DC ENGINEERING & SURVEY INC.
CHARLTON, MA
508-769-6659
508-341-2127

STORMWATER DRAINAGE ANALYSIS

Justin Zuffante
Blueberry Lane
Leicester, MA
JOB NUMBER 2021-122

DATE : April 13, 2021

Developer:
Justin Zuffante
140 Spencer Road
Oakham, MA 01068

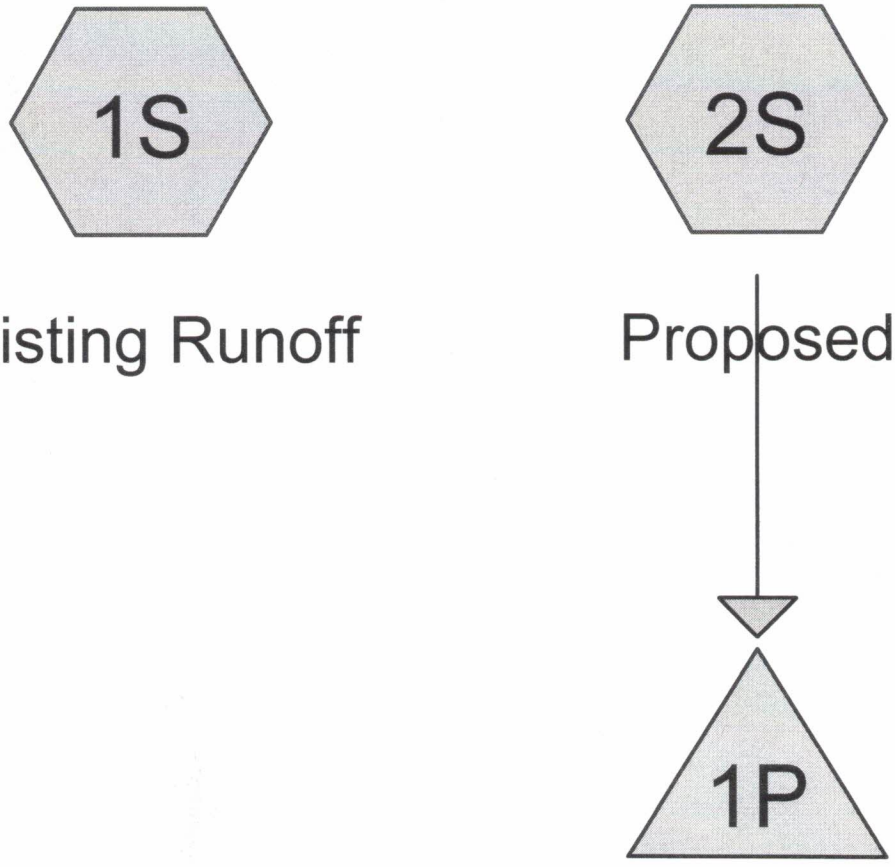
COMMONWEALTH OF MASSACHUSETTS
JASON D DUBOIS CIVIL NO. 48724 REGISTERED

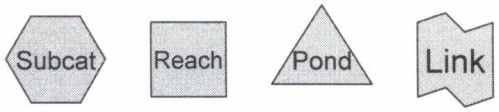
JASON D. DUBOIS, P.E.
MA P.E. LICENSE NO. 48724

SUMMARY

The proposed development will have a decrease in peak rate of runoff for the site. A comparison of the rates of runoff for storms of various return periods are tabulated and presented below.

	Total Runoff to the Eastern Property Line	
Return	Exist.	Prop.
Period	(cfs)	(cfs)
2 yr	0.41	0.40
10 yr	0.94	0.86
25 yr	1.32	1.24
100 yr	2.00	1.97





Routing Diagram for Existing
Prepared by Microsoft, Printed 4/13/2021

Summary for Subcatchment 1S: Existing Runoff

Runoff = 0.41 cfs @ 12.31 hrs, Volume= 0.043 af, Depth> 0.74"

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 2 -yr Rainfall=3.20"

Area (sf)	CN	Description
30,582	70	Woods, Good, HSG C
30,582		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.5	148	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.8	198	Total			

Summary for Subcatchment 2S: Proposed

Runoff = 1.36 cfs @ 12.16 hrs, Volume= 0.109 af, Depth> 1.87"

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 2 -yr Rainfall=3.20"

	Area (sf)	CN	Description
	2,541	70	Woods, Good, HSG C
*	6,600	98	Roof
	12,114	96	Gravel surface, HSG C
	9,327	74	>75% Grass cover, Good, HSG C
	30,582	88	Weighted Average
	23,982		78.42% Pervious Area
	6,600		21.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	27	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	143	0.0100	1.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
11.5	170	Total			

Summary for Pond 1P: Swale

Inflow Area = 0.702 ac, 21.58% Impervious, Inflow Depth > 1.87" for 2 -yr event
Inflow = 1.36 cfs @ 12.16 hrs, Volume= 0.109 af
Outflow = 0.40 cfs @ 12.57 hrs, Volume= 0.100 af, Atten= 70%, Lag= 24.7 min
Primary = 0.40 cfs @ 12.57 hrs, Volume= 0.100 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 1,051.47' @ 12.57 hrs Surf.Area= 4,356 sf Storage= 1,960 cf

Plug-Flow detention time= 93.6 min calculated for 0.100 af (92% of inflow)
Center-of-Mass det. time= 66.2 min (852.0 - 785.8)

Volume	Invert	Avail.Storage	Storage Description
#1	1,051.00'	4,381 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,051.00	4,039	690.0	0	0	4,039
1,052.00	4,732	698.0	4,381	4,381	5,163

Device	Routing	Invert	Outlet Devices
#1	Primary	1,051.00'	**4.0" Round Culvert X 2.00** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 1,051.00' / 1,050.92' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#2	Primary	1,051.50'	**6.0" Round Culvert X 3.00** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 1,051.50' / 1,051.44' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#3	Secondary	1,051.95'	**10.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.40 cfs @ 12.57 hrs HW=1,051.47' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.40 cfs @ 2.30 fps)
└─**2=Culvert** (Controls 0.00 cfs)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=1,051.00' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment 1S: Existing Runoff

Runoff = 0.94 cfs @ 12.29 hrs, Volume= 0.093 af, Depth> 1.59"

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 10-yr Rainfall=4.60"

Area (sf)	CN	Description
30,582	70	Woods, Good, HSG C
30,582		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.5	148	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.8	198	Total			

Summary for Subcatchment 2S: Proposed

Runoff = 2.21 cfs @ 12.16 hrs, Volume= 0.181 af, Depth> 3.10"

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 10-yr Rainfall=4.60"

	Area (sf)	CN	Description
	2,541	70	Woods, Good, HSG C
*	6,600	98	Roof
	12,114	96	Gravel surface, HSG C
	9,327	74	>75% Grass cover, Good, HSG C
	30,582	88	Weighted Average
	23,982		78.42% Pervious Area
	6,600		21.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	27	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	143	0.0100	1.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
11.5	170	Total			

Summary for Pond 1P: Swale

Inflow Area = 0.702 ac, 21.58% Impervious, Inflow Depth > 3.10" for 10-yr event
Inflow = 2.21 cfs @ 12.16 hrs, Volume= 0.181 af
Outflow = 0.86 cfs @ 12.49 hrs, Volume= 0.170 af, Atten= 61%, Lag= 19.6 min
Primary = 0.86 cfs @ 12.49 hrs, Volume= 0.170 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 1,051.70' @ 12.49 hrs Surf.Area= 4,517 sf Storage= 2,985 cf

Plug-Flow detention time= 83.1 min calculated for 0.170 af (94% of inflow)
Center-of-Mass det. time= 61.9 min (835.7 - 773.9)

Volume	Invert	Avail.Storage	Storage Description
#1	1,051.00'	4,381 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,051.00	4,039	690.0	0	0	4,039
1,052.00	4,732	698.0	4,381	4,381	5,163

Device	Routing	Invert	Outlet Devices
#1	Primary	1,051.00'	**4.0" Round Culvert X 2.00** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 1,051.00' / 1,050.92' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#2	Primary	1,051.50'	**6.0" Round Culvert X 3.00** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 1,051.50' / 1,051.44' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#3	Secondary	1,051.95'	**10.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=0.86 cfs @ 12.49 hrs HW=1,051.70' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.58 cfs @ 3.33 fps)
└─**2=Culvert** (Barrel Controls 0.28 cfs @ 1.89 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=1,051.00' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Controls 0.00 cfs)

Summary for Subcatchment 1S: Existing Runoff

Runoff = 1.32 cfs @ 12.28 hrs, Volume= 0.130 af, Depth> 2.22"

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 25-yr Rainfall=5.50"

Area (sf)	CN	Description
30,582	70	Woods, Good, HSG C
30,582		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.5	148	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.8	198	Total			

Summary for Subcatchment 2S: Proposed

Runoff = 2.76 cfs @ 12.16 hrs, Volume= 0.229 af, Depth> 3.91"

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 25-yr Rainfall=5.50"

	Area (sf)	CN	Description
	2,541	70	Woods, Good, HSG C
*	6,600	98	Roof
	12,114	96	Gravel surface, HSG C
	9,327	74	>75% Grass cover, Good, HSG C
	30,582	88	Weighted Average
	23,982		78.42% Pervious Area
	6,600		21.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	27	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	143	0.0100	1.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
11.5	170	Total			

Summary for Pond 1P: Swale

Inflow Area = 0.702 ac, 21.58% Impervious, Inflow Depth > 3.91" for 25-yr event
Inflow = 2.76 cfs @ 12.16 hrs, Volume= 0.229 af
Outflow = 1.24 cfs @ 12.43 hrs, Volume= 0.217 af, Atten= 55%, Lag= 16.5 min
Primary = 1.24 cfs @ 12.43 hrs, Volume= 0.217 af
Secondary = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 1,051.81' @ 12.43 hrs Surf.Area= 4,596 sf Storage= 3,494 cf

Plug-Flow detention time= 77.0 min calculated for 0.217 af (95% of inflow)
Center-of-Mass det. time= 57.6 min (826.0 - 768.3)

Volume	Invert	Avail.Storage	Storage Description
#1	1,051.00'	4,381 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,051.00	4,039	690.0	0	0	4,039
1,052.00	4,732	698.0	4,381	4,381	5,163

Device	Routing	Invert	Outlet Devices
#1	Primary	1,051.00'	**4.0" Round Culvert X 2.00** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 1,051.00' / 1,050.92' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#2	Primary	1,051.50'	**6.0" Round Culvert X 3.00** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 1,051.50' / 1,051.44' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#3	Secondary	1,051.95'	**10.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=1.24 cfs @ 12.43 hrs HW=1,051.81' (Free Discharge)
1=Culvert (Barrel Controls 0.65 cfs @ 3.72 fps)
2=Culvert (Barrel Controls 0.59 cfs @ 2.22 fps)

Secondary OutFlow Max=0.00 cfs @ 5.00 hrs HW=1,051.00' (Free Discharge)
3=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Subcatchment 1S: Existing Runoff

Runoff = 2.00 cfs @ 12.28 hrs, Volume= 0.196 af, Depth> 3.35"

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-yr Rainfall=7.00"

Area (sf)	CN	Description
30,582	70	Woods, Good, HSG C
30,582		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
16.3	50	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
3.5	148	0.0200	0.71		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
19.8	198	Total			

Summary for Subcatchment 2S: Proposed

Runoff = 3.66 cfs @ 12.16 hrs, Volume= 0.309 af, Depth> 5.28"

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-yr Rainfall=7.00"

	Area (sf)	CN	Description
	2,541	70	Woods, Good, HSG C
*	6,600	98	Roof
	12,114	96	Gravel surface, HSG C
	9,327	74	>75% Grass cover, Good, HSG C
	30,582	88	Weighted Average
	23,982		78.42% Pervious Area
	6,600		21.58% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
9.9	27	0.0100	0.05		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 3.20"
1.6	143	0.0100	1.50		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
11.5	170	Total			

Summary for Pond 1P: Swale

Inflow Area = 0.702 ac, 21.58% Impervious, Inflow Depth > 5.28" for 100-yr event
Inflow = 3.66 cfs @ 12.16 hrs, Volume= 0.309 af
Outflow = 1.97 cfs @ 12.37 hrs, Volume= 0.295 af, Atten= 46%, Lag= 12.8 min
Primary = 1.89 cfs @ 12.37 hrs, Volume= 0.295 af
Secondary = 0.08 cfs @ 12.37 hrs, Volume= 0.001 af

Routing by Dyn-Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 1,051.97' @ 12.37 hrs Surf.Area= 4,712 sf Storage= 4,250 cf

Plug-Flow detention time= 68.9 min calculated for 0.294 af (95% of inflow)
Center-of-Mass det. time= 52.1 min (813.8 - 761.7)

Volume	Invert	Avail.Storage	Storage Description
#1	1,051.00'	4,381 cf	**Custom Stage Data (Irregular)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Perim. (feet)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)	Wet.Area (sq-ft)
1,051.00	4,039	690.0	0	0	4,039
1,052.00	4,732	698.0	4,381	4,381	5,163

Device	Routing	Invert	Outlet Devices
#1	Primary	1,051.00'	**4.0" Round Culvert X 2.00** L= 8.0' Ke= 0.500 Inlet / Outlet Invert= 1,051.00' / 1,050.92' S= 0.0100 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 0.09 sf
#2	Primary	1,051.50'	**6.0" Round Culvert X 3.00** L= 6.0' Ke= 0.500 Inlet / Outlet Invert= 1,051.50' / 1,051.44' S= 0.0100 '/' Cc= 0.900 n= 0.010, Flow Area= 0.20 sf
#3	Secondary	1,051.95'	**10.0' long x 8.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.43 2.54 2.70 2.69 2.68 2.68 2.66 2.64 2.64 2.64 2.65 2.65 2.66 2.66 2.68 2.70 2.74

Primary OutFlow Max=1.88 cfs @ 12.37 hrs HW=1,051.97' (Free Discharge)
└─**1=Culvert** (Barrel Controls 0.74 cfs @ 4.23 fps)
└─**2=Culvert** (Barrel Controls 1.15 cfs @ 2.58 fps)

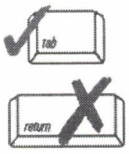
Secondary OutFlow Max=0.07 cfs @ 12.37 hrs HW=1,051.97' (Free Discharge)
└─**3=Broad-Crested Rectangular Weir** (Weir Controls 0.07 cfs @ 0.35 fps)

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.

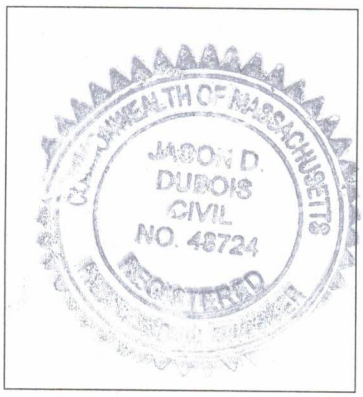
Note: Because stormwater requirements vary from project to project, it is possible that a complete Stormwater Report may not include information on some of the subjects specified in the Checklist. If it is determined that a specific item does not apply to the project under review, please note that the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



4-13-21
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.

Illicit Discharge Compliance Statement
April 13, 2021

This statement is to document that there are no and will be no Illicit Discharges for the Proposed Site Plan located at Blueberry Lane, Leicester, MA operated by Justin Zuffante

Justin Zuffante

4-13-21
Date

Stormwater Operation and Maintenance Plan
& Long-term Pollution Prevention Plan
for
Justin Zuffante

Blueberry Lane
Leicester, MA
Job #2021-122

April 13, 2021

Prepared by

DC Engineering & Survey, Inc.
32 Cranberry Meadow Road
Charlton, MA 01507

Stormwater Operation and Maintenance Plan
for
Justin Zuffante
Blueberry Lane
Leicester, MA

This is an Operation and Maintenance Plan for the Definitive Site plan.

Current Operator:

Justin Zuffante
140 Spencer Road
Oakham, MA 01068

Long term Operator of Stormwater System:

Owner of the site

Stormwater Management Systems

The stormwater management system for the site is as follows:

- Detention Basin
- Drainage Channels

Inspection Schedule

The inspection log shall be completed after every inspection of each component listed below. (See attached Inspection Log sheet)

Detention Basin
Check for sediment accumulation quarterly.

Drainage Channels
Check for sediment annually after the first year. The first year, inspect quarterly for signs of erosion as repair as needed.

Maintenance Procedures

Maintenance log shall be completed after any maintenance is performed on any component listed. (See attached Maintenance Log sheet)

Detention Basin

Inspect to ensure proper functioning after every major storm during first three months of operation and twice a year thereafter. Mow the buffer area, side slopes, and basin bottom floor; remove trash and debris; remove grass clippings and accumulated organic matter twice per year.

Drainage Channels

Mow the channels no lower than 3 to 4 inches above the ground. Mow as needed so that the grass does not exceed 6 inches. Remove grass clippings
Bio-Retention Area
Check vegetation until fully established and seasonal landscaping thereafter. Inspect check dams for accumulation after construction is complete and quarterly thereafter.

Plans:

Plans indicating the location and features of the stormwater management system can be found on the site plan for Justin Zuffante.

Description of Public Safety Features:

All features associated with the stormwater controls are located above ground and are designed with a maximum of 3:1 slopes so should not pose any danger to the public.

Operation and Maintenance Budget:

The owner will have to pay for a service to perform the operation and maintenance described above; therefore the budget is mainly for labor and disposal of sediment collected.

The estimated yearly cost is approximately $500.00

Stormwater Operation and Maintenance Plan
for
Justin Zuffante

Log of Operation and Maintenance Activities

INSPECTION LOG

Date	Inspector	Observations	Action Required

Long-term Pollution Prevention Plan
for
Justin Zuffante
Blueberry Lane
Leicester, MA

This is a Long-term Pollution Prevention Plan for the above-mentioned site.

Current Operator:

Justin Zuffante
140 Main Street
Leicester, MA 01524

Long term Operator of Plan:

Owner of the Site

Good Housekeeping:

Good housekeeping practices, outlined below, will be used on site:
An effort will be made to store only enough products that will be needed.
All materials stored on site will be stored neatly, in their appropriate containers, and, if possible, under a roof or other enclosure.
Products will be kept in their original containers with the original manufacturer's label.
Substances will not be mixed with one another unless recommended by the manufacturer.
Whenever possible, all of a product will be used up before disposing of the container.
Manufacturer's recommendations for proper use and disposal will be followed.

Routine Inspections:

Routine inspections and procedures are outlined in the Stormwater Operation & Maintenance Plan.

Waste Materials:

All waste materials will be collected and stored in a metal dumpster. All trash and debris from the site will be deposited in the dumpsters. Dumpsters will be emptied weekly or more often if necessary, and the trash will be hauled off-site to an approved waste facility. No construction waste materials will be buried on site. All personnel will be instructed regarding the correct procedures for waste disposal. Individual(s) managing day-to-day operations will be responsible for seeing that these procedures are followed.

Hazardous Waste:

All hazardous waste materials will be disposed of in the manner specified by local or state regulation or by the manufacturer. Site personnel will be instructed in these practices and the individual managing day-to-day operations will be responsible for implementing these practices.

Hazardous Materials:

These practices will be used to reduce the risks associated with hazardous materials.

Products will be kept in original containers unless they are not re-sealable.
Original labels and material safety data sheets (MSDS) will be retained; they contain important product information.
Manufacturers' and local and/or state recommended methods for proper disposal of excess materials will be followed.

Spill Control Practices:

In addition to the good housekeeping and material management practices discussed in the previous sections of this plan, the following practices will be used for spill prevention and cleanup:

Manufacturers' recommended methods for spill cleanup will be clearly posted and site personnel will be familiar with the procedures and location of the information and cleanup supplies.

Materials and equipment necessary for spill cleanup will be kept in the material storage area on site. Equipment and materials will include, but not be limited to, brooms, dust pans, mops, rags, gloves, goggles, kitty litter, sand, sawdust, and plastic and metal trash containers specifically for this purpose.

All spills will be cleaned up immediately upon discovery.

Spill areas will be kept well ventilated, and personnel will wear appropriate protective clothing to prevent injury from contact with a hazardous substance.

Spills of toxic or hazardous material will be reported to the appropriate state or local government agency, regardless of the size of the spill.

The spill prevention plan will be adjusted to include measures to prevent this type of spill from re-occurring and how to clean up the spill if there is another one. A description of the spill, what caused it, and the cleanup measures will also be included.

Snow and Ice Management:

Any deicing materials will be stored indoors and used per manufacturer's recommendations. Site personnel will be instructed in these practices and the individual managing day-to-day operations will be responsible for implementing these practices.

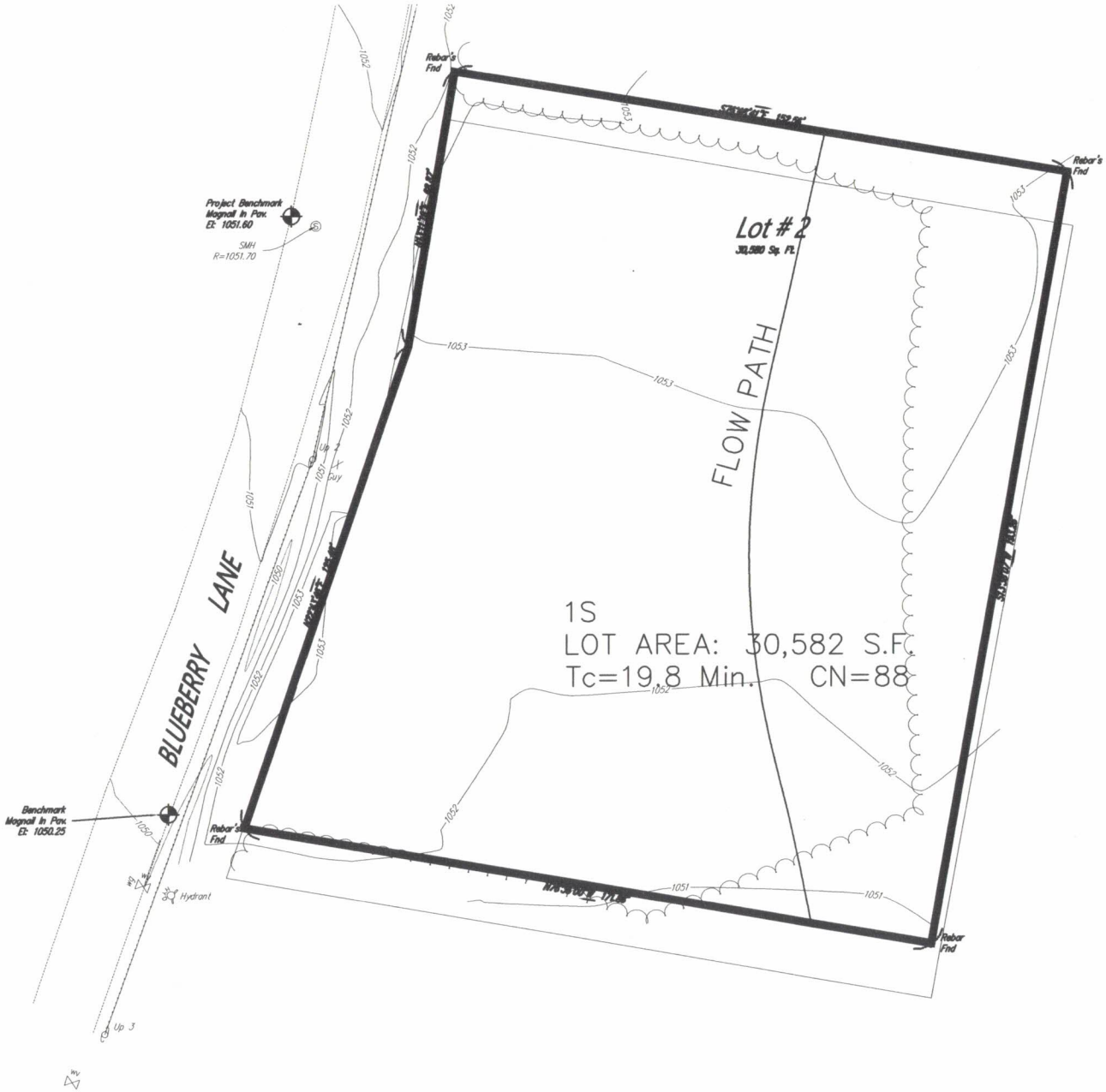
Grass Cutting:

The grass shall be cut to a depth of no less than 3 inches and should be cut as needed during the growing season.

Supporting Plans & Analyses:

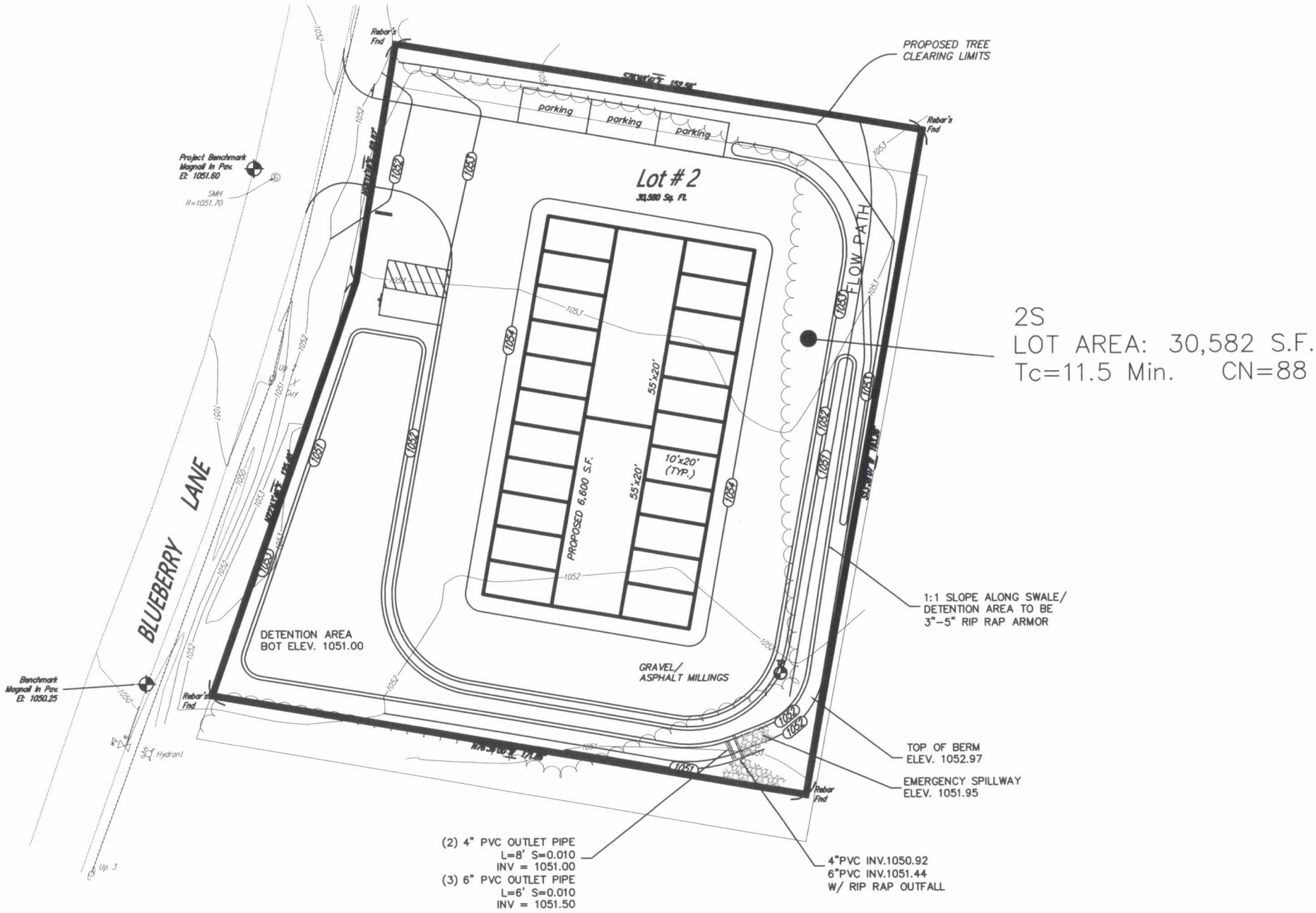
Proposed Site Plan and Detail Drawings

Stormwater Operation and Maintenance Plan, Stormwater Drainage Analysis



EXISTING DRAINAGE PLAN

SCALE: 1"=60'



PROPOSED DRAINAGE PLAN

SCALE: 1"=60'