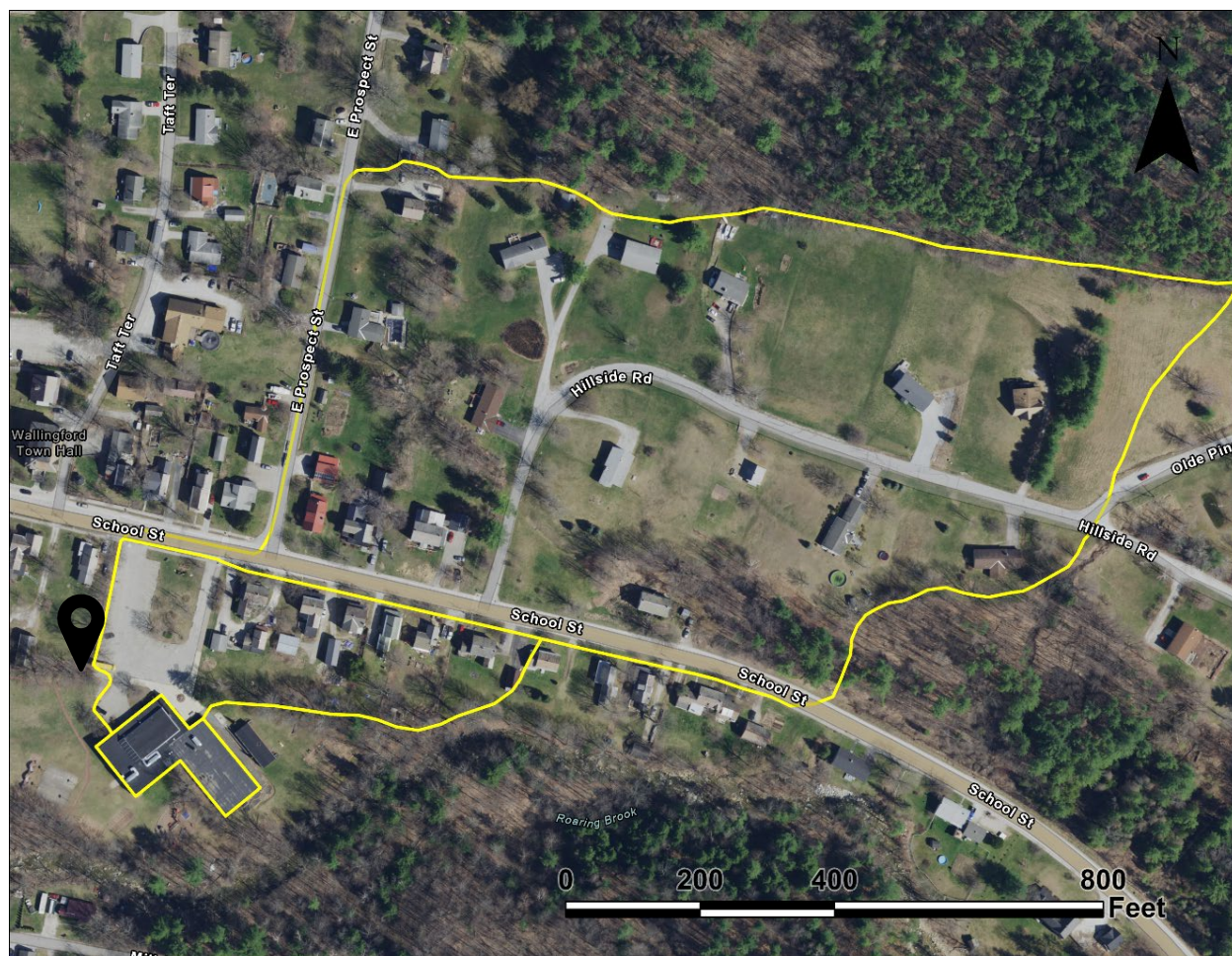


Figure 5: Drainage area (yellow outline) to the proposed infiltration chambers (black pin).



## Phosphorus Removal

Total phosphorus load reductions achieved by the infiltration chambers was computed using the Vermont Department of Environmental Conservation (DEC) Stormwater Treatment Practice (STP) Calculator. As part of the Otter Creek sub-basin, the estimated phosphorus load to the proposed practice is 10.13 kg/yr. With a determined efficiency of 95.91%, the practice results in a phosphorus reduction of 9.72 kg/yr.

## Operations & Maintenance

Once implemented, the project should be maintained for a design life of 20 years. There are three principal components to the operations and maintenance (O & M) of this project: 1) the chambers, 2) manholes and catch basins, and 3) cleanouts. A draft O & M guidelines agreement with a checklist for inspection is provided in Appendix D. The agreement will need to be completed & signed by the responsible party & landowner.

## Opinion of Probable Cost

The estimated total cost for the completion of the proposed design is \$295,000. Raw materials costs amounted to \$206,005 and were determined by the Vermont Agency of Transportation 5 Year Averaged Price List (June 2015 – June 2020). An additional 5% for mobilization and demobilization was included as well as a construction engineering fee (13%) in accordance with the State of Vermont Drinking Water State Revolving Fund (DWSRF) Guidance Document Number 9, Engineering Allowance for DWSRF Projects. A contingency of 15% was also included as material costs at the time of construction may vary from the estimates provided. A detailed summary of the cost estimates can be found in Appendix E.

<b>Subtotal Construction Cost:</b>	<b>\$206,005</b>
Mobilization/Demobilization (5%):	\$10,300
Construction Engineering (13%):	\$26,781
Contingency (25%):	\$51,501
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<b>Total (rounded to the next highest \$1000):</b>	<b>\$295,000</b>

## Bid Documents

Bid documents have been prepared to be submitted when necessary. These documents provide instruction to the bidders, summarize the issues and expectation associated with the project, and outline the responsible parties. These documents can be found in Appendix F.





## Permitting Summary

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### Erosion and Sediment Control Permitting

The proposed development will not result in a total earth disturbance equal to or greater than one acre of land area. As a result, no Construction General Permit (CGP) 3-9020 be required.

### Operational Stormwater

Due to the fact that this parcel does not qualify as a “three-acre site”, and the proposed activities are not determined to be jurisdictional redevelopment, no operational stormwater permit will be needed at this time.

### Land Use and Development (Act 250)

No existing Act 250 stormwater permits were identified on the Wallingford Elementary School parcel. Without the presence of an existing Act 250 permit and the fact that the proposed development does not meet the criteria for jurisdiction means that no action regarding Act 250 will be required.

### Floodplain-Floodway

The stormwater chamber system has been strategically located on the property so that it falls outside of the State of Vermont river corridor and the FEMA flood hazard area, though portions of the roof drain 8” PVC buried pipe and the overflow 18” HDPE buried pipe do fall within these zones. These connection pipes do not require permitting in respect to floodplain and floodway management as they:

- Shadow existing underground piping.
- Do not change the existing grade of the project site.
- Do not add fill to the project site.
- Do not alter floodplain storage or divert flow.

Representatives from the State of Vermont Agency of Natural Resources expressed concern about sediment deposits within the connection pipes as the overflow pipe outlet is below the base flood elevation (BFE) of 614.1 ft and therefore will be subjected to frequent inundation. The proposed design addresses this concern with the inclusion of a manhole (MH5) to the connection pipes outside of the river corridor. As stipulated in the O&M agreement, this manhole will be utilized for the removal of sediment and debris.

### State Highway Access and Work Permit

As shown in the proposed plans, an existing catch basin on School St. will be amended with an 18" HDPE stormwater pipe and a weir. This work will require a State Highway Access and Work Permit as School St is a state operated roadway. The application materials for this permit were prepared by Watershed Consulting for submission by the Town of Wallingford with the Mill River Unified Union School District as a co-applicant. The pre-signed document can be found in Appendix G.

### Town of Wallingford General Zoning Permit

The development proposed in this project falls under the jurisdiction of the Town of Wallingford Zoning Administration. The application materials for the Town of Wallingford General Zoning Permit were prepared by Watershed Consulting for submission by the Town of Wallingford with the Mill River Unified Union School District as a co-applicant. There may need to be a hearing in front of the District Review Board in April 2022, but as of the writing of this report this has yet to be determined. The pre-signed document can be found in Appendix G.