STORMWATER MANAGEMENT REPORT

for

RALPH D. BUTLER ELEMENTARY SCHOOL
PATRICK CLARK DRIVE
PARKING IMPROVEMENT PLAN

in

AVON, MASSACHUSETTS

JUNE 18, 2020

Prepared by
GCG ASSOCIATES, INC.
84 Main Street, Wilmington, MA 01887

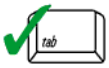
TABLE OF CONTENTS

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

A. Introduction

Important: When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.



A Stormwater Report must be submitted with the Notice of Intent permit application to document compliance with the Stormwater Management Standards. The following checklist is NOT a substitute for the Stormwater Report (which should provide more substantive and detailed information) but is offered here as a tool to help the applicant organize their Stormwater Management documentation for their Report and for the reviewer to assess this information in a consistent format. As noted in the Checklist, the Stormwater Report must contain the engineering computations and supporting information set forth in Volume 3 of the Massachusetts Stormwater Handbook. The Stormwater Report must be prepared and certified by a Registered Professional Engineer (RPE) licensed in the Commonwealth.

The Stormwater Report must include:

- The Stormwater Checklist completed and stamped by a Registered Professional Engineer (see page 2) that certifies that the Stormwater Report contains all required submittals.[1] This Checklist is to be used as the cover for the completed Stormwater Report.
- Applicant/Project Name
- Project Address
- Name of Firm and Registered Professional Engineer that prepared the Report
- Long-Term Pollution Prevention Plan required by Standards 4-6
- Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan required by Standard 8[2]
- Operation and Maintenance Plan required by Standard 9

In addition to all plans and supporting information, the Stormwater Report must include a brief narrative describing stormwater management practices, including environmentally sensitive site design and LID techniques, along with a diagram depicting runoff through the proposed BMP treatment train. Plans are required to show existing and proposed conditions, identify all wetland resource areas, NRCS soil types, critical areas, Land Uses with Higher Potential Pollutant Loads (LUHPPL), and any areas on the site where infiltration rate is greater than 2.4 inches per hour. The Plans shall identify the drainage areas for both existing and proposed conditions at a scale that enables verification of supporting calculations.

As noted in the Checklist, the Stormwater Management Report shall document compliance with each of the Stormwater Management Standards as provided in the Massachusetts Stormwater Handbook. The soils evaluation and calculations shall be done using the methodologies set forth in Volume 3 of the Massachusetts Stormwater Handbook.

To ensure that the Stormwater Report is complete, applicants are required to fill in the Stormwater Report Checklist by checking the box to indicate that the specified information has been included in the Stormwater Report. If any of the information specified in the checklist has not been submitted, the applicant must provide an explanation. The completed Stormwater Report Checklist and Certification must be submitted with the Stormwater Report.

[1] The Stormwater Report may also include the Illicit Discharge Compliance Statement required by Standard 10. If not included in the Stormwater Report, the Illicit Discharge Compliance Statement must be submitted prior to the discharge of stormwater runoff to the post-construction best management practices.

[2] For some complex projects, it may not be possible to include the Construction Period Erosion and Sedimentation Control Plan in the Stormwater Report. In that event, the issuing authority has the discretion to issue an Order of Conditions that approves the project and includes a condition requiring the proponent to submit the Construction Period Erosion and Sedimentation Control Plan before commencing any land disturbance activity on the site.

Massachusetts Department of Environmental Protection
Bureau of Resource Protection - Wetlands Program

Checklist for Stormwater Report

B. Stormwater Checklist and Certification

The following checklist is intended to serve as a guide for applicants as to the elements that ordinarily need to be addressed in a complete Stormwater Report. The checklist is also intended to provide conservation commissions and other reviewing authorities with a summary of the components necessary for a comprehensive Stormwater Report that addresses the ten Stormwater Standards.

Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the item is not applicable (N.A.) and provide the reasons for that determination.

A complete checklist must include the Certification set forth below signed by the Registered Professional Engineer who prepared the Stormwater Report.

Registered Professional Engineer's Certification

I have reviewed the Stormwater Report, including the soil evaluation, computations, Long-term Pollution Prevention Plan, the Construction Period Erosion and Sedimentation Control Plan (if included), the Long-term Post-Construction Operation and Maintenance Plan, the Illicit Discharge Compliance Statement (if included) and the plans showing the stormwater management system, and have determined that they have been prepared in accordance with the requirements of the Stormwater Management Standards as further elaborated by the Massachusetts Stormwater Handbook. I have also determined that the information presented in the Stormwater Checklist is accurate and that the information presented in the Stormwater Report accurately reflects conditions at the site as of the date of this permit application.

Registered Professional Engineer Block and Signature

Signature and Date

Checklist

Project Type: Is the application for new development, redevelopment, or a mix of new and redevelopment?

☐ New development

☐ Redevelopment

☒ Mix of New Development and Redevelopment

Checklist for Stormwater Report

Checklist (continued)

LID Measures: Stormwater Standards require LID measures to be considered. Document what environmentally sensitive design and LID Techniques were considered during the planning and design of the project:

☒ No disturbance to any Wetland Resource Areas

☐ Site Design Practices (e.g. clustered development, reduced frontage setbacks)

☐ Reduced Impervious Area (Redevelopment Only)

☐ Minimizing disturbance to existing trees and shrubs

☐ LID Site Design Credit Requested:

- ☐ Credit 1
- ☐ Credit 2
- ☐ Credit 3

☐ Use of "country drainage" versus curb and gutter conveyance and pipe

☐ Bioretention Cells (includes Rain Gardens)

☐ Constructed Stormwater Wetlands (includes Gravel Wetlands designs)

☐ Treebox Filter

☐ Water Quality Swale

☐ Grass Channel

☐ Green Roof

☐ Other (describe): _____

Standard 1: No New Untreated Discharges

☒ No new untreated discharges

☒ Outlets have been designed so there is no erosion or scour to wetlands and waters of the Commonwealth

☒ Supporting calculations specified in Volume 3 of the Massachusetts Stormwater Handbook included.

Checklist for Stormwater Report

Checklist (continued)

Standard 2: Peak Rate Attenuation

☐ Standard 2 waiver requested because the project is located in land subject to coastal storm flowage and stormwater discharge is to a wetland subject to coastal flooding.

☐ Evaluation provided to determine whether off-site flooding increases during the 100-year 24-hour storm.

☒ Calculations provided to show that post-development peak discharge rates do not exceed pre-development rates for the 2-year and 10-year 24-hour storms. If evaluation shows that off-site flooding increases during the 100-year 24-hour storm, calculations are also provided to show that post-development peak discharge rates do not exceed pre-development rates for the 100-year 24-hour storm.

Standard 3: Recharge

☒ Soil Analysis provided.

☒ Required Recharge Volume calculation provided.

☐ Required Recharge volume reduced through use of the LID site Design Credits.

☐ Sizing the infiltration, BMPs is based on the following method: Check the method used.

☐ Static ☐ Simple Dynamic ☐ Dynamic Field[1]

☐ Runoff from all impervious areas at the site discharging to the infiltration BMP.

☒ Runoff from all impervious areas at the site is *not* discharging to the infiltration BMP and calculations are provided showing that the drainage area contributing runoff to the infiltration BMPs is sufficient to generate the required recharge volume.

☒ Recharge BMPs have been sized to infiltrate the Required Recharge Volume.

☐ Recharge BMPs have been sized to infiltrate the Required Recharge Volume *only* to the maximum extent practicable for the following reason:

☐ Site is comprised solely of C and D soils and/or bedrock at the land surface

☐ M.G.L. c. 21E sites pursuant to 310 CMR 40.0000

☐ Solid Waste Landfill pursuant to 310 CMR 19.000

☐ Project is otherwise subject to Stormwater Management Standards only to the maximum extent practicable.

☒ Calculations showing that the infiltration BMPs will drain in 72 hours are provided.

☐ Property includes a M.G.L. c. 21E site or a solid waste landfill and a mounding analysis is included.

[1] 80% TSS removal is required prior to discharge to infiltration BMP if Dynamic Field method is used.

Checklist for Stormwater Report

Checklist (continued)

Standard 3: Recharge (continued)

☐ The infiltration BMP is used to attenuate peak flows during storms greater than or equal to the 10-year 24-hour storm and separation to seasonal high groundwater is less than 4 feet and a mounding analysis is provided.

☐ Documentation is provided showing that infiltration BMPs do not adversely impact nearby wetland resource areas.

Standard 4: Water Quality

The Long-Term Pollution Prevention Plan typically includes the following:

- Good housekeeping practices;
- Provisions for storing materials and waste products inside or under cover;
- Vehicle washing controls;
- Requirements for routine inspections and maintenance of stormwater BMPs;
- Spill prevention and response plans;
- Provisions for maintenance of lawns, gardens, and other landscaped areas;
- Requirements for storage and use of fertilizers, herbicides, and pesticides;
- Pet waste management provisions;
- Provisions for operation and management of septic systems;
- Provisions for solid waste management;
- Snow disposal and plowing plans relative to Wetland Resource Areas;
- Winter Road Salt and/or Sand Use and Storage restrictions;
- Street sweeping schedules;
- Provisions for prevention of illicit discharges to the stormwater management system;
- Documentation that Stormwater BMPs are designed to provide for shutdown and containment in the event of a spill or discharges to or near critical areas or from LUHPPL;
- Training for staff or personnel involved with implementing Long-Term Pollution Prevention Plan;
- List of Emergency contacts for implementing Long-Term Pollution Prevention Plan.

☒ A Long-Term Pollution Prevention Plan is attached to Stormwater Report and is included as an attachment to the Wetlands Notice of Intent.

☒ Treatment BMPs subject to the 44% TSS removal pretreatment requirement and the one inch rule for calculating the water quality volume are included, and discharge:

- ☐ is within the Zone II or Interim Wellhead Protection Area
- ☐ is near or to other critical areas
- ☒ is within soils with a rapid infiltration rate (greater than 2.4 inches per hour)
- ☐ involves runoff from land uses with higher potential pollutant loads.

☐ The Required Water Quality Volume is reduced through use of the LID site Design Credits.

☒ Calculations documenting that the treatment train meets the 80% TSS removal requirement and, if applicable, the 44% TSS removal pretreatment requirement, are provided.

Checklist for Stormwater Report

Checklist (continued)

Standard 4: Water Quality (continued)

☒ The BMP is sized (and calculations provided) based on:

- ☒ The ½" or 1" Water Quality Volume or
- ☐ The equivalent flow rate associated with the Water Quality Volume and documentation is provided showing that the BMP treats the required water quality volume.

☒ The applicant proposes to use proprietary BMPs, and documentation supporting use of proprietary BMP and proposed TSS removal rate is provided. This documentation may be in the form of the propriety BMP checklist found in Volume 2, Chapter 4 of the Massachusetts Stormwater Handbook and submitting copies of the TARP Report, STEP Report, and/or other third party studies verifying performance of the proprietary BMPs.

☐ A TMDL exists that indicates a need to reduce pollutants other than TSS and documentation showing that the BMPs selected are consistent with the TMDL is provided.

Standard 5: Land Uses With Higher Potential Pollutant Loads (LUHPPLs)

☐ The NPDES Multi-Sector General Permit covers the land use and the Stormwater Pollution Prevention Plan (SWPPP) has been included with the Stormwater Report.

☒ The NPDES Multi-Sector General Permit covers the land use and the SWPPP will be submitted ***prior to*** the discharge of stormwater to the post-construction stormwater BMPs.

☐ The NPDES Multi-Sector General Permit does ***not*** cover the land use.

☐ LUHPPLs are located at the site and industry specific source control and pollution prevention measures have been proposed to reduce or eliminate the exposure of LUHPPLs to rain, snow, snow melt and runoff, and been included in the long term Pollution Prevention Plan.

☐ All exposure has been eliminated.

☐ All exposure has ***not*** been eliminated and all BMPs selected are on MassDEP LUHPPL list.

☐ The LUHPPL has the potential to generate runoff with moderate to higher concentrations of oil and grease (e.g. all parking lots with >1000 vehicle trips per day) and the treatment train includes an oil grit separator, a filtering bioretention area, a sand filter or equivalent.

Standard 6: Critical Areas

☐ The discharge is near or to a critical area and the treatment train includes only BMPs that MassDEP has approved for stormwater discharges to or near that particular class of critical area.

☐ Critical areas and BMPs are identified in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 7: Redevelopments and Other Projects Subject to the Standards only to the maximum extent practicable

☒ The project is subject to the Stormwater Management Standards only to the maximum Extent Practicable as a:

- ☐ Limited Project
- ☐ Small Residential Projects: 5-9 single family houses or 5-9 units in a multi-family development provided there is no discharge that may potentially affect a critical area.
- ☐ Small Residential Projects: 2-4 single family houses or 2-4 units in a multi-family development with a discharge to a critical area
- ☐ Marina and/or boatyard provided the hull painting, service and maintenance areas are protected from exposure to rain, snow, snow melt and runoff
- ☐ Bike Path and/or Foot Path
- ☐ Redevelopment Project
- ☒ Redevelopment portion of mix of new and redevelopment.

☐ Certain standards are not fully met (Standard No. 1, 8, 9, and 10 must always be fully met) and an explanation of why these standards are not met is contained in the Stormwater Report.

☐ The project involves redevelopment and a description of all measures that have been taken to improve existing conditions is provided in the Stormwater Report. The redevelopment checklist found in Volume 2 Chapter 3 of the Massachusetts Stormwater Handbook may be used to document that the proposed stormwater management system (a) complies with Standards 2, 3 and the pretreatment and structural BMP requirements of Standards 4-6 to the maximum extent practicable and (b) improves existing conditions.

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control

A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan must include the following information:

- Narrative;
- Construction Period Operation and Maintenance Plan;
- Names of Persons or Entity Responsible for Plan Compliance;
- Construction Period Pollution Prevention Measures;
- Erosion and Sedimentation Control Plan Drawings;
- Detail drawings and specifications for erosion control BMPs, including sizing calculations;
- Vegetation Planning;
- Site Development Plan;
- Construction Sequencing Plan;
- Sequencing of Erosion and Sedimentation Controls;
- Operation and Maintenance of Erosion and Sedimentation Controls;
- Inspection Schedule;
- Maintenance Schedule;
- Inspection and Maintenance Log Form.

☒ A Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan containing the information set forth above has been included in the Stormwater Report.

Checklist for Stormwater Report

Checklist (continued)

Standard 8: Construction Period Pollution Prevention and Erosion and Sedimentation Control (continued)

☐ The project is highly complex and information is included in the Stormwater Report that explains why it is not possible to submit the Construction Period Pollution Prevention and Erosion and Sedimentation Control Plan with the application. A Construction Period Pollution Prevention and Erosion and Sedimentation Control has ***not*** been included in the Stormwater Report but will be submitted ***before*** land disturbance begins.

☐ The project is ***not*** covered by a NPDES Construction General Permit.

☐ The project is covered by a NPDES Construction General Permit and a copy of the SWPPP is in the Stormwater Report.

☒ The project is covered by a NPDES Construction General Permit but no SWPPP been submitted. The SWPPP will be submitted BEFORE land disturbance begins.

Standard 9: Operation and Maintenance Plan

☒ The Post Construction Operation and Maintenance Plan is included in the Stormwater Report and includes the following information:

- ☒ Name of the stormwater management system owners;
- ☒ Party responsible for operation and maintenance;
- ☒ Schedule for implementation of routine and non-routine maintenance tasks;
- ☒ Plan showing the location of all stormwater BMPs maintenance access areas;
- ☐ Description and delineation of public safety features;
- ☒ Estimated operation and maintenance budget; and
- ☒ Operation and Maintenance Log Form.

☐ The responsible party is ***not*** the owner of the parcel where the BMP is located and the Stormwater Report includes the following submissions:

- ☐ A copy of the legal instrument (deed, homeowner's association, utility trust or other legal entity) that establishes the terms of and legal responsibility for the operation and maintenance of the project site stormwater BMPs;
- ☐ A plan and easement deed that allows site access for the legal entity to operate and maintain BMP functions.

Standard 10: Prohibition of Illicit Discharges

☐ The Long-Term Pollution Prevention Plan includes measures to prevent illicit discharges;

☒ An Illicit Discharge Compliance Statement is attached;

☐ NO Illicit Discharge Compliance Statement is attached but will be submitted ***prior to*** the discharge of any stormwater to post-construction BMPs.

IMAGES OBTAINED FROM: "OFFICE OF GEOGRAPHIC AND ENVIRONMENTAL INFORMATION (MASSGIS), COMMONWEALTH OF MASSACHUSETTS EXECUTIVE OFFICE OF ENVIRONMENTAL AFFAIRS"

GCG ASSOCIATES,INC.
84 MAIN STREET
WILMINGTON,
MASSACHUSETTS
(978) 657-9714

USGS Site Locus Map

Ralph D. Butler Elementary School
1 Patrick Clark Drive
Avon, Massachusetts

Plan Ref.

1000 0 500 1000

Scale: **1"=1000'** SCALE IN FEET

Date: **5/15/2020**

Rev:

1

File Name: C:\Users\jgetherall\Documents\1983\1983-COVER-LOCUS-1.dwg Saved 4/27/2020 4:41 PM Plotted: Apr 29, 2020 10:07:45am Tab: 11x8.5P-LOCUS Plot Style: GCG-2018.ctb Plotted By: John Getherall

National Flood Hazard Layer FIRMette

FEMA

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN — Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 / 17.5 — Cross Sections with 1% Annual Chance Water Surface Elevation
- Coastal Transect
- 513 — Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/9/2020 at 4:09:58 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

1.0 PROJECT SUMMARY

Existing Site

The existing site is the location of the Butler Elementary School and two small administration buildings and is located at Patrick Clark Drive in Avon, Massachusetts. The property is identified on the Assessors Map C3-2 Lot 15, consists of 28.3 Acres and owned by the Town of Avon. The property contains a paved driveway with a drop-off area and has 68 marked parking spaces. An existing tennis court is also used for additional parking. The property slopes from South street and partially drains easterly towards the existing wetlands and partially drains westerly towards the existing headwall.

The site has an existing on-site storm drain system. There is a catch basin in the east side parking area and it is connected in a series of additional catch basins and then discharges to a head wall in the west side of the site.

The is a septic system in the rear of the building and the site is serviced by the municipal water system.

In 2019 the Town of Avon acquired the 144 and 156 South Street properties. The properties were owned by a single entity and is the site of an old unused church and accessory building. The property contains a driveway and parking lot. The property slopes from South Street and onto the Butler Elementary School property. The property contains no visible drainage structures.

The total area of all three properties is 29.43 acres. Refer to the attached USGS Topographic Map and the Cover Sheet of the drawings for project location.

Proposed Work

The Avon Public School District is submitting plans and supporting documents for a proposed parking lot improvement project. The project will include a revised driveway, parking area, sidewalks and curbing. The new design will improve school bus access and add 101 additional marked parking spaces. The 144 and 156 South Street properties will be used for an additional driveway that will improve traffic flow for parents and safety for the students. The existing church and driveway will be demolished.

The project will add an additional 25750+/- S.F. of impervious area. The increased stormwater runoff will be directed into 2 separate infiltration basins. Both basins have two forebays in series for water quality improvement prior to discharging in the basins. The catch basin on the east side of the parking will be converted to a drain manhole and an inlet pipe will be added as an overflow for Infiltration Basin 3. An overflow will be added to Infiltration Basin 4and the runoff will be piped to an existing catch basin that will be converted to a manhole. A water quality device will be added to the existing drain line as the last drain structure prior to discharging out the headwall. There will be a decrease in the stormwater peak flow and volume that flows offsite.

All disturbed areas will be restored the existing conditions. After the site has stabilized the erosion controls will be removed. It is expected that construction will be completed within 90 days after commencing.

2.0 ENGINEERING METHODS & STANDARDS

The existing conditions or pre-drainage calculations were performed using HydroCAD software for Windows. HydroCAD uses the Soil Conservation Service (SCS), time of concentration by TR55 methodology, reach and pond rating by the Storage Indication Method and Manning's Equation, unit Hydrograph Method and the Storage Indication Method for developing the runoff and reservoir routing hydrographs, respectively.

Drainage calculations for the pre- and post-development conditions were performed for the 2, 10, 25 and 100 year Type III, 24 hour storm events. All calculations generated for pre-, and revised post-development conditions can be found in the attached appendices.

The Massachusetts Department of Environmental Protection (MADEP) Stormwater Management Policy standards were observed in the design of the stormwater management system. These standards included limiting post-development peak discharge rates and volumes to the pre-development peak discharge rates and volumes and recharging stormwater runoff to the groundwater.

3.0 SELECTION OF STORM EVENTS

The storm events are based upon 24 hour rainfall from TP-40.
Rainfall frequency data has been provided as follows:

Frequency (Years)	Rainfall [24-Hour Event (inches)]
2	3.2
10	4.6
25	5.5
100	6.7

4.0 CLASSIFICATION OF SOILS

Drainage classes have been established based on soil maps provided by U.S. Department of Agriculture Soil Conservation Service. Soil maps and descriptions are part of "Norfolk and Suffolk Counties, MA Survey Area Data: Version 12, September 15, 2016.

On-site soils are classified as:

260B – Sudbury Fine Sandy Loam, 2-8% slopes: HSG B

5.0 DESIGN POINTS

Design points (DPs) are discharge points or lines that convey runoff from the study area via overland flow or through drainage pipes. The pre-development and post-development areas of disturbance drain to two analysis ‘Design Points’ described as follows and shown on Figures 1 and 2.

School Street Side:

DP-1 A drainage comparison point at a headwall in the south west of the site.

DP-2 A drainage comparison point located the rear of #3 Leo’s Lane

6.0 ON-SITE PRE-DEVELOPMENT WATERSHEDS

Existing watersheds are delineated based on topography, physical characteristics and drainage networks within the site limits that collect and direct stormwater towards the DPs. Therefore the total study area for the site/ roadway is 4.74 acres which is divided into two (2) pre-development watersheds below:

PRE-1 The 177,206 S.F. (4.07 acre) watershed is 47.15% impervious. Runoff travels through the closed drainage system and over land to DP-1, Headwall.

PRE-2 The 29,358 S.F. (0.67 acre) watershed is 11.2% impervious. Runoff travels overland to DP-2, Rear of #3 Leo's Lane.

7.0 ON-SITE POST-DEVELOPMENT WATERSHEDS

The proposed watersheds are delineated based on topography, physical characteristics and drainage networks within the site limits and collect and direct stormwater towards the DPs. Analysis area is divided into four post development watersheds described below:

POST-1 The 104,741 S.F. (2.405 acre) watershed is 56.82% impervious. Subcatchment consists of the parking area, lawn and some of the undisturbed portion of watershed area. The runoff is collected in the closed drainage system and is treated by the Water Quality Device prior to discharging at the existing headwall, DP-1.

POST-2 The 5,577 S.F. (0.128 acre) watershed is 100% impervious. The runoff discharges to the rear of #3 Loe's Lane.

POST-3 The 42,534 S.F. (0.976 acre) watershed is 50.36% impervious. The new driveway and a portion of the new parking lot is directed into a pre-treatment forebay and then overflows into a second pre-treatment foray and then into Infiltration Basin 3. There is an overflow that connects to the existing closed drainage system.

POST-4 The 53,718 S.F. (1.233 acre) watershed is 59.50% impervious. The driveway and a portion of the reconstructed parking lot is directed into a pre-treatment forebay and then overflows into a second pre-treatment foray and then into Infiltration Basin 4. There is an overflow that connects to the existing closed drainage system

8.0 GROUNDWATER RECHARGE – MassDEP Stormwater Handbook Standard 3

The required recharge volumes are dependent on the soil type and are as follows: 0.6 inches of runoff from impervious areas for hydrologic soil group "A", 0.35 inches of runoff from impervious areas for hydrologic soil group "B" and 0.25 inches of runoff from impervious areas for hydrologic soil group "C" and 0.10 inches of runoff from impervious areas for hydrologic soil group "D". The recharge stage will store runoff for an extended period of time filtering out sediment and pollutants through the infiltration process.

Infiltration basins 3 and 4 are utilized for both recharge and detention capabilities. Collected roadway runoff will be stored within the basins until it can percolate through the bed soils. During more intense storm events, runoff that cannot be stored will flow into the closed drainage system. The infiltration basins have been designed to meet recharge and peak rate/flow attenuation.

RECHARGE VOLUME REQUIRED:

The following calculations demonstrate required volumes and capacity of infiltration chambers provided to accommodate flows from expanded pavement.

Impervious Area Analysis

Post-Development Impervious Area = 112,586 S.F.
Pre-Development Impervious Area = 86,834 S.F.

Increase in Impervious Area = 25,752 S.F

Recharge Volume Required

Rv = (F) x (newly created impervious area)
Where

Rv=Required recharge volume (cubic feet)
F = Target depth factor corresponding to the HSG (F value for type B soils = 0.35)

Increase in Impervious Area =25,752 S.F.
Rv=0.35 in x 1 ft/12 inch x 25,752 S.F. = 751 cubic feet

RECHARGE VOLUME PROVIDED:

Volume provided by Infiltration Basin 3 = 4,497 C.F.
(Volume below elevation of 204.88 - See Hydrocad Pond DET3)

Volume provided by Infiltration Basin 4 = 3,968 C.F.
(Volume below elevation of 206.10 - See Hydrocad Pond DET4)

Total Storage Provided = 8,465 C.F.

9.0 WATER QUALITY – MassDEP Stormwater Handbook Standard 4

The redevelopment includes measures to treat runoff from impervious areas prior to discharge. New stormwater controls have been incorporated into the design that result in a reduction in annual stormwater pollutant loads from the site. Through the use of structural and non-structural BMPs, the water quality volume from the watersheds contributing to the proposed drainage system will undergo treatment. The following BMPs were selected to treat the average annual TSS load from stormwater runoff under the post development condition. Refer to the TSS Removal Calculations below. As defined by the MADEP Stormwater Management Policy, the water quality volume to be treated is equal to the first flush volume which is equal to the ½" of runoff from impervious areas (or 1" in critical areas).

- Deep Sump Hooded Catch Basins
  Stormwater runoff from proposed pavement areas will be directed via curbing and site grading to catch basins with deep sumps and hooded outlets. The catch basins will trap and remove sediment and larger particles from the stormwater and will improve the performance of subsequent BMP's. The sumps will be a minimum of 4' in depth and a regular inspection and cleaning schedule has been proposed to ensure optimal effectiveness. When properly designed and maintained, catch basin and manhole sumps are effective in reducing the sediment and pollutant load in runoff.

- Hydrodynamic Separator (STC-2400 Unit)

Hydrodynamic Separators are designed to remove heavy particles, floating debris and hydrocarbons from stormwater. Stormwater enters the system where floatables and oils are separated prior to the clarified stormwater runoff discharging to an outlet pipe. See attached TSS removal worksheets for the TSS rates utilized for these proprietary BMPs.

- Sediment Forebay
  Sediment Forebay's provide pre-treatment of the impervious area runoff. The forebay slows the velocities of the incoming stormwater and are designed. to be easily accessed for accumulated sediment removal.

- Infiltration Basin
  Infiltration Basins are stormwater runoff impoundments constructed over impervious soils. They are designed for peak flow attenuation, groundwater recharge and provide 80%TSS removal with adequate pre-treatment.

Water Quality Volume (WQV) – (Standard 4)

Impervious Area Analysis

Post-Development Impervious Area = 112,586 S.F.
Pre-Development Impervious Area = 86,834 S.F.

Increase in Impervious Area = 25,752 S.F

1 inches of the total impervious area. **- (MassDEP Stormwater Handbook)**
Increase in impervious area = 25,752 S.F. x 1"/12" = 2,146 C.F.

STORAGE VOLUME PROVIDED:

Volume provided by Infiltration Basin 3 = 4,497 C.F.
(Volume below elevation of 204.88 - See Hydrocad Pond DET3)

Volume provided by Infiltration Basin 4 = 3,968 C.F.
(Volume below elevation of 205.64 - See Hydrocad Pond DET4)

Total Storage Provided = 8,465 C.F.

Drawdown calculations:

Infiltration Basin 3
Infiltration basin storage volume at elevation 204.88 = 4,497 C.F., pond bottom surface = 1,527 S.F. , exfiltration rate 8.27 in/hr (Rawls rate, 1982)
Drawdown time = 4,497 C.F./1,527 S.F. = 2.95' x 12" = 35.4"/8.27"/hr = 4.28 hrs < 72 hrs. OK

Infiltration Basin 4
Infiltration basin storage volume at elevation 205.64 = 3,968 C.F., pond bottom surface = 2,363 S.F. , exfiltration rate 8.27 in/hr (Rawls rate, 1982)
Drawdown time = 3,968 C.F./2,363 S.F. = 1.68' x 12" = 20.16"/8.27"/hr = 2.4 hrs < 72 hrs. OK

Sediment Forebay Sizing

- MassDEP Stormwater Handbook (MSH) minimum volume requirement 0.1" of impervious area
- Dedham Drainage & Stormwater Management Design Standards, Table 7 – 7 requires 1" of stormwater runoff from all impervious surface except for roofs.

Forebay #3A sizing

Subcatchment POST-3 Impervious area = 21,115 S.F. Pavement

MSH requirements = 21,115 S.F. x 0.1"/12" = 176 C.F.

Forebay-3A has a storage capacity of 233 C.F. below the riprap spillway at elevation 204.0'. (See HydroCAD Pond 3A Forebay Storage Table)

Forebay-3B has a storage capacity of 222 C.F. below the riprap spillway at elevation 204.0'. (See HydroCAD Pond 3B Storage Table)

Forebays #4A & #4B sizing

Subcatchment POST-4 Impervious area = 31,960 S.F. Pavement

MSH requirements = 31,960 S.F. x 0.1"/12" = 266 C.F.

Forebay-4A has a storage capacity of 272 C.F. below the riprap spillway at elevation 205.20. (See HydroCAD Pond 4A Forebay Storage Table)

Forebay-4B has a storage capacity of 272 C.F. below the riprap spillway at elevation 205.20. (See HydroCAD Pond 4B Storage Table)

10.0 SUMMARY OF FLOWS AT DESIGN POINTS

The Massachusetts Department of Environmental Protection (MADEP) Stormwater Management Standards and the Dedham Drainage and Stormwater Design Standards were used in the design of the stormwater management system. These standards included limiting post-development peak discharge rates to the pre-development peak discharge rates and recharging stormwater runoff to the groundwater.

The Table 1 includes a comparison for pre and post-development runoff values obtained using total peak values from hydrographs in attached calculation.

Table 1

Butler Elementary School
Avon, MA

PRE vs. POST Development Conditions

Storm	DP-1				DP-1		
Event	Discharge Rate (CFS)				Volume (acre-ft)		
	Pre-Dev	Post-Dev	**Difference**		*Pre-Dev*	Post-Dev	**Difference**
2	*6.59*	4.65	**-1.94**		*0.461*	0.337	**-0.124**
10	*12.30*	8.20	**-4.10**		*0.862*	0.643	**-0.219**
25	*15.45*	11.55	**-3.90**		*1.089*	0.841	**-0.248**
100	*20.24*	17.80	**-2.44**		*1.442*	1.166	**-0.276**
Storm	DP-2					DP-2	
Event	Discharge Rate (CFS)				Volume (acre-ft)		
	Pre-Dev	Post-Dev	**Difference**		*Pre-Dev*	Post-Dev	**Difference**
2	0.51	0.07	**-0.44**		*0.039*	0.006	**-0.033**
10	1.27	0.20	**-1.07**		*0.090*	0.016	**-0.074**
25	1.72	0.28	**-1.44**		*0.121*	0.021	**-0.100**
100	2.45	0.42	**-2.03**		*0.170*	0.031	**-0.139**

11.0 COMPLIANCE WITH THE MA DEP STORMWATER HANDBOOK

Per Massachusetts Stormwater Handbook Standard 7: *A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3 and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5 and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.*

This report presents a comparative analysis of the pre-development and post-development hydrologic characteristics of the site, and outlines the proposed measures to mitigate flow, provide groundwater recharge, and improve water quality from the site. The best management practices (BMPs) outlined in this report include measures to meet the municipal and the Massachusetts Department of Environmental Protection (DEP) requirements. Below is a summary of how the design complies with each applicable DEP standard with respect to the Massachusetts Stormwater Handbook Chapter 3 Volume 2 "Checklist for Redevelopment Projects."

Standard 1: No new stormwater conveyances (e.g. outfalls) may discharge untreated directly to or cause erosion in wetlands or waters of the Commonwealth.

The proposed stormwater conveyance system does not include any new *untreated* discharges. The overland and subsurface drainage points will remain consistent with the existing condition.

Standard 2: Stormwater management systems shall be designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

Stormwater management systems have been designed so that post-development peak discharge rates do not exceed pre-development peak discharge rates.

Standard 3: Loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration measures including environmentally sensitive site design, low impact development techniques, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge form the post-development site shall approximate the annual recharge from the pre-development conditions based on soil type. This standard is met when the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

Stormwater management systems have been designed to accommodate increase in impervious area so the loss of annual recharge to groundwater shall be eliminated or minimized through the use of infiltration basins, stormwater best management practices, and good operation and maintenance. At a minimum, the annual recharge from the post-development site shall approximate the annual recharge from pre-development conditions based on soil type. This standard is met as the stormwater management system is designed to infiltrate the required recharge volume as determined in accordance with the Massachusetts Stormwater Handbook.

Standard 4: Stormwater management systems shall be designed to remove 80% of the average annual post construction load of Total Suspended Solids (TSS).

This standard is met for design analysis points. To aid in removal of total suspended solids, deep sump hooded catch basins, water quality units, and infiltration basins with sediment forebays are proposed.

Standard 5: For land uses with higher potential pollutant loads, source control and pollution prevention shall be implemented in accordance with the Massachusetts Stormwater Handbook to eliminate or reduce the discharge of stormwater runoff from such land uses to the maximum extent practicable.

Not applicable. This project is not considered a higher potential pollutant load use.

Standard 6: Stormwater discharges within the Zone II or Interim Wellhead Protection Area of a public water supply, and stormwater discharges near or to any other critical area, require the use of the specific source control and pollution prevention measures and the specific structural stormwater best management practices determined by the Department to be suitable for managing discharges to such areas, as provided in the Massachusetts Stormwater Handbook.

Not applicable. This project is not located within or near any critical area.

Standard 7: A redevelopment project is required to meet the following Stormwater Management Standards only to the maximum extent practicable: Standard 2, Standard 3 and the pretreatment and structural stormwater best management practice requirements of Standards 4, 5 and 6. Existing stormwater discharges shall comply with Standard 1 only to the maximum extent practicable. A redevelopment project shall also comply with all other requirements of the Stormwater Management Standards and improve existing conditions.

Redevelopment standards have been met.

Standard 8: A plan to control construction-related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities (construction period erosion, sedimentations, and pollution prevention plan) shall be developed and implemented.

A Construction Period Pollution Prevention and Sedimentation Erosion Control Plan, Appendix D, has been developed to outline recommended requirements to control construction related impacts including erosion, sedimentation and other pollutant sources during construction and land disturbance activities. Measures are depicted on detail sheets.

Standard 9: A long-term operation and maintenance plan shall be developed and implemented to ensure that stormwater management systems function as designed.

An Operation and Maintenance Plan (O&M) has been developed that outlines maintenance requirements to ensure longevity of BMP's. See Appendix D for Long Term Operations & Maintenance Plan.

Standard 10: All illicit discharges to the stormwater management system are prohibited.

The proposed stormwater management system does not include any illicit discharges. See Appendix D for 'Illicit Discharge Statement.

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Infiltration Basin 3 - Butler Elementary School, Avon, MA

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Infiltration Basin	**0.80**	**1.00**	**0.80**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **1983-Butler School, Avon**

Prepared By: **GCG Associates, Inc**

Date: **June 15, 2020**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

INSTRUCTIONS:

Version 1, Automated: Mar. 4, 2008

1. In BMP Column, click on Blue Cell to Activate Drop Down Menu
2. Select BMP from Drop Down Menu
3. After BMP is selected, TSS Removal and other Columns are automatically completed.

Location: Infiltration Basin 4 - Butler Elementary School, Avon, MA

TSS Removal Calculation Worksheet

B BMP[1]	C TSS Removal Rate[1]	D Starting TSS Load*	E Amount Removed (C*D)	F Remaining Load (D-E)
Infiltration Basin	**0.80**	**1.00**	**0.80**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**
	0.00	**0.20**	**0.00**	**0.20**

Total TSS Removal = **80%**

Separate Form Needs to be Completed for Each Outlet or BMP Train

Project: **1983-Butler School, Avon**

Prepared By: **GCG Associates, Inc**

Date: **June 15, 2020**

*Equals remaining load from previous BMP (E) which enters the BMP

Non-automated TSS Calculation Sheet must be used if Proprietary BMP Proposed

1. From MassDEP Stormwater Handbook Vol. 1

Brief Stormceptor Sizing Report - Butler School

Project Information & Location			
Project Name	1983-WITH ROOF	**Project Number**	1
City	Avon	**State/ Province**	Massachusetts
Country	United States of America	**Date**	4/24/2020
Designer Information		**EOR Information (optional)**	
Name	John Getherall	**Name**	
Company	GCG Associates, Inc.	**Company**	
Phone #	978-657-9714	**Phone #**	
Email	jgetherall@gcgassociates.net	**Email**	

Stormwater Treatment Recommendation
The recommended Stormceptor Model(s) which achieve or exceed the user defined water quality objective for each site within the project are listed in the below Sizing Summary table.

Site Name	Butler School
Target TSS Removal (%)	80
TSS Removal (%) Provided	82
Recommended Stormceptor Model	STC 2400

The recommended Stormceptor Model achieves the water quality objectives based on the selected inputs, historical rainfall records and selected particle size distribution.

Stormceptor Sizing Summary	
Stormceptor Model	**% TSS Removal Provided**
STC 450i	70
STC 900	78
STC 1200	78
STC 1800	78
STC 2400	82
STC 3600	83
STC 4800	86
STC 6000	87
STC 7200	89
STC 11000	92
STC 13000	92
STC 16000	93

Sizing Details

Drainage Area

Total Area (acres)	2.89
Imperviousness %	64.1

Rainfall

Station Name	BOSTON WSFO AP
State/Province	Massachusetts
Station ID #	0770
Years of Records	58
Latitude	42°21'38"N
Longitude	71°0'38"W

Water Quality Objective

TSS Removal (%)	80.0
Runoff Volume Capture (%)	
Oil Spill Capture Volume (Gal)	
Peak Conveyed Flow Rate (CFS)	
Water Quality Flow Rate (CFS)	

Up Stream Storage

Storage (ac-ft)	Discharge (cfs)
0.000	0.000

Up Stream Flow Diversion

Max. Flow to Stormceptor (cfs)	

Particle Size Distribution (PSD)
The selected PSD defines TSS removal

Fine Distribution

Particle Diameter (microns)	Distribution %	Specific Gravity
20.0	20.0	1.30
60.0	20.0	1.80
150.0	20.0	2.20
400.0	20.0	2.65
2000.0	20.0	2.65

Notes

• Stormceptor performance estimates are based on simulations using PCSWMM for Stormceptor, which uses the EPA Rainfall and Runoff modules.
• Design estimates listed are only representative of specific project requirements based on total suspended solids (TSS) removal defined by the selected PSD, and based on stable site conditions only, after construction is completed.
• For submerged applications or sites specific to spill control, please contact your local Stormceptor representative for further design assistance.

For Stormceptor Specifications and Drawings Please Visit:
https://www.conteches.com/technical-guides/search?filter=1WBC0O5EYX

Stage-Area-Storage for Pond DET-3: DET-3

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
203.00	1,527	0
203.02	1,539	31
203.04	1,551	62
203.06	1,564	93
203.08	1,576	124
203.10	1,588	156
203.12	1,601	188
203.14	1,613	220
203.16	1,626	252
203.18	1,638	285
203.20	1,651	318
203.22	1,664	351
203.24	1,676	384
203.26	1,689	418
203.28	1,702	452
203.30	1,715	486
203.32	1,728	520
203.34	1,741	555
203.36	1,754	590
203.38	1,767	625
203.40	1,780	661
203.42	1,793	696
203.44	1,806	732
203.46	1,819	769
203.48	1,833	805
203.50	1,846	842
203.52	1,859	879
203.54	1,873	916
203.56	1,886	954
203.58	1,900	992
203.60	1,913	1,030
203.62	1,927	1,068
203.64	1,941	1,107
203.66	1,954	1,146
203.68	1,968	1,185
203.70	1,982	1,225
203.72	1,996	1,264
203.74	2,010	1,304
203.76	2,024	1,345
203.78	2,038	1,385
203.80	2,052	1,426
203.82	2,066	1,468
203.84	2,080	1,509
203.86	2,094	1,551
203.88	2,108	1,593
203.90	2,123	1,635
203.92	2,137	1,678
203.94	2,152	1,721
203.96	2,166	1,764
203.98	2,180	1,807
204.00	2,195	1,851
204.02	2,228	1,895
204.04	2,262	1,940
204.06	2,296	1,986
204.08	2,330	2,032
204.10	2,364	2,079
204.12	2,399	2,126
204.14	2,434	2,175
204.16	2,469	2,224
204.18	2,504	2,274
204.20	2,540	2,324
204.22	2,576	2,375
204.24	2,612	2,427
204.26	2,648	2,480
204.28	2,685	2,533
204.30	2,722	2,587
204.32	2,759	2,642
204.34	2,796	2,697
204.36	2,834	2,754
204.38	2,872	2,811
204.40	2,910	2,869
204.42	2,948	2,927
204.44	2,987	2,986
204.46	3,026	3,047
204.48	3,065	3,108
204.50	3,104	3,169
204.52	3,144	3,232
204.54	3,184	3,295
204.56	3,224	3,359
204.58	3,264	3,424
204.60	3,305	3,490
204.62	3,346	3,556
204.64	3,387	3,623
204.66	3,429	3,692
204.68	3,470	3,761
204.70	3,512	3,830
204.72	3,554	3,901
204.74	3,597	3,973
204.76	3,639	4,045
204.78	3,682	4,118
204.80	3,725	4,192
204.82	3,769	4,267
204.84	3,813	4,343
204.86	3,857	4,420
204.88	3,901	4,497 ← **STORAGE VOLUME**
204.90	3,945	4,576
204.92	3,990	4,655
204.94	4,035	4,735
204.96	4,080	4,817
204.98	4,125	4,899
205.00	**4,171**	**4,982**

Stage-Area-Storage for Pond DET-4: DET-4

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
204.00	1,696	0
204.02	1,709	34
204.04	1,722	68
204.06	1,734	103
204.08	1,747	138
204.10	1,760	173
204.12	1,773	208
204.14	1,786	244
204.16	1,799	280
204.18	1,812	316
204.20	1,825	352
204.22	1,839	389
204.24	1,852	426
204.26	1,865	463
204.28	1,879	500
204.30	1,892	538
204.32	1,905	576
204.34	1,919	614
204.36	1,932	653
204.38	1,946	691
204.40	1,960	731
204.42	1,973	770
204.44	1,987	809
204.46	2,001	849
204.48	2,015	889
204.50	2,029	930
204.52	2,043	971
204.54	2,057	1,012
204.56	2,071	1,053
204.58	2,085	1,094
204.60	2,099	1,136
204.62	2,113	1,178
204.64	2,127	1,221
204.66	2,141	1,263
204.68	2,156	1,306
204.70	2,170	1,350
204.72	2,184	1,393
204.74	2,199	1,437
204.76	2,213	1,481
204.78	2,228	1,526
204.80	2,242	1,570
204.82	2,257	1,615
204.84	2,272	1,661
204.86	2,287	1,706
204.88	2,301	1,752
204.90	2,316	1,798
204.92	2,331	1,845
204.94	2,346	1,891
204.96	2,361	1,939
204.98	2,376	1,986
205.00	2,391	2,034
205.02	2,428	2,082
205.04	2,464	2,131
205.06	2,502	2,180
205.08	2,539	2,231
205.10	2,577	2,282
205.12	2,615	2,334
205.14	2,653	2,387
205.16	2,692	2,440
205.18	2,730	2,494
205.20	2,770	2,549
205.22	2,809	2,605
205.24	2,849	2,662
205.26	2,889	2,719
205.28	2,929	2,777
205.30	2,969	2,836
205.32	3,010	2,896
205.34	3,051	2,956
205.36	3,092	3,018
205.38	3,134	3,080
205.40	3,176	3,143
205.42	3,218	3,207
205.44	3,261	3,272
205.46	3,303	3,338
205.48	3,346	3,404
205.50	3,390	3,471
205.52	3,433	3,540
205.54	3,477	3,609
205.56	3,521	3,679
205.58	3,565	3,750
205.60	3,610	3,821
205.62	3,655	3,894
205.64	3,700	3,968 ← **STORAGE VOLUME**
205.66	3,746	4,042
205.68	3,792	4,117
205.70	3,838	4,194
205.72	3,884	4,271
205.74	3,931	4,349
205.76	3,978	4,428
205.78	4,025	4,508
205.80	4,072	4,589
205.82	4,120	4,671
205.84	4,168	4,754
205.86	4,216	4,838
205.88	4,265	4,923
205.90	4,314	5,008
205.92	4,363	5,095
205.94	4,412	5,183
205.96	4,462	5,272
205.98	4,512	5,361
206.00	**4,562**	**5,452**

Stage-Area-Storage for Pond 3A: Forebay 3A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
203.00	139	0
203.02	142	3
203.04	145	6
203.06	149	9
203.08	152	12
203.10	155	15
203.12	159	18
203.14	162	21
203.16	166	24
203.18	169	28
203.20	173	31
203.22	176	35
203.24	180	38
203.26	183	42
203.28	187	45
203.30	191	49
203.32	194	53
203.34	198	57
203.36	202	61
203.38	206	65
203.40	210	69
203.42	214	73
203.44	218	78
203.46	222	82
203.48	226	87
203.50	230	91
203.52	234	96
203.54	238	101
203.56	242	105
203.58	246	110
203.60	251	115
203.62	255	120
203.64	259	125
203.66	263	131
203.68	268	136
203.70	272	141
203.72	277	147
203.74	281	152
203.76	286	158
203.78	290	164
203.80	295	170
203.82	300	176
203.84	304	182
203.86	309	188
203.88	314	194
203.90	319	200
203.92	323	207
203.94	328	213
203.96	333	220
203.98	338	227
204.00	343	233
204.02	347	240
204.04	350	247
204.06	354	254
204.08	358	261
204.10	361	269
204.12	365	276
204.14	369	283
204.16	373	291
204.18	377	298
204.20	380	306
204.22	384	313
204.24	388	321
204.26	392	329
204.28	396	337
204.30	400	345
204.32	404	353
204.34	408	361
204.36	412	369
204.38	416	377
204.40	420	386
204.42	424	394
204.44	428	403
204.46	432	411
204.48	436	420
204.50	440	429
204.52	444	438
204.54	448	446
204.56	452	455
204.58	457	465
204.60	461	474
204.62	465	483
204.64	469	492
204.66	474	502
204.68	478	511
204.70	482	521
204.72	486	531
204.74	491	540
204.76	495	550
204.78	500	560
204.80	504	570
204.82	508	580
204.84	513	591
204.86	517	601
204.88	522	611
204.90	526	622
204.92	531	632
204.94	535	643
204.96	540	654
204.98	544	664
205.00	**549**	**675**

STORAGE VOLUME BELOW OVERFLOW

Stage-Area-Storage for Pond 3B: Forebay 3B

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
203.00	137	0
203.02	140	3
203.04	143	6
203.06	146	8
203.08	149	11
203.10	152	14
203.12	155	18
203.14	158	21
203.16	161	24
203.18	164	27
203.20	167	30
203.22	171	34
203.24	174	37
203.26	177	41
203.28	181	44
203.30	184	48
203.32	187	52
203.34	191	55
203.36	194	59
203.38	198	63
203.40	201	67
203.42	205	71
203.44	208	75
203.46	212	80
203.48	215	84
203.50	219	88
203.52	223	93
203.54	226	97
203.56	230	102
203.58	234	106
203.60	238	111
203.62	241	116
203.64	245	121
203.66	249	126
203.68	253	131
203.70	257	136
203.72	261	141
203.74	265	146
203.76	269	152
203.78	273	157
203.80	277	162
203.82	281	168
203.84	286	174
203.86	290	179
203.88	294	185
203.90	298	191
203.92	303	197
203.94	307	203
203.96	311	210
203.98	316	216
204.00	320	222
204.02	322	229
204.04	325	235
204.06	327	242
204.08	330	248
204.10	332	255
204.12	335	261
204.14	337	268
204.16	340	275
204.18	342	282
204.20	345	289
204.22	347	295
204.24	350	302
204.26	352	309
204.28	355	317
204.30	357	324
204.32	360	331
204.34	362	338
204.36	365	345
204.38	367	353
204.40	370	360
204.42	373	367
204.44	375	375
204.46	378	382
204.48	381	390
204.50	383	398
204.52	386	405
204.54	388	413
204.56	391	421
204.58	394	429
204.60	396	437
204.62	399	445
204.64	402	453
204.66	405	461
204.68	407	469
204.70	410	477
204.72	413	485
204.74	415	493
204.76	418	502
204.78	421	510
204.80	424	519
204.82	427	527
204.84	429	536
204.86	432	544
204.88	435	553
204.90	438	562
204.92	441	571
204.94	443	579
204.96	446	588
204.98	449	597
205.00	**452**	**606**

STORAGE VOLUME BELOW OVERFLOW

Stage-Area-Storage for Pond 4A: Forebay 4A

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
204.00	95	0
204.02	98	2
204.04	102	4
204.06	105	6
204.08	109	8
204.10	112	10
204.12	116	13
204.14	119	15
204.16	123	17
204.18	127	20
204.20	131	22
204.22	135	25
204.24	139	28
204.26	143	31
204.28	147	34
204.30	151	37
204.32	155	40
204.34	159	43
204.36	164	46
204.38	168	49
204.40	172	53
204.42	177	56
204.44	181	60
204.46	186	63
204.48	190	67
204.50	195	71
204.52	200	75
204.54	205	79
204.56	210	83
204.58	215	87
204.60	219	92
204.62	225	96
204.64	230	101
204.66	235	105
204.68	240	110
204.70	245	115
204.72	251	120
204.74	256	125
204.76	261	130
204.78	267	135
204.80	272	141
204.82	278	146
204.84	284	152
204.86	289	158
204.88	295	164
204.90	301	170
204.92	307	176
204.94	313	182
204.96	319	188
204.98	325	195
205.00	331	201
205.02	336	208
205.04	341	215

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	
205.06	346	221	
205.08	351	228	
205.10	356	235	
205.12	361	243	
205.14	366	250	
205.16	372	257	
205.18	377	265	
205.20	382	272	**STORAGE VOLUME BELOW OVERFLOW**
205.22	387	280	
205.24	393	288	
205.26	398	296	
205.28	404	304	
205.30	409	312	
205.32	414	320	
205.34	420	328	
205.36	426	337	
205.38	431	346	
205.40	437	354	
205.42	442	363	
205.44	448	372	
205.46	454	381	
205.48	460	390	
205.50	466	399	
205.52	471	409	
205.54	477	418	
205.56	483	428	
205.58	489	437	
205.60	495	447	
205.62	501	457	
205.64	507	467	
205.66	513	478	
205.68	520	488	
205.70	526	498	
205.72	532	509	
205.74	538	520	
205.76	545	530	
205.78	551	541	
205.80	557	553	
205.82	564	564	
205.84	570	575	
205.86	577	587	
205.88	583	598	
205.90	590	610	
205.92	596	622	
205.94	603	634	
205.96	610	646	
205.98	616	658	
206.00	**623**	**670**	

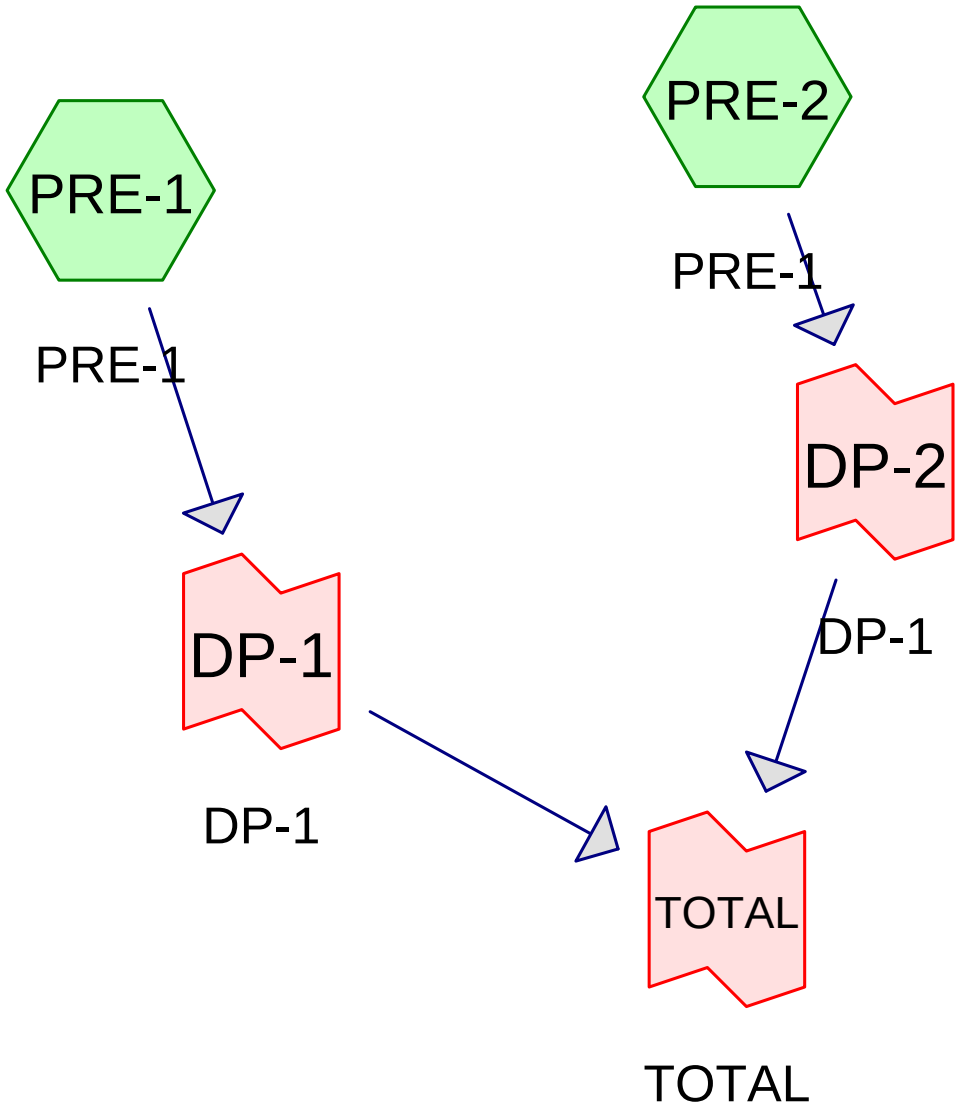
Stage-Area-Storage for Pond 4B: Forebay 4B

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)
204.00	95	0
204.02	98	2
204.04	102	4
204.06	105	6
204.08	109	8
204.10	112	10
204.12	116	13
204.14	119	15
204.16	123	17
204.18	127	20
204.20	131	22
204.22	135	25
204.24	139	28
204.26	143	31
204.28	147	34
204.30	151	37
204.32	155	40
204.34	159	43
204.36	164	46
204.38	168	49
204.40	172	53
204.42	177	56
204.44	181	60
204.46	186	63
204.48	190	67
204.50	195	71
204.52	200	75
204.54	205	79
204.56	210	83
204.58	215	87
204.60	219	92
204.62	225	96
204.64	230	101
204.66	235	105
204.68	240	110
204.70	245	115
204.72	251	120
204.74	256	125
204.76	261	130
204.78	267	135
204.80	272	141
204.82	278	146
204.84	284	152
204.86	289	158
204.88	295	164
204.90	301	170
204.92	307	176
204.94	313	182
204.96	319	188
204.98	325	195
205.00	331	201
205.02	336	208
205.04	341	215

Elevation (feet)	Surface (sq-ft)	Storage (cubic-feet)	
205.06	346	221	
205.08	351	228	
205.10	356	235	
205.12	361	243	
205.14	366	250	
205.16	372	257	
205.18	377	265	
205.20	382	272	**STORAGE VOLUME BELOW OVERFLOW**
205.22	387	280	
205.24	393	288	
205.26	398	296	
205.28	404	304	
205.30	409	312	
205.32	414	320	
205.34	420	328	
205.36	426	337	
205.38	431	346	
205.40	437	354	
205.42	442	363	
205.44	448	372	
205.46	454	381	
205.48	460	390	
205.50	466	399	
205.52	471	409	
205.54	477	418	
205.56	483	428	
205.58	489	437	
205.60	495	447	
205.62	501	457	
205.64	507	467	
205.66	513	478	
205.68	520	488	
205.70	526	498	
205.72	532	509	
205.74	538	520	
205.76	545	530	
205.78	551	541	
205.80	557	553	
205.82	564	564	
205.84	570	575	
205.86	577	587	
205.88	583	598	
205.90	590	610	
205.92	596	622	
205.94	603	634	
205.96	610	646	
205.98	616	658	
206.00	**623**	**670**	

APPENDIX A: HYDROCAD CALCULATIONS
Existing Conditions – Pre-Development Analysis
Proposed Conditions – Post-Development Analysis

Butler Elementary School
Avon, MA
1983



Subcat Reach Pond Link

Routing Diagram for 1983-PRE-Development-4
Prepared by {enter your company name here}, Printed 5/6/2020

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
1.993	98	Paved parking, HSG B (PRE-1, PRE-2)
2.749	65	Woods/grass comb., Fair, HSG B (PRE-1, PRE-2)
4.742	**79**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
4.742	HSG B	PRE-1, PRE-2
0.000	HSG C	
0.000	HSG D	
0.000	Other	
4.742		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	1.993	0.000	0.000	0.000	1.993	Paved parking	PRE-1, PRE-2
0.000	2.749	0.000	0.000	0.000	2.749	Woods/grass comb., Fair	PRE-1, PRE-2
0.000	**4.742**	**0.000**	**0.000**	**0.000**	**4.742**	**TOTAL AREA**	

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PRE-1: PRE-1 Runoff Area=177,206 sf 47.15% Impervious Runoff Depth>1.36"
Flow Length=842' Tc=7.2 min CN=81 Runoff=6.59 cfs 0.461 af

Subcatchment PRE-2: PRE-1 Runoff Area=29,358 sf 11.20% Impervious Runoff Depth>0.70"
Flow Length=216' Tc=7.1 min CN=69 Runoff=0.51 cfs 0.039 af

Link DP-1: DP-1 Inflow=6.59 cfs 0.461 af
Primary=6.59 cfs 0.461 af

Link DP-2: DP-1 Inflow=0.51 cfs 0.039 af
Primary=0.51 cfs 0.039 af

Link TOTAL: TOTAL Inflow=7.10 cfs 0.500 af
Primary=7.10 cfs 0.500 af

Total Runoff Area = 4.742 ac Runoff Volume = 0.500 af Average Runoff Depth = 1.27"
57.96% Pervious = 2.749 ac 42.04% Impervious = 1.993 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PRE-1: PRE-1 Runoff Area=177,206 sf 47.15% Impervious Runoff Depth>2.54"
Flow Length=842' Tc=7.2 min CN=81 Runoff=12.30 cfs 0.862 af

Subcatchment PRE-2: PRE-1 Runoff Area=29,358 sf 11.20% Impervious Runoff Depth>1.60"
Flow Length=216' Tc=7.1 min CN=69 Runoff=1.27 cfs 0.090 af

Link DP-1: DP-1 Inflow=12.30 cfs 0.862 af
Primary=12.30 cfs 0.862 af

Link DP-2: DP-1 Inflow=1.27 cfs 0.090 af
Primary=1.27 cfs 0.090 af

Link TOTAL: TOTAL Inflow=13.56 cfs 0.951 af
Primary=13.56 cfs 0.951 af

Total Runoff Area = 4.742 ac Runoff Volume = 0.951 af Average Runoff Depth = 2.41"
57.96% Pervious = 2.749 ac 42.04% Impervious = 1.993 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PRE-1: PRE-1 Runoff Area=177,206 sf 47.15% Impervious Runoff Depth>3.21"
Flow Length=842' Tc=7.2 min CN=81 Runoff=15.45 cfs 1.089 af

Subcatchment PRE-2: PRE-1 Runoff Area=29,358 sf 11.20% Impervious Runoff Depth>2.15"
Flow Length=216' Tc=7.1 min CN=69 Runoff=1.72 cfs 0.121 af

Link DP-1: DP-1 Inflow=15.45 cfs 1.089 af
Primary=15.45 cfs 1.089 af

Link DP-2: DP-1 Inflow=1.72 cfs 0.121 af
Primary=1.72 cfs 0.121 af

Link TOTAL: TOTAL Inflow=17.18 cfs 1.210 af
Primary=17.18 cfs 1.210 af

Total Runoff Area = 4.742 ac Runoff Volume = 1.210 af Average Runoff Depth = 3.06"
57.96% Pervious = 2.749 ac 42.04% Impervious = 1.993 ac

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment PRE-1: PRE-1 Runoff Area=177,206 sf 47.15% Impervious Runoff Depth>4.25"
Flow Length=842' Tc=7.2 min CN=81 Runoff=20.24 cfs 1.442 af

Subcatchment PRE-2: PRE-1 Runoff Area=29,358 sf 11.20% Impervious Runoff Depth>3.03"
Flow Length=216' Tc=7.1 min CN=69 Runoff=2.45 cfs 0.170 af

Link DP-1: DP-1 Inflow=20.24 cfs 1.442 af
Primary=20.24 cfs 1.442 af

Link DP-2: DP-1 Inflow=2.45 cfs 0.170 af
Primary=2.45 cfs 0.170 af

Link TOTAL: TOTAL Inflow=22.69 cfs 1.612 af
Primary=22.69 cfs 1.612 af

Total Runoff Area = 4.742 ac Runoff Volume = 1.612 af Average Runoff Depth = 4.08"
57.96% Pervious = 2.749 ac 42.04% Impervious = 1.993 ac

Summary for Subcatchment PRE-1: PRE-1

Runoff = 20.24 cfs @ 12.10 hrs, Volume= 1.442 af, Depth> 4.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
93,661	65	Woods/grass comb., Fair, HSG B
83,545	98	Paved parking, HSG B
177,206	81	Weighted Average
93,661		52.85% Pervious Area
83,545		47.15% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.7	50	0.0200	1.20		**Sheet Flow, Paved Sheet Flow** Smooth surfaces n= 0.011 P2= 3.20"
6.5	792	0.0100	2.03		**Shallow Concentrated Flow, Paved** Paved Kv= 20.3 fps
7.2	842	Total			

Summary for Subcatchment PRE-2: PRE-1

Runoff = 2.45 cfs @ 12.11 hrs, Volume= 0.170 af, Depth> 3.03"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
26,069	65	Woods/grass comb., Fair, HSG B
3,289	98	Paved parking, HSG B
29,358	69	Weighted Average
26,069		88.80% Pervious Area
3,289		11.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
3.5	50	0.0500	0.24		**Sheet Flow, Lawn Sheet Flow** Range n= 0.130 P2= 3.20"
3.6	166	0.0120	0.77		**Shallow Concentrated Flow, Lawn SCF** Short Grass Pasture Kv= 7.0 fps
7.1	216	Total			

Summary for Link DP-1: DP-1

Inflow Area = 4.068 ac, 47.15% Impervious, Inflow Depth > 4.25" for 100-Year event
Inflow = 20.24 cfs @ 12.10 hrs, Volume= 1.442 af
Primary = 20.24 cfs @ 12.10 hrs, Volume= 1.442 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: DP-1

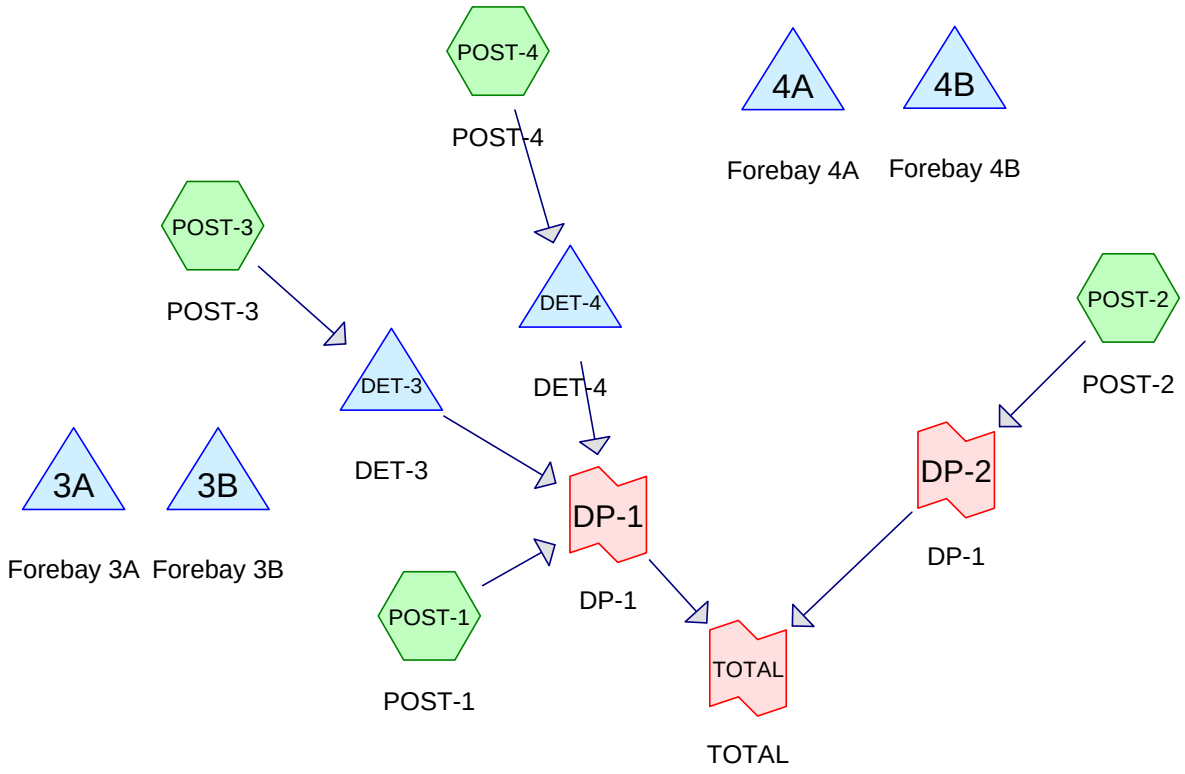
Inflow Area = 0.674 ac, 11.20% Impervious, Inflow Depth > 3.03" for 100-Year event
Inflow = 2.45 cfs @ 12.11 hrs, Volume= 0.170 af
Primary = 2.45 cfs @ 12.11 hrs, Volume= 0.170 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs

Summary for Link TOTAL: TOTAL

Inflow Area = 4.742 ac, 42.04% Impervious, Inflow Depth > 4.08" for 100-Year event
Inflow = 22.69 cfs @ 12.10 hrs, Volume= 1.612 af
Primary = 22.69 cfs @ 12.10 hrs, Volume= 1.612 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs



Subcat Reach Pond Link

Routing Diagram for 1983-POST-Development-5
Prepared by {enter your company name here}, Printed 6/15/2020

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.585	98	Paved parking, HSG B (POST-1, POST-3, POST-4)
2.158	65	Woods/grass comb., Fair, HSG B (POST-1, POST-2, POST-3, POST-4)

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.000	HSG A	
4.742	HSG B	POST-1, POST-2, POST-3, POST-4
0.000	HSG C	
0.000	HSG D	
0.000	Other	

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	2.585	0.000	0.000	0.000	2.585	Paved parking	POST-1, POST-3, POST-4
0.000	2.158	0.000	0.000	0.000	2.158	Woods/grass comb., Fair	POST-1, POST-2, POST-3, POST-4

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	DET-3	201.80	200.35	144.0	0.0101	0.010	8.0	0.0	0.0
2	DET-4	203.49	199.75	353.0	0.0106	0.010	12.0	0.0	0.0

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment POST-1: POST-1 Runoff Area=104,741 sf 56.82% Impervious Runoff Depth>1.68"
Tc=6.0 min CN=84 Runoff=4.65 cfs 0.337 af

Subcatchment POST-2: POST-2 Runoff Area=5,577 sf 0.00% Impervious Runoff Depth>0.60"
Tc=6.0 min CN=65 Runoff=0.07 cfs 0.006 af

Subcatchment POST-3: POST-3 Runoff Area=42,534 sf 49.64% Impervious Runoff Depth>1.47"
Tc=6.0 min CN=81 Runoff=1.64 cfs 0.119 af

Subcatchment POST-4: POST-4 Runoff Area=53,718 sf 59.50% Impervious Runoff Depth>1.76"
Tc=6.0 min CN=85 Runoff=2.49 cfs 0.180 af

Pond 3A: Forebay 3A Peak Elev=0.00' Storage=0 cf

Pond 3B: Forebay 3B Peak Elev=0.00' Storage=0 cf

Pond 4A: Forebay 4A Peak Elev=0.00' Storage=0 cf

Pond 4B: Forebay 4B Peak Elev=0.00' Storage=0 cf

Pond DET-3: DET-3 Peak Elev=203.72' Storage=1,273 cf Inflow=1.64 cfs 0.119 af
Discarded=0.38 cfs 0.120 af Primary=0.00 cfs 0.000 af Outflow=0.38 cfs 0.120 af

Pond DET-4: DET-4 Peak Elev=205.10' Storage=2,270 cf Inflow=2.49 cfs 0.180 af
Discarded=0.49 cfs 0.181 af Primary=0.00 cfs 0.000 af Outflow=0.49 cfs 0.181 af

Link DP-1: DP-1 Inflow=4.65 cfs 0.337 af
Primary=4.65 cfs 0.337 af

Link DP-2: DP-1 Inflow=0.07 cfs 0.006 af
Primary=0.07 cfs 0.006 af

Link TOTAL: TOTAL Inflow=4.72 cfs 0.343 af
Primary=4.72 cfs 0.343 af

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment POST-1: POST-1 Runoff Area=104,741 sf 56.82% Impervious Runoff Depth>2.99"
Tc=6.0 min CN=84 Runoff=8.23 cfs 0.600 af

Subcatchment POST-2: POST-2 Runoff Area=5,577 sf 0.00% Impervious Runoff Depth>1.46"
Tc=6.0 min CN=65 Runoff=0.20 cfs 0.016 af

Subcatchment POST-3: POST-3 Runoff Area=42,534 sf 49.64% Impervious Runoff Depth>2.72"
Tc=6.0 min CN=81 Runoff=3.05 cfs 0.221 af

Subcatchment POST-4: POST-4 Runoff Area=53,718 sf 59.50% Impervious Runoff Depth>3.09"
Tc=6.0 min CN=85 Runoff=4.34 cfs 0.317 af

Pond 3A: Forebay 3A Peak Elev=0.00' Storage=0 cf

Pond 3B: Forebay 3B Peak Elev=0.00' Storage=0 cf

Pond 4A: Forebay 4A Peak Elev=0.00' Storage=0 cf

Pond 4B: Forebay 4B Peak Elev=0.00' Storage=0 cf

Pond DET-3: DET-3 Peak Elev=204.45' Storage=3,020 cf Inflow=3.05 cfs 0.221 af
Discarded=0.58 cfs 0.222 af Primary=0.00 cfs 0.000 af Outflow=0.58 cfs 0.222 af

Pond DET-4: DET-4 Peak Elev=205.46' Storage=3,334 cf Inflow=4.34 cfs 0.317 af
Discarded=0.63 cfs 0.274 af Primary=1.66 cfs 0.043 af Outflow=2.29 cfs 0.317 af

Link DP-1: DP-1 Inflow=8.20 cfs 0.643 af
Primary=8.20 cfs 0.643 af

Link DP-2: DP-1 Inflow=0.20 cfs 0.016 af
Primary=0.20 cfs 0.016 af

Link TOTAL: TOTAL Inflow=8.40 cfs 0.659 af
Primary=8.40 cfs 0.659 af

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment POST-1: POST-1 Runoff Area=104,741 sf 56.82% Impervious Runoff Depth>3.73"
Tc=6.0 min CN=84 Runoff=10.18 cfs 0.747 af

Subcatchment POST-2: POST-2 Runoff Area=5,577 sf 0.00% Impervious Runoff Depth>1.99"
Tc=6.0 min CN=65 Runoff=0.28 cfs 0.021 af

Subcatchment POST-3: POST-3 Runoff Area=42,534 sf 49.64% Impervious Runoff Depth>3.43"
Tc=6.0 min CN=81 Runoff=3.83 cfs 0.279 af

Subcatchment POST-4: POST-4 Runoff Area=53,718 sf 59.50% Impervious Runoff Depth>3.83"
Tc=6.0 min CN=85 Runoff=5.34 cfs 0.394 af

Pond 3A: Forebay 3A Peak Elev=0.00' Storage=0 cf

Pond 3B: Forebay 3B Peak Elev=0.00' Storage=0 cf

Pond 4A: Forebay 4A Peak Elev=0.00' Storage=0 cf

Pond 4B: Forebay 4B Peak Elev=0.00' Storage=0 cf

Pond DET-3: DET-3 Peak Elev=204.66' Storage=3,697 cf Inflow=3.83 cfs 0.279 af
Discarded=0.66 cfs 0.265 af Primary=0.45 cfs 0.014 af Outflow=1.10 cfs 0.279 af

Pond DET-4: DET-4 Peak Elev=205.54' Storage=3,615 cf Inflow=5.34 cfs 0.394 af
Discarded=0.67 cfs 0.313 af Primary=3.11 cfs 0.080 af Outflow=3.77 cfs 0.393 af

Link DP-1: DP-1 Inflow=11.55 cfs 0.841 af
Primary=11.55 cfs 0.841 af

Link DP-2: DP-1 Inflow=0.28 cfs 0.021 af
Primary=0.28 cfs 0.021 af

Link TOTAL: TOTAL Inflow=11.83 cfs 0.863 af
Primary=11.83 cfs 0.863 af

Time span=0.00-24.00 hrs, dt=0.05 hrs, 481 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Dyn-Stor-Ind method - Pond routing by Dyn-Stor-Ind method

Subcatchment POST-1: POST-1 Runoff Area=104,741 sf 56.82% Impervious Runoff Depth>4.85"
Tc=6.0 min CN=84 Runoff=13.11 cfs 0.972 af

Subcatchment POST-2: POST-2 Runoff Area=5,577 sf 0.00% Impervious Runoff Depth>2.87"
Tc=6.0 min CN=65 Runoff=0.42 cfs 0.031 af

Subcatchment POST-3: POST-3 Runoff Area=42,534 sf 49.64% Impervious Runoff Depth>4.52"
Tc=6.0 min CN=81 Runoff=5.02 cfs 0.368 af

Subcatchment POST-4: POST-4 Runoff Area=53,718 sf 59.50% Impervious Runoff Depth>4.96"
Tc=6.0 min CN=85 Runoff=6.84 cfs 0.510 af

Pond 3A: Forebay 3A Peak Elev=0.00' Storage=0 cf

Pond 3B: Forebay 3B Peak Elev=0.00' Storage=0 cf

Pond 4A: Forebay 4A Peak Elev=0.00' Storage=0 cf

Pond 4B: Forebay 4B Peak Elev=0.00' Storage=0 cf

Pond DET-3: DET-3 Peak Elev=204.88' Storage=4,499 cf Inflow=5.02 cfs 0.368 af
Discarded=0.75 cfs 0.316 af Primary=1.04 cfs 0.052 af Outflow=1.78 cfs 0.368 af

Pond DET-4: DET-4 Peak Elev=205.65' Storage=4,002 cf Inflow=6.84 cfs 0.510 af
Discarded=0.71 cfs 0.369 af Primary=4.88 cfs 0.141 af Outflow=5.59 cfs 0.510 af

Link DP-1: DP-1 Inflow=17.80 cfs 1.166 af
Primary=17.80 cfs 1.166 af

Link DP-2: DP-1 Inflow=0.42 cfs 0.031 af
Primary=0.42 cfs 0.031 af

Link TOTAL: TOTAL Inflow=18.21 cfs 1.196 af
Primary=18.21 cfs 1.196 af

Summary for Subcatchment POST-1: POST-1

Runoff = 13.11 cfs @ 12.09 hrs, Volume= 0.972 af, Depth> 4.85"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
45,230	65	Woods/grass comb., Fair, HSG B
59,511	98	Paved parking, HSG B
104,741	84	Weighted Average
45,230		43.18% Pervious Area
59,511		56.82% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment POST-2: POST-2

Runoff = 0.42 cfs @ 12.10 hrs, Volume= 0.031 af, Depth> 2.87"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
5,577	65	Woods/grass comb., Fair, HSG B
0	98	Paved parking, HSG B
5,577	65	Weighted Average
5,577		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment POST-3: POST-3

Runoff = 5.02 cfs @ 12.09 hrs, Volume= 0.368 af, Depth> 4.52"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
21,419	65	Woods/grass comb., Fair, HSG B
21,115	98	Paved parking, HSG B
42,534	81	Weighted Average
21,419		50.36% Pervious Area
21,115		49.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Subcatchment POST-4: POST-4

Runoff = 6.84 cfs @ 12.09 hrs, Volume= 0.510 af, Depth> 4.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Type III 24-hr 100-Year Rainfall=6.70"

Area (sf)	CN	Description
21,758	65	Woods/grass comb., Fair, HSG B
31,960	98	Paved parking, HSG B
53,718	85	Weighted Average
21,758		40.50% Pervious Area
31,960		59.50% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry,**

Summary for Pond 3A: Forebay 3A

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	203.00'	238 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
203.00	139	0	0	139
204.00	354	238	238	361

Summary for Pond 3B: Forebay 3B

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	203.00'	220 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
203.00	135	0	0	135
204.00	317	220	220	324

Summary for Pond 4A: Forebay 4A

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	204.00'	670 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
204.00	95	0	0	95
205.00	331	201	201	336
206.00	623	469	670	638

Summary for Pond 4B: Forebay 4B

[43] Hint: Has no inflow (Outflow=Zero)

Volume	Invert	Avail.Storage	Storage Description
#1	204.00'	670 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
204.00	95	0	0	95
205.00	331	201	201	336
206.00	623	469	670	638

Summary for Pond DET-3: DET-3

[87] Warning: Oscillations may require smaller dt or Finer Routing (severity=61)

Inflow Area = 0.976 ac, 49.64% Impervious, Inflow Depth > 4.52" for 100-Year event
Inflow = 5.02 cfs @ 12.09 hrs, Volume= 0.368 af
Outflow = 1.78 cfs @ 12.37 hrs, Volume= 0.368 af, Atten= 64%, Lag= 16.9 min
Discarded = 0.75 cfs @ 12.37 hrs, Volume= 0.316 af
Primary = 1.04 cfs @ 12.37 hrs, Volume= 0.052 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 204.88' @ 12.37 hrs Surf.Area= 3,902 sf Storage= 4,499 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 44.4 min (851.1 - 806.7)

Volume	Invert	Avail.Storage	Storage Description
#1	203.00'	4,982 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
203.00	1,527	0	0	1,527
204.00	2,195	1,851	1,851	2,212
205.00	4,171	3,131	4,982	4,198

Device	Routing	Invert	Outlet Devices
#1	Discarded	203.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	201.80'	**8.0" Round Culvert** L= 144.0' RCP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 201.80' / 200.35' S= 0.0101 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.35 sf
#3	Device 2	204.50'	**8.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Discarded OutFlow Max=0.75 cfs @ 12.37 hrs HW=204.88' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.75 cfs)

Primary OutFlow Max=1.03 cfs @ 12.37 hrs HW=204.88' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Passes 1.03 cfs of 2.23 cfs potential flow)
└**3=Orifice/Grate** (Orifice Controls 1.03 cfs @ 2.96 fps)

Summary for Pond DET-4: DET-4

Inflow Area = 1.233 ac, 59.50% Impervious, Inflow Depth > 4.96" for 100-Year event
Inflow = 6.84 cfs @ 12.09 hrs, Volume= 0.510 af
Outflow = 5.59 cfs @ 12.14 hrs, Volume= 0.510 af, Atten= 18%, Lag= 3.2 min
Discarded = 0.71 cfs @ 12.15 hrs, Volume= 0.369 af
Primary = 4.88 cfs @ 12.14 hrs, Volume= 0.141 af

Routing by Dyn-Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs
Peak Elev= 205.65' @ 12.15 hrs Surf.Area= 3,721 sf Storage= 4,002 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 32.8 min (829.0 - 796.2)

Volume	Invert	Avail.Storage	Storage Description
#1	204.00'	5,452 cf	**Custom Stage Data (Conic)**Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
204.00	1,696	0	0	1,696
205.00	2,391	2,034	2,034	2,409
206.00	4,562	3,419	5,452	4,590

Device	Routing	Invert	Outlet Devices
#1	Discarded	204.00'	**8.270 in/hr Exfiltration over Surface area**
#2	Primary	203.49'	**12.0" Round Culvert** L= 353.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 203.49' / 199.75' S= 0.0106 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#3	Device 2	205.30'	**24.0" x 24.0" Horiz. Orifice/Grate** C= 0.600

Limited to weir flow at low heads

Discarded OutFlow Max=0.71 cfs @ 12.15 hrs HW=205.65' (Free Discharge)
└**1=Exfiltration** (Exfiltration Controls 0.71 cfs)

Primary OutFlow Max=4.86 cfs @ 12.14 hrs HW=205.64' TW=0.00' (Dynamic Tailwater)
└**2=Culvert** (Inlet Controls 4.86 cfs @ 6.19 fps)
└**3=Orifice/Grate** (Passes 4.86 cfs of 5.30 cfs potential flow)

Summary for Link DP-1: DP-1

Inflow Area = 4.614 ac, 56.01% Impervious, Inflow Depth > 3.03" for 100-Year event
Inflow = 17.80 cfs @ 12.11 hrs, Volume= 1.166 af
Primary = 17.80 cfs @ 12.11 hrs, Volume= 1.166 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link DP-2: DP-1

Inflow Area = 0.128 ac, 0.00% Impervious, Inflow Depth > 2.87" for 100-Year event
Inflow = 0.42 cfs @ 12.10 hrs, Volume= 0.031 af
Primary = 0.42 cfs @ 12.10 hrs, Volume= 0.031 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

Summary for Link TOTAL: TOTAL

Inflow Area = 4.742 ac, 54.50% Impervious, Inflow Depth > 3.03" for 100-Year event
Inflow = 18.21 cfs @ 12.11 hrs, Volume= 1.196 af
Primary = 18.21 cfs @ 12.11 hrs, Volume= 1.196 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-24.00 hrs, dt= 0.05 hrs

APPENDIX B: Soil Map & Classifications
Web Soil Survey, USDA, NRCS

Butler Elementary School
Avon, MA
1983

Custom Soil Resource Report
Soil Map

Map Scale: 1:2,730 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 40 80 160 240

Feet: 0 100 200 400 600

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:25,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Norfolk and Suffolk Counties, Massachusetts
Survey Area Data: Version 15, Sep 12, 2019

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 31, 2019—Sep 24, 2019

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
31A	Walpole sandy loam, 0 to 3 percent slopes	0.4	1.6%
254B	Merrimac fine sandy loam, 3 to 8 percent slopes	7.7	28.8%
260B	Sudbury fine sandy loam, 2 to 8 percent slopes	16.4	61.7%
422B	Canton fine sandy loam, 0 to 8 percent slopes, extremely stony	1.9	7.2%
653	Udorthents, sandy	0.2	0.7%
Totals for Area of Interest		**26.7**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Norfolk and Suffolk Counties, Massachusetts

31A—Walpole sandy loam, 0 to 3 percent slopes

Map Unit Setting

National map unit symbol: 2svkl
Elevation: 0 to 1,020 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: Not prime farmland

Map Unit Composition

Walpole and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Walpole

Setting

Landform: Deltas, outwash terraces, depressions, outwash plains, depressions
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, talf, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy glaciofluvial deposits derived from igneous, metamorphic and sedimentary rock

Typical profile

Oe - 0 to 1 inches: mucky peat
A - 1 to 7 inches: sandy loam
Bg - 7 to 21 inches: sandy loam
BC - 21 to 25 inches: gravelly sandy loam
C - 25 to 65 inches: very gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: About 0 to 4 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Sudbury

Percent of map unit: 10 percent
Landform: Deltas, outwash plains, terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Scarboro

Percent of map unit: 10 percent
Landform: Outwash terraces, deltas, outwash plains
Landform position (two-dimensional): Toeslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

254B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyqs
Elevation: 0 to 1,290 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Merrimac and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Merrimac

Setting

Landform: Kames, eskers, outwash terraces, moraines, outwash plains
Landform position (two-dimensional): Backslope, footslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam
Bw1 - 10 to 22 inches: fine sandy loam

Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand
2C - 26 to 65 inches: stratified gravel to very gravelly sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline (0.0 to 1.4 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 1.0
Available water storage in profile: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Hydric soil rating: No

Minor Components

Hinckley

Percent of map unit: 5 percent
Landform: Eskers, deltas, outwash plains, kames
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest, head slope, rise
Down-slope shape: Convex
Across-slope shape: Convex, linear
Hydric soil rating: No

Sudbury

Percent of map unit: 5 percent
Landform: Terraces, deltas, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Windsor

Percent of map unit: 3 percent
Landform: Dunes, deltas, outwash terraces, outwash plains
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

Agawam

Percent of map unit: 2 percent

Landform: Moraines, outwash plains, kames, stream terraces, eskers, outwash terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

260B—Sudbury fine sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: vky4
Elevation: 0 to 2,100 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sudbury and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sudbury

Setting

Landform: Outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Friable coarse-loamy eolian deposits over loose sandy glaciofluvial deposits

Typical profile

H1 - 0 to 11 inches: sandy loam
H2 - 11 to 22 inches: sandy loam
H3 - 22 to 60 inches: gravelly coarse sand

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 18 to 36 inches to strongly contrasting textural stratification
Natural drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Merrimac

Percent of map unit: 5 percent
Hydric soil rating: No

Deerfield

Percent of map unit: 5 percent
Landform: Outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: No

Walpole

Percent of map unit: 5 percent
Landform: Terraces
Hydric soil rating: Yes

422B—Canton fine sandy loam, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w818
Elevation: 0 to 1,180 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton, extremely stony, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Extremely Stony

Setting

Landform: Moraines, ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest, nose slope
Down-slope shape: Convex, linear
Across-slope shape: Convex

Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 5 inches: fine sandy loam
Bw1 - 5 to 16 inches: fine sandy loam
Bw2 - 16 to 22 inches: gravelly fine sandy loam
2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 0 to 8 percent
Percent of area covered with surface fragments: 9.0 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water storage in profile: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Scituate, extremely stony

Percent of map unit: 6 percent
Landform: Drumlins, ground moraines, hills
Landform position (two-dimensional): Footslope, backslope, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Charlton, extremely stony

Percent of map unit: 6 percent
Landform: Hills, ridges, ground moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Montauk, extremely stony

Percent of map unit: 4 percent
Landform: Recessionial moraines, hills, drumlins, ground moraines
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex

Across-slope shape: Convex
Hydric soil rating: No

Swansea

Percent of map unit: 4 percent
Landform: Marshes, swamps, kettles, bogs, depressions
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

653—Udorthents, sandy

Map Unit Setting

National map unit symbol: vky8
Elevation: 0 to 3,000 feet
Mean annual precipitation: 45 to 54 inches
Mean annual air temperature: 43 to 54 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Tread, riser
Down-slope shape: Linear, convex
Across-slope shape: Linear, convex
Parent material: Excavated and filled sandy glaciofluvial deposits

Typical profile

H1 - 0 to 6 inches: variable
H2 - 6 to 60 inches: variable

Properties and qualities

Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to very high (0.06 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: A
Hydric soil rating: Unranked

Minor Components

Udorthents
Percent of map unit: 8 percent
Hydric soil rating: Unranked

Urban land
Percent of map unit: 5 percent
Hydric soil rating: Unranked

Swansea
Percent of map unit: 2 percent
Landform: Bogs
Hydric soil rating: Yes

APPENDIX C: Stormwater Standards

Standard 8: Construction Period Pollution Prevention Plan
Standard 9: Long Term Operation & Maintenance Plan
Standard 10: Illicit Discharge Statement

STANDARD #8

CONSTRUCTION PERIOD POLLUTION PREVENTION AND SEDIMENTATION EROSION CONTROL PLAN

RALPH D. BUTLER ELEMENTARY SCHOOL
AVON, MASSACHUSETTS

I. INTRODUCTION

The maintenance program below provides for a general construction plan with specific requirements for the **Ralph D. Butler Elementary School Parking Improvement Plan** project and stormwater management controls. The program is based on the recommended standards presented in the DEP Stormwater Management Policy Handbook dated February 2008.

II. RESPONSIBILITY AND IMPLEMENTATION

The implementation and execution of this maintenance program shall be the responsibility of the construction period contractor.

Construction activities shall conform to the approved project construction plans referenced below and any other regulations or requirements of the Town of Avon. Mulch filter tubes and silt fence shall be installed prior to construction. All sediment controls shall be in place before construction shall begin and shall be properly maintained throughout the course of construction. During construction, silt laden runoff shall not be permitted.

All BMPs and sediment controls shall be inspected, by the contractor, on a weekly basis and within 24 hours of a rain event that generates more than ½" of rain in a 24 hour period.

Should any dewatering activities be required, the contractor shall make certain that the all pumped water is free of sediment prior to discharging. The methods for removing any sediment shall be approved by the Town prior to any dewatering activities commence.

III. MAINTENANCE AND INSPECTION SCHEDULE

Maintenance of Stormwater BMP's

The following temporary and permanent erosion and sediment control BMP's are to be implemented in the stormwater management system and shall be monitored and maintained to assure continuous and effective performance. All inspections shall be conducted in accordance with the required schedule indicated below. Maintenance and repair shall be performed as required or if the effectiveness of the BMP is diminished.

A. Catch Basins with Deep Sumps

Each catch basin shall be protected with silt sacks and stone, as shown on the details contained in the project plan set referenced below. All accumulated sediment, debris, etc., should be removed as necessary. All sediment and debris removed from the silt sacks or catch basins shall be properly handled and disposed of in accordance with local, state, and federal guidelines and regulations. Catch basins with deep sumps should also be inspected on a monthly basis.

Any required maintenance or repairs noted during the inspection should be addressed immediately.

B. Compost Sock & Orange Construction Fence

Compost Socks shall be installed per project plan set referenced below and should be inspected regularly, as well as after each rainfall event, to ensure that they are intact and the area behind the tube is not filled with sediment. If there is excessive ponding behind the sock or accumulated sediments reach the top of the sock, an additional sock should be added on top or in front of the existing filter sock in these areas, without disturbing the soil or accumulated sediment. If the compost sock tube was overtopped during a storm event, the operator should consider installing an additional compost sock on top of the original, placing an additional compost sock further up the slope, or using an additional BMP, such as a compost blanket in conjunction with the tube(s). Construction fence shall be inspected regularly and torn or damaged sections repaired immediately.

Maintenance requires the removal of sediment before it has accumulated to one-half of the above ground height of any perimeter control

C. Surface Stabilization

The surface of all disturbed areas shall be stabilized during and after construction. Temporary measures shall be taken during construction to prevent erosion and siltation. All disturbed slopes will be stabilized with a permanent vegetative cover. Some or all of the following measures will be utilized on this project as conditions may warrant.

a. Temporary seeding (perform weekly if establishment is less than 80%)
b. Temporary mulching
c. Permanent seeding (perform weekly if establishment is less than 80%)
d. Placement of sod
e. Hydroseeding
f. Placement of Hay
g. Placement of Jute Netting

D. Preserve Natural Vegetation and Buffer Zones

Inspect limit of disturbance boundary for encroachment and Injury/exposure of tree roots. Inspections shall be conducted daily.

E. Dust Control

Apply/re-apply dust control measures to minimize dust from the site. Dust control activities shall be performed daily during dry weather

Inspection Requirements

All temporary and permanent erosion and sediment controls shall be inspected by qualified personnel. Inspection Technician shall assess the conditions of the site, the effectiveness of any erosion and sediment controls and provide recommendations and directions to ensure effective control of stormwater runoff, and suitable water quality discharge from construction activity.

Inspections shall include the entire area within the limit of disturbance of construction activity and stockpile/staging areas. A report shall be prepared identifying all areas of erosion, sediment accumulation, the condition and of all BMP's (structural and non-structural) and identify those in need of repair.

Maintenance

The site contractor is responsible for the installation and maintenance of all construction period erosion and sedimentation controls and BMP's. Prior to acceptance and approval of the completed stormwater management system, the entire system shall be inspected and cleaned in order to ensure the system will function as designed.

If it is observed through the course of construction that modifications to the system are necessary to provide proper treatment the work shall be performed prior to the next storm event.

IV. REFERENCES

- Plan Set: Ralph D. Butler Elementary School, 1 Patrick Clark Drive, Avon, Massachusetts, Parking Improvement Plan. Plans prepared by GCG Associates, Inc. and dated June 18, 2020.

STANDARD #9

STORMWATER AND DRAINAGE OPERATION AND MAINTENANCE PLAN

RALPH D. BUTLER ELEMENTARY SCHOOL
AVON, MASSACHUSETTS

I. INTRODUCTION

The maintenance program below provides for a general construction plan with specific requirements for the **Ralph D. Butler Elementary School Parking Improvement Plan** project and stormwater management controls. The program is based on the recommended standards presented in the DEP Stormwater Management Policy Handbook dated February 2008 and DEP Snow Disposal Guidance, dated December 21, 2015.

II. RESPONSIBILITY AND IMPLEMENTATION

Owner/Operator: Avon Public Schools
Central Office
Patrick Clark Drive
Avon, MA 02322

Owner Signature:_____ Date:_____

The property owner is the owner of all components of the drainage system as listed in Section III below, until property ownership is transferred, at which the drainage system becomes the property of the successive owner. The implementation, execution, and financing of this maintenance program and emergency repairs shall be the responsibility of the property owner until property ownership is transferred, at which time maintenance and repairs shall be the responsibility of the successive owner.

III. MAINTENANCE AND INSPECTION SCHEDULE

A. Catch Basin With Deep Sump System and Drainage Manhole

Catch basins with deep sumps and drainage manholes should be inspected four (4) times per year and after every major storm event. All accumulated sediment, debris, organic matter, etc., should be removed during this time. All sediment and debris removed from the catch basins should be properly handled and disposed of in accordance with local, state, and federal guidelines and regulations. Any required maintenance or repairs noted during the inspection should be addressed immediately. During each inspection, the drains should be inspected for evidence of clogging, and if necessary, any maintenance shall be performed so that it functions as designed. The catch basin shall be cleaned twice per year, and when sediment in the bottom of the sump reaches 24 inches below the bottom of the outlet pipe. At a minimum, inspection of the catch basin shall be performed during the last week of April and the first week of October each year.

B. Water Quality Structure (Stormceptor)

The performance of all stormwater quality measures decrease as they fill with sediment. Although the maintenance frequency will be site specific, SSR Hydro Conduit generally recommends annual maintenance be performed when the sediment volume in the unit reaches 15% of the total storage. Oil is removed through the inspection/ cleanout pipe and sediment is removed through the outlet riser pipe. Alternatively, oil could be removed from the outlet riser pipe if water is removed from the treatment chamber, lowering the oil level below the drop pipes. In the event of any hazardous material spill, CSR Hydro Conduit recommends maintenance be performed immediately. Maintenance should be performed by a licensed liquid waste hauler. Recharge Systems shall adhere to the following maintenance schedule:

- Vacuum truck stormceptor cleaning Annually

Maintenance shall be performed by the Vacuum Service Industry, a well-established sector of the service industry that cleans underground tanks, sewers, and catch basins. Costs to clean a stormceptor will vary based on the size of the unit and transportation distances.

The requirements for the disposal of material from a Stormceptor are similar to that of any other Best Management Practices (BMP's). Local guidelines should be consulted prior to disposal of the separator contents. In most areas the sediment, once dewatered, can be disposed of in a sanitary landfill. It is not anticipated that the sediment would be classified as a hazardous waste. In some areas, mixing the water with the sediment will create a slurry that can be discharged into a trunk sanitary sewer. In all disposal options, approval from the disposal facility agency is required. Petroleum waste products collected I stormceptor (oil/ chemical/ fuel spills) should be removed by a licensed waste management company.

C. Sediment Forebay (Infiltration Basin Pre-Treatment Area)

The sediment forebays shall be inspected after every major storm event during the first three months following construction and monthly thereafter. Clean the sediment four times per year and when the sediment depth reaches 1/3 of the sump. All sediment removed should be properly handled and disposed of in accordance with local, state, and federal guidelines and regulations. Forebay should be mowed at least twice per year during growth season, keep the grass height no greater than 6 inches. Set mower blades no lower than 3 to 4 inches. Check for signs of rilling and gullying and repair as needed.

D. Infiltration Basin

Preventative maintenance, twice a year; Inspect after every major storm during first 3 months of operation and twice a year thereafter and when there are discharges through the high outlet orifice. Twice a year, mow the buffer area, side slopes, and basin bottom if grassed floor; rake if stone bottom; remove trash and debris; remove grass clippings and accumulated organic matter. Inspect and clean pretreatment devices every other month recommended and at least twice a year and after every major storm event.

Inspect infiltration basin after every major storm for the first few months to ensure it is stabilized and functioning properly and if necessary take corrective action. Note how long water remains standing in the basin after a storm; standing water within the basin 48 to 72 hours after a storm indicates that the infiltration capacity may have been overestimated. If the ponding is due to clogging, immediately address the reasons for the clogging (such as upland sediment erosion, excessive compaction of soils, or low spots).Thereafter, inspect the infiltration basin at least twice per year. Important items to check during the inspection include: Signs of differential settlement; Cracking; Erosion; Leakage in the embankments; Tree growth on the embankments;

Condition of riprap; Sediment accumulation and the health of the turf. At least twice a year, mow the buffer area, side slopes, and basin bottom. Remove grass clippings and accumulated organic matter to prevent an impervious organic mat from forming. Remove trash and debris at the same time. Use deep tilling to break up clogged surfaces, and revegetate immediately. Remove sediment from the basin as necessary, but wait until the floor of the basin is thoroughly dry. Use light equipment to remove the top layer so as to not compact the underlying soil. Deeply till the remaining soil, and revegetate as soon as possible. Inspect and clean pretreatment devices associated with basins at least twice a year, and ideally every other month.

E. Rip-Rap

It is recommended that dumped rip-rap be inspected monthly and cleaned two times per year. Excessive sediment and debris should be removed as necessary and should typically be done after the street has been swept of sediment accumulated debris from winter sanding operations. Barren areas or eroded areas in should be repaired immediately. All sediment removed should be handled properly and disposed of in accordance with local, state, and federal guidelines and regulations.

F. Grassed Slope

Grassed slope area adjacent to the roadway (where possible) should be mowed weekly between the months of May to September and a minimum of once per year in March or early April. Regular maintenance tasks include mowing, fertilizing, watering, pruning, weeding, and pest control. Maintain an average grass height of 4-6 inches to maintain the depth necessary to serve as a conveyance. Re-seed periodically to maintain the dense growth of grass vegetation.

G. Street Sweeping

Driveway, associated parking areas, and sidewalks adjacent to the roadway (where possible) should be swept by a street sweeper a minimum of twice per year. Street sweeping four times per year is recommended. Vacuum street sweepers are recommended.

H. Snow Storage Areas

All sidewalks and walkways shall remain clear from snow. Snow shall be stored in proposed locations shown on site. In the event of excessive snowfall, snow shall be plowed and temporarily stored in identified snow storage 'temporary' location and removed from site. Snow stored on-site within identified 'temporary' locations shall be limited to 10 days prior to removal. Snow storage areas shall be raked and inspected each spring and hydroseeded as necessary in addition to regular landscaping maintenance. Debris shall be cleared from the site and properly disposed of no later than May 15. Snow storage location within wetland buffer zone shall be revegetated with a hydroseed mix consisting of 50% or greater annual mix to speed vegetative growth.

IV. YEARLY MAINTENANCE BUDGET

Activity	Cost	Frequency/year	Total
A. Catch Basins	$500.00	2	$1,000.00
B. Stormceptor	$600.00	1	$600.00
C. Sediment Forebay	$250.00	4	$1,000.00
D. Infiltration Basin	$300.00	2	$600.00
E. Rip-Rap Cleaning	$100.00	2	$200.00
F. Grassed Slope Mowing	$50.00	3	$150.00
G. Street Sweeping	$300.00	2	$600.00

H. Snow Store Areas	$200.00	1	$200.00
		Total =	$4,350.00

V. REFERENCES

- Plan Set: Ralph D. Butler Elementary School, 1 Patrick Clark Drive, Avon, Massachusetts, Parking Improvement Plan. Plans prepared by GCG Associates, Inc. and dated June 18, 2020.

- Long Term Operation And Maintenance Plan, Butler Elementary School, Avon, MA Scale 1"=60', Dated: June 18, 2020.

NAD-83

SOUTH STREET

PATRICK CLARK DRIVE

#208

#186

#160

#156

#7

#1

4" MAINTENANCE DRAIN PIPE AND VALVE

INFILTRATION BASIN 4

SEDIMENT FOREBAY

RIP-RAP OVERFLOW

DCS

STONE LEVEL SPREADER

12" DRAIN

SNOW STORAGE

SEDIMENT FOREBAY

EMERGENCY OVERFLOW

DMH

INFILTRATION BASIN 3

8" DRAIN

RIP-RAP OVERFLOW

DCS

STONE LEVEL SPREADER

4" MAINTENANCE DRAIN PIPE AND VALVE

8" DRAIN

CB

12" DRAIN

DMH

12" DRAIN

CB

DMH

RALPH D. BUTLER ELEMENTARY SCHOOL

15" DRAIN

DMH

CB

WATER QUALITY DEVICE

15" DRAIN

HEADWALL

MULCH

GCG ASSOCIATES,INC. 84 MAIN STREET WILMINGTON, MASSACHUSETTS (978) 657-9714	**LONG TERM OPERATION AND MAINTENANCE PLAN** BUTLER ELEMENTARY SCHOOL AVON MA Plan Ref.	60 0 30 60 Scale: 1" = 60' SCALE IN FEET Date: JUNE 18, 2020 Rev: _____ **OM-1**

STANDARD #10

STORMWATER AND DRAINAGE
ILLICIT DISCHARGE STATEMENT

RALPH D. BUTLER ELEMENTARY SCHOOL
AVON, MASSACHUSETTS

All illicit discharges to the stormwater management system are prohibited.

I. STATEMENT

This site as shown on the plan titled "RALPH D. BUTLER ELEMENTARY SCHOOL, 1 PATRICK CLARK DRIVE, AVON, MASSACHUSETTS, PARKING IMPROVEMENT PLANS, dated June 18, 2020." does not contain any illicit discharges, this was confirmed using visual screening as required by standard 10 of the "Massachusetts Stormwater Handbook" Vol. 1, Ch. 1 page 25. The project proponent, owner, or lessee (in perpetuity) must comply with local, state, and federal regulations for the discharge of illicit discharges from the site. Illicit discharges are discharges that are not entirely comprised of storm water. Notwithstanding the foregoing, an illicit discharge does not include discharges from the following activities:

- Fire fighting
- Water line flushing
- Landscape irrigation
- Uncontaminated ground water
- Potable water sources
- Foundation drains
- Air conditioning condensation
- Footing drains
- Individual car washing
- Water used for street washing and water used to clean residential buildings without detergents

The project proponent, owner, or lessee (in perpetuity) shall adhere to this report on file with the Town of Avon.

FIGURES: Watershed Plans

Pre-Development Watershed Plan
Post-Development Watershed Plan

Butler Elementary School
Avon, MA
1983

SOUTH STREET

SOUTH STREET SIDELINE

PATRICK CLARK DRIVE

RALPH D. BUTLER ELEMENTARY SCHOOL

PRE-1

PRE-2

#210 — N/F JAMES V., JR. & CLAIRE A. FICARRA LCC 72231 210 SOUTH STREET MAP C3 BLOCK 2 LOT 12

#208 — N/F JOHN & JEANNINE IERARDI LCC 173634 208 SOUTH STREET MAP C3 BLOCK 2 LOT 11

#186 — N/F GEORGE J. & JUSTINA A. LEURINI LCC 123873 186 SOUTH STREET MAP C3 BLOCK 2 LOT 10

#160 — N/F PAUL E. & LAURA A. MCCARTHY LCC 191789 160 SOUTH STREET MAP C3 BLOCK 2 LOT 9

N/F TOWN OF AVON BOOK/PAGE 37251/312 144 & 146 SOUTH STREET MAP C3 BLOCK 2 LOT 7 & 8

N/F SHARON A. & PAUL A. KONOWICZ AND NICHOLAS S. CELIA BOOK/PAGE 31517/20 3 LEO'S LANE MAP C3 BLOCK 2 LOT 5

N/F CHARLES M. & JOYCE ZYMARIS BOOK/PAGE 7090/76 7 LEO'S LANE MAP C3 BLOCK 2 LOT 3

#1 — RALPH D. BUTLER ELEMENTARY SCHOOL

#5

#7

"AVON COMMUNITY OF CHRIST"

"BUTLER ELEMENTARY SCHOOL"

"AVON PUBLIC SCHOOLS"

TENNIS COURT

BIT PARKING

TEST PIT MOVED TO ACTUAL TEST LOCATION 3/13/2020

50' WATER & FOOT PATH EASEMENT

LINE OF EASEMENT

PROPERTY LINE

APPROXIMATE PROPERTY LINE

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

PRE-DEVELOPMENT WATERSHED PLAN

RALPH D. BUTLER ELEMENTARY SCHOOL
AVON, MASSACHUSETTS
NORFOLK COUNTY

GCG ASSOCIATES, INC.
WILMINGTON MASSACHUSETTS

SCALE: 1" = 30' DATE: JUNE 18, 2020

JOB NO.\FILE NAME: 1983-DESIGN-1

DESIGNED BY: J.P.G.
DRAWN BY: W.R.H.
CHECKED BY: M.J.C.

PLAN NO. 1 OF 2

Tab: WATERSHED-PRE Plot Style: GCG2010-COLOR.ctb Plotted By: John Gerhardt

1983-DESIGN-1.dwg Saved: 6/15/2020 3:42 PM Plotted: Jun 15, 2020 4:02 pm

SOUTH STREET

SOUTH STREET SIDELINE

PATRICK CLARK DRIVE

N/F
JAMES V., JR. &
CLAIRE A. FICARRA
LCC 72231
210 SOUTH STREET
MAP C3 BLOCK 2 LOT 12

N/F
JOHN & JEANNINE IERARDI
LCC 173634
208 SOUTH STREET
MAP C3 BLOCK 2 LOT 11

N/F
GEORGE J. & JUSTINA A. LEURINI
LCC 123873
186 SOUTH STREET
MAP C3 BLOCK 2 LOT 10

N/F
PAUL E. & LAURA A. MCCARTHY
LCC 191789
160 SOUTH STREET
MAP C3 BLOCK 2 LOT 9

N/F
TOWN OF AVON
BOOK/PAGE 37251/312
144 & 156 SOUTH STREET
MAP C3 BLOCK 2 LOT 4 & 6

N/F
SHARON A. & PAUL A. KONOWICZ
AND NICHOLAS S. CELIA
BOOK/PAGE 31517/20
3 LEO'S LANE
MAP C3 BLOCK 2 LOT 5

N/F
CHARLES M. & JOYCE ZYMARIS
BOOK/PAGE 7090/76
7 LEO'S LANE
MAP C3 BLOCK 2 LOT 3

RALPH D. BUTLER ELEMENTARY SCHOOL

"BUTLER ELEMENTARY SCHOOL"

"AVON PUBLIC SCHOOLS"

POST-1

POST-2

POST-3

POST-4

INFILTRATION BASIN 3

INFILTRATION BASIN 4

TEMPORARY CRUSHED STONE CONSTRUCTION VEHICLE ENTRANCE/EXIT

SAWCUT EXISTING PAVEMENT

INSTALL SILT SACK IN CB

LIMIT OF WORK (TYP.)

LIMIT OF WORK

EROSION CONTROL FILTER TUBE (TYP.)

PROPOSED TREE LINE

10' WIDE ACCESS PATH

4:1 SLOPE

3:1 SLOPE

SEDIMENT FOREBAY

STONE LEVEL SPREADER

RIP-RAP OVERFLOW ELEV.=205.20

RIP-RAP OVERFLOW ELEV.=204.00

4"MAINTENANCE DRAIN PIPE AND VALVE INV=203.50

MAINTENANCE DRAIN PIPE AND VALVE INV=202.50

DCS RIM=205.30 INV=203.49

DCS OVERFLOW GRATE=204.5 INV=201.8(OUT)

CONVERT TO DMH RIM=206.8 8" CORE INV=200.35

8" HDPE S=0.01 FT/FT

12" HDPE S=0.01 FT/FT

TC 206.00 BC 205.50

TC 206.15 BC 205.82 NO CURB

HIGH POINT ELEV=207.3

HIGH POINT RIDGE LINE ELEV=207.5

REM. & RESET HYDRANT

REM. & RESET LIGHT

REM. & REPLACE FRAME AND GRATE ADJUST RIM TO 204.50

REM. FRAME AND GRATE REPLACE WITH NEW FRAME & SOLID COVER ADJUST RIM TO

REM. CB

CONVERT CB TO DMH NEW FRAME & COVER RIM=204.26 INV=199.94

CB RIM=204.06 INV=199.86

CB RIM=203.60 INV=197.60

DMH RIM=203.70 INV=196.30

12" RCP

12" HDPE DRAIN

WATER QUALITY DEVICE RIM=204.00 INV=196.25(IN) INV=196.17(OUT)

EXISTING HEADWALL INV=195.66

EXISTING BUILDINGS TO BE RAZED BY OTHERS

SAWCUT EXISTING PAVEMENT

LINE OF EASEMENT

50' WATER & FOOT PATH EASEMENT

PROPERTY LINE

LINE OF

NO CURB

NO PARKING

NO IDLING

ONE WAY

CHILDREN AT PLAY

STOP

H-RAMP

TRANSFORMER PAD

LOADING DOCK

DUMPSTER

BIT PARKING

BIT WALK

BIT DRIVE

GRASS

SHED

CONC. WALK

CROSSWALK

GRAVEL DRIVE

TENNIS COURT

CONC. PAD

TREELINE

HEDGE ROW

WOODEN FENCE

6" CLAY PIPE

10" CLAY

12" CLAY

GRAPHIC SCALE

30 0 15 30 60 120

(IN FEET)
1 inch = 30 ft.

POST-DEVELOPMENT WATERSHED PLAN

RALPH D. BUTLER ELEMENTARY SCHOOL
AVON, MASSACHUSETTS
NORFOLK COUNTY

GCG ASSOCIATES, INC.
WILMINGTON MASSACHUSETTS

SCALE: 1" = 30' DATE: JUNE 18, 2020

JOB NO.\FILE NAME: 1983-DESIGN-1

DESIGNED BY: J.P.G.
DRAWN BY: W.R.H.
CHECKED BY: M.J.C.

PLAN NO. 2 OF 2

Tab: WATERSHED-POST Plot Style: GCG-2018-COLOR.ctb Plotted By: John Gerhard

1983-DESIGN-1.dwg Saved: 6/15/2020 3:42 PM Plotted: Jun 15, 2020 4:02 pm