TOWN OF DURHAM
STORMWATER MANAGEMENT PLAN

REVISED: MARCH 2021

TOOMERFS, LLC
19 MAIN STREET and 21 MAIN STREET
TAX MAP 5, LOTS 1-9, 1-10, 1-15, and 1-16
Durham, New Hampshire

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FOR
TOOMERFS, LLC

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TAX MAP 5, LOTS 1-9, 1-10, 1-15 and 1-16

DURHAM, NEW HAMPSHIRE

OCTOBER 2020
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Project Number 20601

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SECTION 1.0 PROJECT INFORMATION NARRATIVE

1.1 Project Narrative

1.1.1 Project Summary

Toomerfs, LLC intents to develop a parking facility at 19 and 21 Main Street, in Durham, New Hampshire, on Tax Map 5, Lots 1-9, 1-10, 1-15, and 1-16. The parking facility will serve the apartments at the front of the site, as well as providing needed extra parking capacity for the Main Street area. Additionally, the driveway to the site will be reconstructed to improve clearances to the existing buildings.

The parking area will be constructed on a filled pad, supported by an engineered pre-cast retaining wall on the south end of the site. Fill and grading for subgrade preparation will be required to complete the pad improvements. The total disturbance for this work is 79,700 square feet. Stormwater from the parking area will be directed via sheet flow to grass swales leading to catchbasins feeding an underground ADS Stormtech MC4500 chamber system within the fill area. The chambers will allow infiltration into the fill area and to native ground. An overflow structure is provided to control flowrates for larger storm events.

The following table shows the 1-inch storm; 2, 10, 25, 50, and 100 year peak flow rate comparison at the discharge points.

Table 1.0 – 1 Inch; 2, 10, 25, 50, and 100 Year Comparison

Watershed Area Discharge Point	Pre 1 In Flow Rate (cfs)	Post 1 In Flow Rate (cfs)	Pre 2 Yr Flow Rate (cfs)	Post 2 Yr Flow Rate (cfs)	Pre 10 Yr Flow Rate (cfs)	Post 10 Yr Flow Rate (cfs)	Pre 25 Yr Flow Rate (cfs)	Post 25 Yr Flow Rate (cfs)	Pre 50 Yr Flow Rate (cfs)	Post 50 Yr Flow Rate (cfs)	Pre 100 Yr Flow Rate (cfs)	Post 100 Yr Flow Rate (cfs)
DP-1	0.00	0.00	2.17	2.15	5.29	5.28	8.03	7.23	10.72	9.04	14.01	13.82
DP-2	0.13	0.10	0.66	0.56	1.07	0.92	1.38	1.19	1.68	1.45	2.03	1.76

Impacts to watershed water quality from grading within the watersheds would be likely to occur from uncontrolled discharge of site runoff during construction activities and stabilized post-project surfaces. To minimize the impacts to the watersheds, the site has been designed to cause no increase in runoff and erosion control methods have been sized in accordance with the Env-Wq 1500 and the *New Hampshire Stormwater Management Manual* (December, 2008).

1.1.2 Existing Site Conditions

The proposed work is located on the south side of Main Street approximately 0.10 miles east of the intersection of Newmarket Road. The primary project site is located behind existing residential apartments.

The project site currently consists of forest sloping to the south down to College Brook. The upper portion of the site includes four residences, a garage, and 43 paved parking spaces.

There are existing no delineated wetlands located with the project disturbance area, and no wetland impacts are proposed as part of this project. Wetland exists in the extreme south of the property; buffer areas are to be maintained to the wetlands.

1.1.3 Proposed Site Conditions & Disturbances

The project proposes the removal of an existing structure, reconstruction of the site's driveway, and construction of a 153-space parking lot. To create the relatively level area required for the parking lot, an engineered concrete block retaining wall will be constructed, and significant quantities of engineered fill will be imported to the site. An underground chamber system is proposed to detain and infiltrate stormwater from the site. In the immediate vicinity of the chamber system, the imported fill will be design to produce a hydraulic conductivity matching the underlying soils.

Approximately 79,700 square feet of earth disturbance will be required to construct the driveway improvements and parking lot, and associated utilities and drainage practices. An area of disturbance breakdown has been shown in **Table 1.1**.

Table 1.1 – Proposed Disturbance Area Breakdown

Construction/Disturbance Activity	Area (square feet)	% EIC*	% UDC*
Grading and Site Disturbance	79,700	-	-
Total Impervious Area (within drainage area)	73,282	56.6%	
Total Undisturbed Area (within drainage area)	28,991		22.4%
Total Drainage Area[1]	129,549		

** EIC = Effective Impervious Cover*
** UDC = Undisturbed Cover*

The total connected Effective Impervious Cover is 56.6% of the proposed disturbance area, and the total undisturbed area is 22.4% within the entire modeled drainage area.

The impacts to water quality during site development will be minimized using erosion control measures. Frequent site inspections during construction are required during or directly following rainfall events to ensure erosion control devices are working properly. A copy of the Stormwater Inspection and Maintenance Manual can be found in **Section 2.8** of this report.

1.1.4 Rainfall Data

Using SCS TR-20, run under HydroCAD Version 10.0 with Type III-24 hour rainfall events, pre- and post-development cover types and drainage paths were modeled to generate peak discharge rates. Rainfall events modeled have intensities described by data provided by the Northeast Regional Climate Center for the geographic location of the project. These data are provided in full in section 2.13 of this report, and are summarized below in **Table 1.2**.

Table 1.2 - Type II, 24 Hour Rainfall Depths for Project Site (43.133ºN, 70.923ºW)

Rainfall Event	Depth*
1-Inch	1.00”
2-Year	3.14”
10-Year	4.76”
25-Year	6.03”
50-Year	7.22”
100-Year	8.64”

** Rainfall depths from the Northeast Regional Climate Center Extreme Precipitation Tables, http://precip.eas.cornell.edu, accessed 20 October 2020, See section 2.13*

1.1.5 Peak Runoff Control Requirement

Town of Durham Site Design Standards require that measures be taken to control the post-development peak rate runoff so that it does not exceed pre-development runoff for the 2-year, 10-year, and 17-year[*], 24-hour storm events. Due to the post-project grading of the site and changes in land cover, stormwater devices were used to attenuate flow in order to meet these Peak Runoff Control requirements. **Table 1.3** summarizes the stormwater runoff peak flow rate for the 1 inch, 2, 10 and 25 year storm events. Additionally, for reference we are providing a comparison of the 50 and 100 year storm events in the table.

[*]*Understood to be a typo, and the 25-year event is intended.*

Table 1.3 – Reprint of Table 1.0 – 1 Inch; 2, 10, 25, 50, and 100 Year Comparison

Watershed Area Discharge Point	Pre 1 In Flow Rate (cfs)	Post 1 In Flow Rate (cfs)	Pre 2 Yr Flow Rate (cfs)	Post 2 Yr Flow Rate (cfs)	Pre 10 Yr Flow Rate (cfs)	Post 10 Yr Flow Rate (cfs)	Pre 25 Yr Flow Rate (cfs)	Post 25 Yr Flow Rate (cfs)	Pre 50 Yr Flow Rate (cfs)	Post 50 Yr Flow Rate (cfs)	Pre 100 Yr Flow Rate (cfs)	Post 100 Yr Flow Rate (cfs)
DP-1	0.00	0.00	2.17	2.15	5.29	5.28	8.03	7.23	10.72	9.04	14.01	13.82
DP-2	0.13	0.10	0.66	0.56	1.07	0.92	1.38	1.19	1.68	1.45	2.03	1.76

1.1.6 Runoff Volume Requirement

Town of Durham Site Design Standards require that measures be taken to control the post-development peak rate runoff so that it does not exceed pre-development runoff for the 2-year, 10-year, and 17-year*, 24-hour storm events. Additionally, shown in the table for reference, are the 50 and 100 year storm events. Receiving waters and downstream wetland channels must be protected from erosion and sedimentation resulting from the project development. **Table 1.1** summarizes the flow volume data. While runoff volumes for larger events increase at Dp-1, overall volumes are reduced.

**Understood to be a typo, and the 25-year event is intended.*

Table 1.4 – 1 Inch; 2, 10, 25, 50, and 100 Year Volume Comparison

Watershed Area Discharge Point	Pre 1 In Volume (af)	Post 1 In Volume (af)	Pre 2 Yr Volume (af)	Post 2 Yr Volume (af)	Pre 10 Yr Volume (af)	Post 10 Yr Volume (af)	Pre 25 Yr Volume (af)	Post 25 Yr Volume (af)	Pre 50 Yr Volume (af)	Post 50 Yr Volume (af)	Pre 100 Yr Volume (af)	Post 100 Yr Volume (af)
DP-1	0.003	0.000	0.201	0.207	0.454	0.505	0.680	0.761	0.906	1.008	1.186	1.310
DP-2	0.009	0.007	0.050	0.042	0.082	0.070	0.109	0.093	0.133	0.114	0.162	0.140

1.1.7 Infiltration Volume Requirement

Town of Durham Site Design Standards require that a portion of the stormwater runoff be infiltrated to protect groundwater resources. The amount of groundwater recharge required per soil group, as a ratio of the Water Quality Volume is summarized in **Table 1.5**. To provide stormwater management an infiltrating underground chamber system is proposed, providing 5,301 cubic feet of storage, equivalent to the full water quality volume for the area draining to the structure, for groundwater recharge through infiltration.

Table 1.5 – Groundwater Recharge Volume Comparison

HSG	Total Area [sf]	Impervious Area [sf]	Percent Impervious [%]	Water Quality Volume [cf]	Ratio of Water Quality Volume	Required Volume [cf]
A	0	0	0	0	1.00	0
B	25,556	17,868	69.9	1,441	0.75	1,081
C	70,322	32,753	46.6	2,738	0.40	1,095
D	33,671	22,661	67.3	1,833	0.16	293
Required Recharge						2,469 cf
Provided Recharge						**5,310 cf**

1.2 NRCS Soils Information
(Web Soils Survey Map)

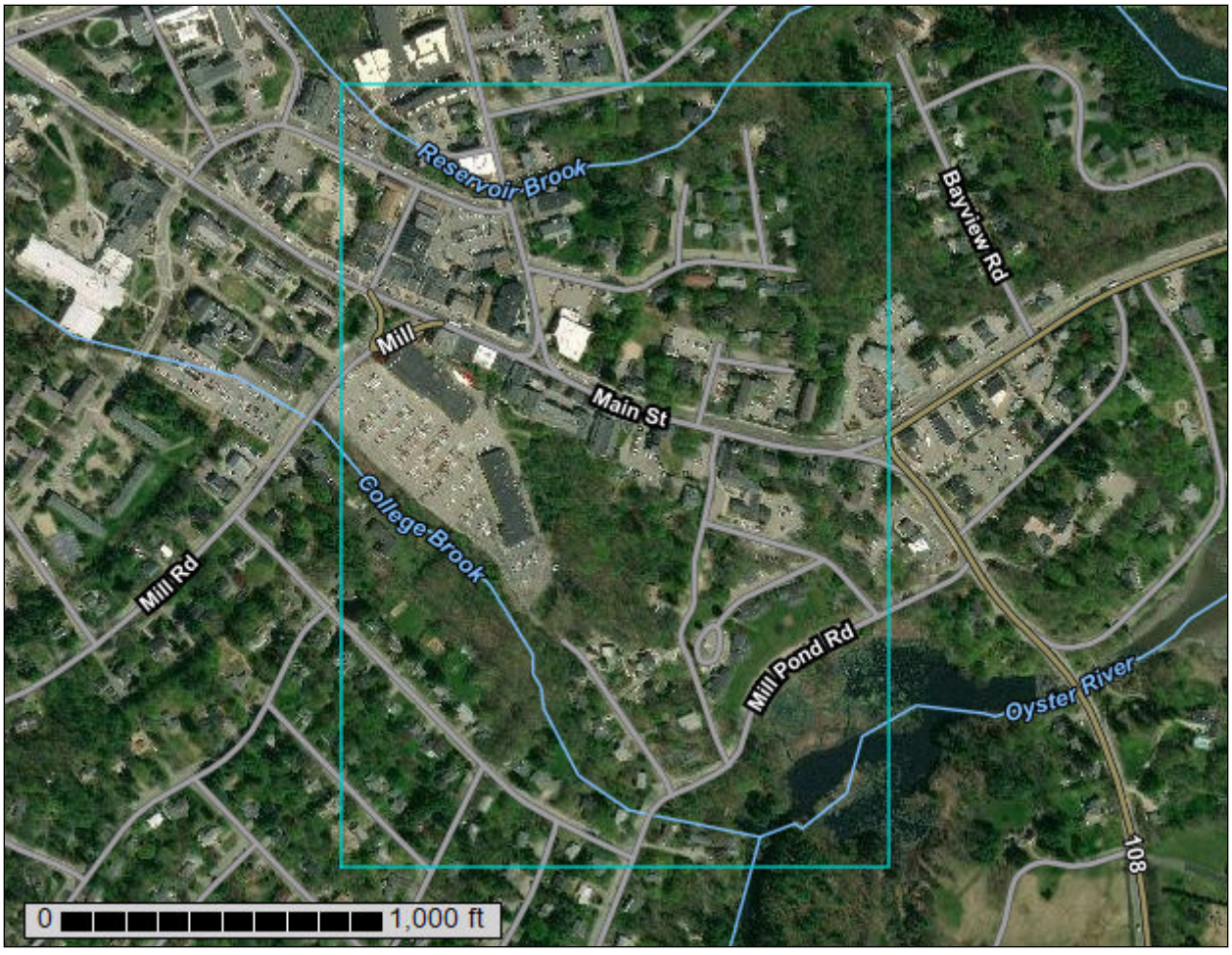
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Strafford County, New Hampshire



October 20, 2020

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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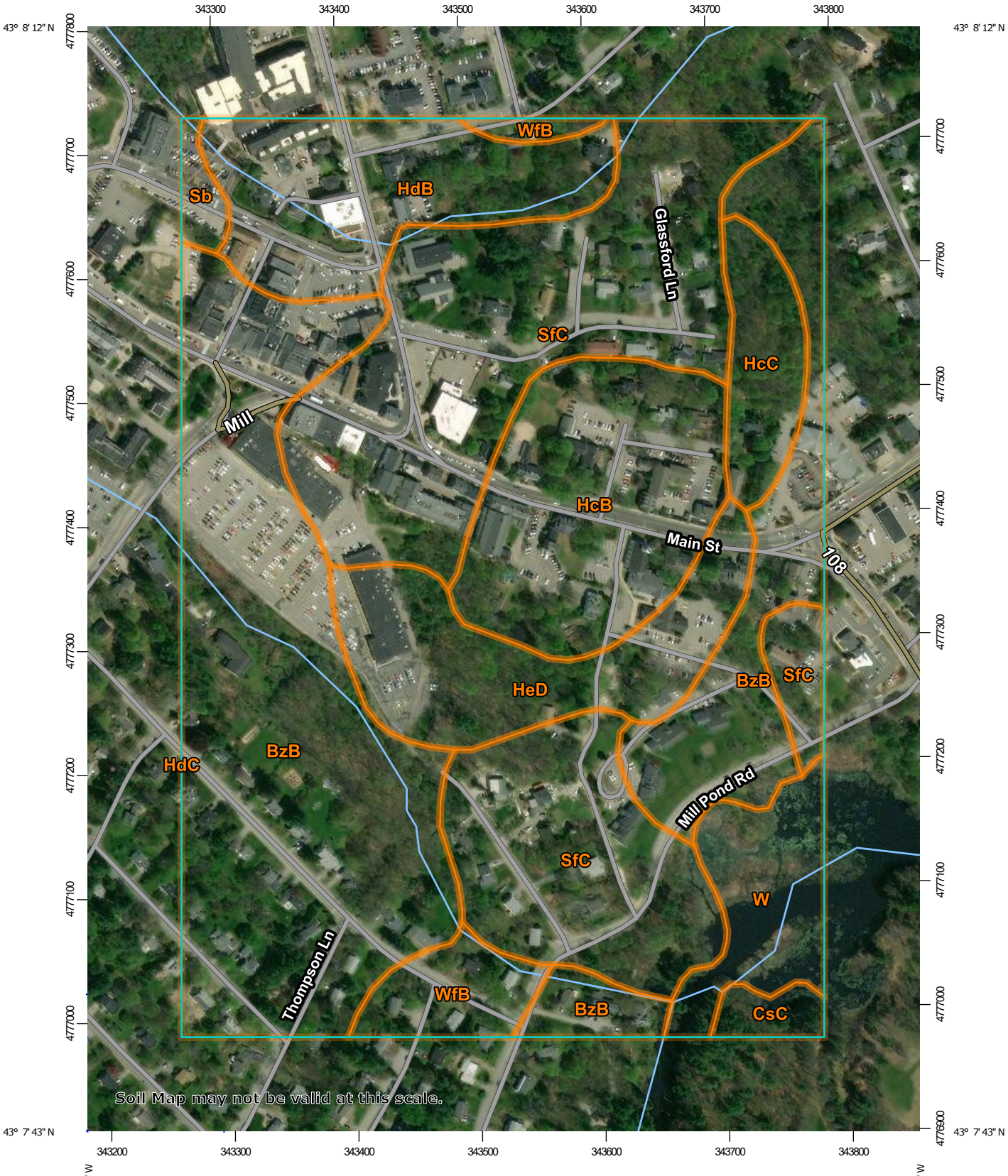
Contents

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



Map Scale: 1:4,340 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

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 1:20,000.

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: Strafford County, New Hampshire
Survey Area Data: Version 20, May 29, 2020

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

Date(s) aerial images were photographed: Dec 31, 2009—Sep 9, 2017

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
BzB	Buxton silt loam, 3 to 8 percent slopes	31.7	33.2%
CsC	Charlton fine sandy loam, 8 to 15 percent slopes, very stony	0.8	0.9%
HcB	Hollis-Charlton fine sandy loams, 3 to 8 percent slopes	10.0	10.5%
HcC	Hollis-Charlton fine sandy loams, 8 to 15 percent slopes	3.0	3.1%
HdB	Hollis-Charlton very rocky fine sandy loams, 3 to 8 percent slopes	8.2	8.5%
HdC	Hollis-Charlton very rocky fine sandy loams, 8 to 15 percent slopes	0.0	0.0%
HeD	Hollis-Charlton extremely rocky fine sandy loams, 8 to 25 percent slopes	7.5	7.8%
Sb	Saugatuck loamy sand	0.7	0.7%
SfC	Suffield silt loam, 8 to 15 percent slopes	26.9	28.1%
W	Water	4.1	4.3%
WfB	Windsor loamy fine sand, clay subsoil variant, 0 to 8 percent slopes	2.7	2.8%
Totals for Area of Interest		**95.6**	**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.

Strafford County, New Hampshire

BzB—Buxton silt loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9d6p
Elevation: 0 to 260 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

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

Description of Buxton

Setting

Parent material: Glaciomarine

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 28 inches: silty clay loam
H3 - 28 to 43 inches: silty clay

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F145XY006CT - Semi-Rich Moist Lake Plain
Hydric soil rating: No

Minor Components

Elmwood

Percent of map unit: 10 percent
Hydric soil rating: No

Not named

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

CsC—Charlton fine sandy loam, 8 to 15 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2wh0p
Elevation: 0 to 1,570 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: Not prime farmland

Map Unit Composition

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

Description of Charlton, Very Stony

Setting

Landform: Hills, ground moraines, ridges
Landform position (two-dimensional): Backslope, shoulder, summit
Landform position (three-dimensional): Crest, side slope
Down-slope shape: Linear, convex
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material
A - 2 to 4 inches: fine sandy loam
Bw - 4 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
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
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water capacity: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B

Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Sutton, very stony
Percent of map unit: 5 percent
Landform: Hills, ground moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Paxton, very stony
Percent of map unit: 5 percent
Landform: Drumlins, hills, ground moraines
Landform position (two-dimensional): Shoulder, summit, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Linear, convex
Across-slope shape: Convex
Hydric soil rating: No

Chatfield, very stony
Percent of map unit: 3 percent
Landform: Hills, ridges
Landform position (two-dimensional): Summit, backslope, shoulder
Landform position (three-dimensional): Crest, side slope, nose slope
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Leicester, very stony
Percent of map unit: 2 percent
Landform: Drainageways, ground moraines, hills, depressions
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Linear, concave
Across-slope shape: Concave
Hydric soil rating: Yes

HcB—Hollis-Charlton fine sandy loams, 3 to 8 percent slopes

Map Unit Setting
National map unit symbol: 9d7j
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: 120 to 240 days
Farmland classification: Farmland of local importance

Map Unit Composition

Hollis and similar soils: 55 percent
Charlton and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Parent material: Till

Typical profile

H1 - 0 to 14 inches: fine sandy loam
H2 - 14 to 18 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Charlton

Setting

Parent material: Till

Typical profile

H1 - 0 to 13 inches: fine sandy loam
H2 - 13 to 36 inches: fine sandy loam
H3 - 36 to 40 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Not named

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

Buxton

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

HcC—Hollis-Charlton fine sandy loams, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9d7k
Elevation: 0 to 1,080 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Farmland of local importance

Map Unit Composition

Hollis and similar soils: 55 percent
Charlton and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Parent material: Till

Typical profile

H1 - 0 to 14 inches: fine sandy loam
H2 - 14 to 18 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches

Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Charlton

Setting

Parent material: Till

Typical profile

H1 - 0 to 13 inches: fine sandy loam
H2 - 13 to 36 inches: fine sandy loam
H3 - 36 to 40 inches: gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Not named

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

Buxton

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

HdB—Hollis-Charlton very rocky fine sandy loams, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 9d7m
Elevation: 0 to 1,000 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis and similar soils: 40 percent
Charlton and similar soils: 30 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Parent material: Till

Typical profile

H1 - 0 to 14 inches: very stony fine sandy loam
H2 - 14 to 18 inches: bedrock

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Charlton

Setting

Parent material: Till

Typical profile

H1 - 0 to 13 inches: very stony fine sandy loam
H2 - 13 to 36 inches: fine sandy loam
H3 - 36 to 40 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 10 percent
Hydric soil rating: No

Not named

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

Sutton

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

Buxton

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

Leicester

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

HdC—Hollis-Charlton very rocky fine sandy loams, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9d7n
Elevation: 0 to 1,200 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis and similar soils: 40 percent
Charlton and similar soils: 30 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Parent material: Till

Typical profile

H1 - 0 to 14 inches: very stony fine sandy loam
H2 - 14 to 18 inches: bedrock

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Charlton

Setting

Parent material: Till

Typical profile

H1 - 0 to 13 inches: very stony fine sandy loam
H2 - 13 to 36 inches: fine sandy loam
H3 - 36 to 40 inches: gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 10 percent
Hydric soil rating: No

Not named

Percent of map unit: 10 percent
Hydric soil rating: No

Woodbridge

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

Sutton

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

HeD—Hollis-Charlton extremely rocky fine sandy loams, 8 to 25 percent slopes

Map Unit Setting

National map unit symbol: 9d7q
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: 120 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Hollis and similar soils: 30 percent
Charlton and similar soils: 25 percent
Minor components: 45 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hollis

Setting

Parent material: Till

Typical profile

H1 - 0 to 14 inches: extremely stony fine sandy loam
H2 - 14 to 18 inches: bedrock

Properties and qualities

Slope: 8 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 10 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 2.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: D
Ecological site: F144AY033MA - Shallow Dry Till Uplands
Hydric soil rating: No

Description of Charlton

Setting

Parent material: Till

Typical profile

H1 - 0 to 13 inches: extremely stony fine sandy loam
H2 - 13 to 36 inches: fine sandy loam
H3 - 36 to 40 inches: gravelly loamy sand

Properties and qualities

Slope: 8 to 25 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Rock outcrop

Percent of map unit: 25 percent
Hydric soil rating: No

Not named

Percent of map unit: 10 percent
Hydric soil rating: No

Leicester

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

Sutton

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

Sb—Saugatuck loamy sand

Map Unit Setting

National map unit symbol: 9d8r
Elevation: 300 to 1,000 feet
Mean annual precipitation: 27 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 125 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Saugatuck

Setting

Landform: Outwash terraces
Parent material: Outwash

Typical profile

H1 - 0 to 4 inches: loamy sand
H2 - 4 to 7 inches: sand
H3 - 7 to 26 inches: loamy sand
H4 - 26 to 42 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 10 to 16 inches to undefined
Drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Very low (about 1.1 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

Not named wet

Percent of map unit: 15 percent

Landform: Outwash terraces
Hydric soil rating: Yes

SfC—Suffield silt loam, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 9d8v
Elevation: 0 to 250 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: Farmland of statewide importance

Map Unit Composition

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

Description of Suffield

Typical profile

H1 - 0 to 19 inches: silt loam
H2 - 19 to 28 inches: silt loam
H3 - 28 to 41 inches: silty clay

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 7.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C
Ecological site: F144AY017NH - Well Drained Lake Plain
Hydric soil rating: No

Minor Components

Not named

Percent of map unit: 9 percent
Hydric soil rating: No

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

Rock outcrop
Percent of map unit: 1 percent
Hydric soil rating: No

W—Water

Map Unit Composition
Water (less than 40 acres): 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

WfB—Windsor loamy fine sand, clay subsoil variant, 0 to 8 percent slopes

Map Unit Setting
National map unit symbol: 9d9b
Elevation: 0 to 280 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
Windsor variant and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Windsor Variant

Typical profile
H1 - 0 to 26 inches: loamy fine sand
H2 - 26 to 30 inches: loamy sand
H3 - 30 to 42 inches: silt loam

Properties and qualities
Slope: 0 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: F144AY022MA - Dry Outwash
Hydric soil rating: No

Minor Components

Not named

Percent of map unit: 15 percent
Hydric soil rating: No

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

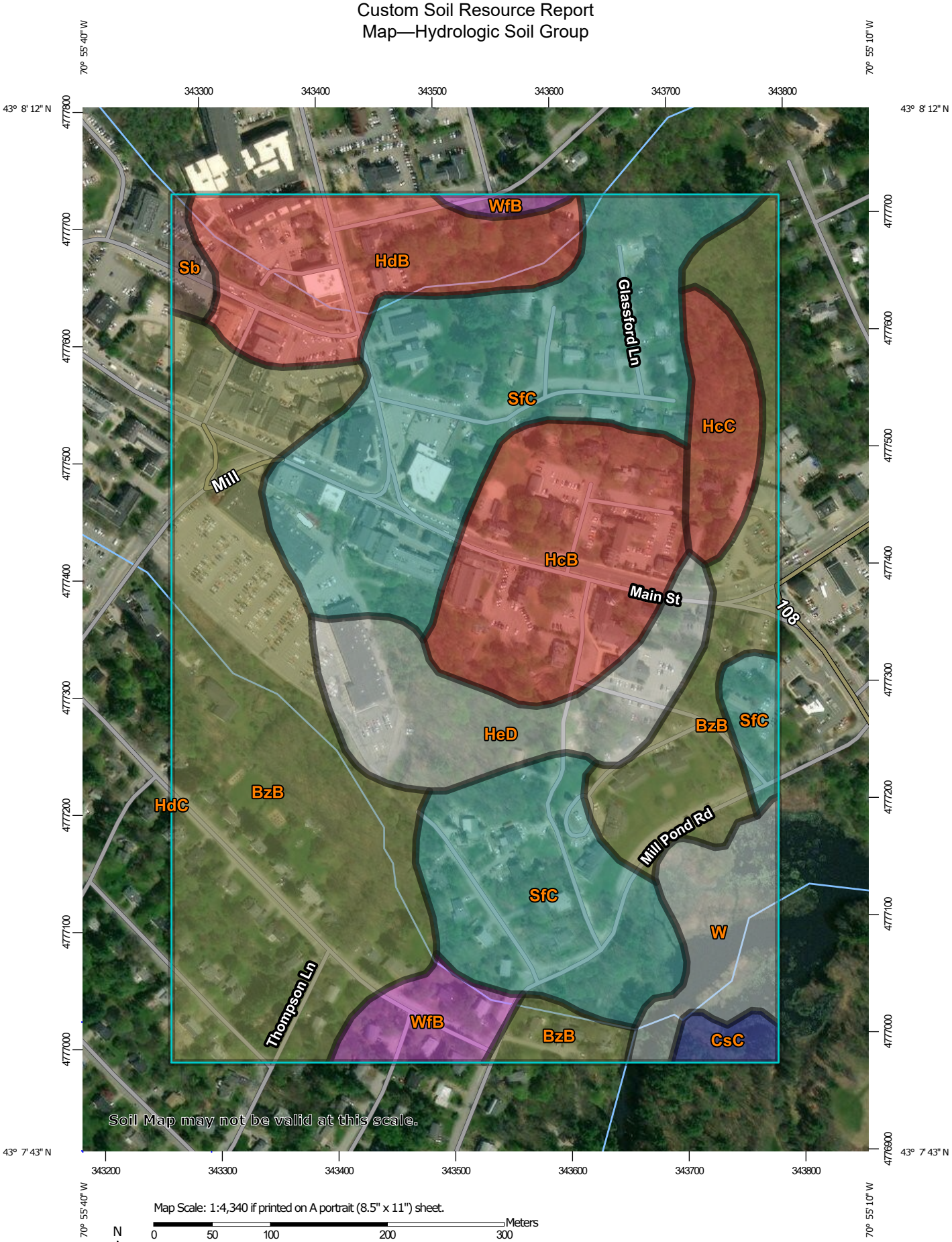
Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.


70° 55' 40" W
70° 55' 10" W
43° 8' 12" N
43° 7' 43" N
343300
343400
343500
343600
343700
343800
4777800
4777700
4777600
4777500
4777400
4777300
4777200
4777100
4777000
4776900
WfB
HdB
Sb
Glassford Ln
SfC
HcC
Mill
HcB
Main St
108
HeD
BzB
SfC
HdC
BzB
Mill Pond Rd
SfC
W
Thompson Ln
WfB
BzB
CsC
Soil Map may not be valid at this scale.
Map Scale: 1:4,340 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0 50 100 200 300
Feet
0 200 400 800 1200
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 Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

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 1:20,000.

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: Strafford County, New Hampshire
Survey Area Data: Version 20, May 29, 2020

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

Date(s) aerial images were photographed: Dec 31, 2009—Sep 9, 2017

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.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
BzB	Buxton silt loam, 3 to 8 percent slopes	C/D	31.7	33.2%
CsC	Charlton fine sandy loam, 8 to 15 percent slopes, very stony	B	0.8	0.9%
HcB	Hollis-Charlton fine sandy loams, 3 to 8 percent slopes	D	10.0	10.5%
HcC	Hollis-Charlton fine sandy loams, 8 to 15 percent slopes	D	3.0	3.1%
HdB	Hollis-Charlton very rocky fine sandy loams, 3 to 8 percent slopes	D	8.2	8.5%
HdC	Hollis-Charlton very rocky fine sandy loams, 8 to 15 percent slopes	D	0.0	0.0%
HeD	Hollis-Charlton extremely rocky fine sandy loams, 8 to 25 percent slopes		7.5	7.8%
Sb	Saugatuck loamy sand	B/D	0.7	0.7%
SfC	Suffield silt loam, 8 to 15 percent slopes	C	26.9	28.1%
W	Water		4.1	4.3%
WfB	Windsor loamy fine sand, clay subsoil variant, 0 to 8 percent slopes	A	2.7	2.8%
Totals for Area of Interest			**95.6**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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1.3 Extreme Precipitation Tables
(Northeast Regional Climate Center)

Extreme Precipitation Tables

Northeast Regional Climate Center

Data represents point estimates calculated from partial duration series. All precipitation amounts are displayed in inches.

Smoothing	No
State	New Hampshire
Location	
Longitude	70.923 degrees West
Latitude	43.133 degrees North
Elevation	0 feet
Date/Time	Tue, 20 Oct 2020 14:53:49 -0400

Extreme Precipitation Estimates

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.26	0.40	0.49	0.66	0.81	1.00	**1yr**	0.70	0.98	1.13	1.59	2.03	2.61	2.84	**1yr**	2.31	2.74	3.14	3.86	4.44	**1yr**
2yr	0.32	0.49	0.61	0.82	1.01	1.19	**2yr**	0.88	1.17	1.39	1.86	2.41	3.14	3.48	**2yr**	2.78	3.34	3.84	4.57	5.21	**2yr**
5yr	0.37	0.57	0.70	0.96	1.23	1.48	**5yr**	1.06	1.44	1.72	2.32	2.96	3.98	4.46	**5yr**	3.52	4.29	4.90	5.79	6.55	**5yr**
10yr	0.41	0.63	0.78	1.10	1.42	1.73	**10yr**	1.22	1.69	2.02	2.73	3.46	4.76	5.39	**10yr**	4.21	5.18	5.90	6.92	7.80	**10yr**
25yr	0.48	0.74	0.91	1.31	1.72	2.14	**25yr**	1.48	2.09	2.51	3.40	4.26	6.03	6.91	**25yr**	5.34	6.65	7.53	8.78	9.83	**25yr**
50yr	0.54	0.83	1.03	1.48	2.00	2.51	**50yr**	1.72	2.46	2.96	4.01	4.99	7.22	8.36	**50yr**	6.39	8.04	9.06	10.51	11.72	**50yr**
100yr	0.62	0.93	1.17	1.69	2.32	2.95	**100yr**	2.00	2.89	3.48	4.73	5.84	8.64	10.11	**100yr**	7.65	9.72	10.91	12.58	13.97	**100yr**
200yr	0.70	1.05	1.33	1.93	2.69	3.48	**200yr**	2.32	3.40	4.10	5.59	6.84	10.36	12.22	**200yr**	9.16	11.75	13.14	15.07	16.66	**200yr**
500yr	0.83	1.24	1.59	2.31	3.29	4.31	**500yr**	2.84	4.22	5.10	6.97	8.45	13.16	15.72	**500yr**	11.64	15.12	16.81	19.15	21.05	**500yr**

Lower Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.24	0.37	0.45	0.60	0.74	0.90	**1yr**	0.64	0.88	0.91	1.26	1.56	2.02	2.52	**1yr**	1.79	2.42	2.93	3.27	4.01	**1yr**
2yr	0.31	0.49	0.60	0.81	1.00	1.18	**2yr**	0.86	1.16	1.37	1.83	2.36	3.04	3.39	**2yr**	2.69	3.26	3.74	4.46	5.05	**2yr**
5yr	0.35	0.54	0.67	0.92	1.16	1.40	**5yr**	1.01	1.37	1.62	2.15	2.78	3.72	4.14	**5yr**	3.29	3.98	4.59	5.43	6.14	**5yr**
10yr	0.38	0.59	0.73	1.02	1.32	1.60	**10yr**	1.14	1.57	1.82	2.45	3.13	4.30	4.82	**10yr**	3.80	4.63	5.34	6.30	7.08	**10yr**
25yr	0.44	0.67	0.83	1.18	1.56	1.91	**25yr**	1.35	1.87	2.11	2.85	3.66	5.03	5.87	**25yr**	4.45	5.65	6.54	7.68	8.56	**25yr**
50yr	0.48	0.74	0.92	1.32	1.77	2.19	**50yr**	1.53	2.14	2.36	3.20	4.11	5.77	6.81	**50yr**	5.11	6.55	7.63	8.92	9.87	**50yr**
100yr	0.54	0.82	1.02	1.48	2.03	2.51	**100yr**	1.75	2.45	2.64	3.59	4.60	6.60	7.89	**100yr**	5.84	7.59	8.91	10.35	11.35	**100yr**
200yr	0.60	0.90	1.15	1.66	2.31	2.87	**200yr**	2.00	2.80	2.94	4.01	5.14	7.55	9.15	**200yr**	6.68	8.80	10.41	12.02	13.08	**200yr**
500yr	0.70	1.05	1.34	1.95	2.78	3.45	**500yr**	2.40	3.37	3.42	4.65	5.98	8.99	11.12	**500yr**	7.95	10.69	12.80	14.67	15.72	**500yr**

Upper Confidence Limits

	5min	10min	15min	30min	60min	120min		1hr	2hr	3hr	6hr	12hr	24hr	48hr		1day	2day	4day	7day	10day	
1yr	0.28	0.43	0.53	0.71	0.87	1.08	**1yr**	0.75	1.05	1.24	1.75	2.22	2.84	3.03	**1yr**	2.51	2.91	3.38	4.18	4.78	**1yr**
2yr	0.33	0.51	0.62	0.84	1.04	1.25	**2yr**	0.90	1.22	1.48	1.95	2.50	3.26	3.58	**2yr**	2.88	3.44	3.95	4.71	5.40	**2yr**
5yr	0.39	0.60	0.75	1.03	1.31	1.58	**5yr**	1.13	1.55	1.85	2.50	3.19	4.23	4.77	**5yr**	3.74	4.59	5.22	6.16	6.93	**5yr**
10yr	0.46	0.70	0.87	1.21	1.57	1.92	**10yr**	1.35	1.88	2.23	3.04	3.84	5.21	5.94	**10yr**	4.61	5.71	6.48	7.56	8.45	**10yr**
25yr	0.55	0.84	1.05	1.50	1.97	2.48	**25yr**	1.70	2.42	2.87	3.96	4.93	7.05	7.95	**25yr**	6.24	7.65	8.59	9.94	11.01	**25yr**
50yr	0.64	0.97	1.21	1.74	2.34	2.99	**50yr**	2.02	2.92	3.48	4.83	5.99	8.73	9.93	**50yr**	7.73	9.55	10.65	12.21	13.47	**50yr**
100yr	0.74	1.12	1.41	2.03	2.79	3.61	**100yr**	2.40	3.53	4.23	5.91	7.27	10.81	12.40	**100yr**	9.57	11.92	13.19	15.02	16.48	**100yr**
200yr	0.86	1.29	1.64	2.37	3.31	4.38	**200yr**	2.86	4.28	5.14	7.23	8.81	13.43	15.50	**200yr**	11.88	14.91	16.34	18.47	20.19	**200yr**
500yr	1.05	1.56	2.01	2.92	4.15	5.63	**500yr**	3.58	5.50	6.63	9.47	11.40	17.92	20.82	**500yr**	15.86	20.02	21.69	24.30	26.43	**500yr**

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SECTION 2.0 - DRAINAGE CALCULATIONS, ANALYSIS & DESIGN

2.1 BMP Worksheets for all Treatment Systems

Stage-Area-Storage for Pond MC45: MC-4500 Chambers

Elevation (feet)	Horizontal (sq-ft)	Storage (cubic-feet)
52.50	**3,293**	0
52.52	3,293	26
52.54	3,293	53
52.56	3,293	79
52.58	3,293	105
52.60	3,293	132
52.62	3,293	158
52.64	3,293	184
52.66	3,293	211
52.68	3,293	237
52.70	3,293	263
52.72	3,293	290
52.74	3,293	316
52.76	3,293	342
52.78	3,293	369
52.80	3,293	395
52.82	3,293	421
52.84	3,293	448
52.86	3,293	474
52.88	3,293	501
52.90	3,293	527
52.92	3,293	553
52.94	3,293	580
52.96	3,293	606
52.98	3,293	632
53.00	3,293	659
53.02	3,293	685
53.04	3,293	711
53.06	3,293	738
53.08	3,293	764
53.10	3,293	790
53.12	3,293	817
53.14	3,293	843
53.16	3,293	869
53.18	3,293	896
53.20	3,293	922
53.22	3,293	948
53.24	3,293	975
53.26	3,293	1,001
53.28	3,293	1,027
53.30	3,293	1,054
53.32	3,293	1,080
53.34	3,293	1,106
53.36	3,293	1,133
53.38	3,293	1,159
53.40	3,293	1,185
53.42	3,293	1,212
53.44	3,293	1,238
53.46	3,293	1,264
53.48	3,293	1,291
53.50	3,293	1,317
53.52	3,293	1,374
53.54	3,293	1,430
53.56	3,293	1,486
53.58	3,293	1,543
53.60	3,293	1,599
53.62	3,293	1,655
53.64	3,293	1,712
53.66	3,293	1,768
53.68	3,293	1,824
53.70	3,293	1,881
53.72	3,293	1,937
53.74	3,293	1,993
53.76	3,293	2,049
53.78	3,293	2,105
53.80	3,293	2,161
53.82	3,293	2,217
53.84	3,293	2,273
53.86	3,293	2,329
53.88	3,293	2,385
53.90	3,293	2,441
53.92	3,293	2,497
53.94	3,293	2,553
53.96	3,293	2,609
53.98	3,293	2,665
54.00	3,293	2,721
54.02	3,293	2,776
54.04	3,293	2,832
54.06	3,293	2,888
54.08	3,293	2,943
54.10	3,293	2,999
54.12	3,293	3,055
54.14	3,293	3,110
54.16	3,293	3,166
54.18	3,293	3,221
54.20	3,293	3,277
54.22	3,293	3,332
54.24	3,293	3,388
54.26	3,293	3,443
54.28	3,293	3,498
54.30	3,293	3,554
54.32	3,293	3,609
54.34	3,293	3,664
54.36	3,293	3,719
54.38	3,293	3,774
54.40	3,293	3,830
54.42	3,293	3,885
54.44	3,293	3,940
54.46	3,293	3,995
54.48	3,293	4,050
54.50	3,293	4,105
54.52	3,293	4,159
54.54	3,293	4,214
54.56	3,293	4,269

Stage-Area-Storage for Pond MC45: MC-4500 Chambers (continued)

Elevation (feet)	Horizontal (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Horizontal (sq-ft)	Storage (cubic-feet)
54.58	3,293	4,324	55.62	3,293	7,099
54.60	3,293	4,379	55.64	3,293	7,151
54.62	3,293	4,433	55.66	3,293	7,202
54.64	3,293	4,488	55.68	3,293	7,254
54.66	3,293	4,542	55.70	3,293	7,305
54.68	3,293	4,597	55.72	3,293	7,357
54.70	3,293	4,651	55.74	3,293	7,408
54.72	3,293	4,706	55.76	3,293	7,459
54.74	3,293	4,760	55.78	3,293	7,511
54.76	3,293	4,814	55.80	3,293	7,562
54.78	3,293	4,869	55.82	3,293	7,613
54.80	3,293	4,923	55.84	3,293	7,664
54.82	3,293	4,977	55.86	3,293	7,715
54.84	3,293	5,031	55.88	3,293	7,765
54.86	3,293	5,085	55.90	3,293	7,816
54.88	3,293	5,139	55.92	3,293	7,867
54.90	3,293	5,193	55.94	3,293	7,917
54.92	3,293	5,247	55.96	3,293	7,968
54.94	3,293	5,301	55.98	3,293	8,018
54.96	3,293	5,355	56.00	3,293	8,069
54.98	3,293	5,409	56.02	3,293	8,119
55.00	3,293	5,463	56.04	3,293	8,169
55.02	3,293	5,516	56.06	3,293	8,219
55.04	3,293	5,570	56.08	3,293	8,269
55.06	3,293	5,624	56.10	3,293	8,319
55.08	3,293	5,677	56.12	3,293	8,369
55.10	3,293	5,731	56.14	3,293	8,418
55.12	3,293	5,784	56.16	3,293	8,468
55.14	3,293	5,837	56.18	3,293	8,518
55.16	3,293	5,891	56.20	3,293	8,567
55.18	3,293	5,944	56.22	3,293	8,616
55.20	3,293	5,997	56.24	3,293	8,666
55.22	3,293	6,050	56.26	3,293	8,715
55.24	3,293	6,103	56.28	3,293	8,764
55.26	3,293	6,156	56.30	3,293	8,813
55.28	3,293	6,209	56.32	3,293	8,862
55.30	3,293	6,262	56.34	3,293	8,910
55.32	3,293	6,315	56.36	3,293	8,959
55.34	3,293	6,367	56.38	3,293	9,008
55.36	3,293	6,420	56.40	3,293	9,056
55.38	3,293	6,473	56.42	3,293	9,104
55.40	3,293	6,525	56.44	3,293	9,153
55.42	3,293	6,578	56.46	3,293	9,201
55.44	3,293	6,630	56.48	3,293	9,249
55.46	3,293	6,683	56.50	3,293	9,297
55.48	3,293	6,735	56.52	3,293	9,345
55.50	3,293	6,787	56.54	3,293	9,392
55.52	3,293	6,839	56.56	3,293	9,440
55.54	3,293	6,891	56.58	3,293	9,487
55.56	3,293	6,943	56.60	3,293	9,535
55.58	3,293	6,995	56.62	3,293	9,582
55.60	3,293	7,047	56.64	3,293	9,629

Stage-Area-Storage for Pond MC45: MC-4500 Chambers (continued)

Elevation (feet)	Horizontal (sq-ft)	Storage (cubic-feet)	Elevation (feet)	Horizontal (sq-ft)	Storage (cubic-feet)
56.66	3,293	9,676	57.70	3,293	11,923
56.68	3,293	9,723	57.72	3,293	11,961
56.70	3,293	9,770	57.74	3,293	11,999
56.72	3,293	9,817	57.76	3,293	12,037
56.74	3,293	9,863	57.78	3,293	12,074
56.76	3,293	9,910	57.80	3,293	12,111
56.78	3,293	9,956	57.82	3,293	12,148
56.80	3,293	10,002	57.84	3,293	12,185
56.82	3,293	10,048	57.86	3,293	12,221
56.84	3,293	10,094	57.88	3,293	12,257
56.86	3,293	10,140	57.90	3,293	12,292
56.88	3,293	10,186	57.92	3,293	12,328
56.90	3,293	10,231	57.94	3,293	12,362
56.92	3,293	10,277	57.96	3,293	12,397
56.94	3,293	10,322	57.98	3,293	12,430
56.96	3,293	10,367	58.00	3,293	12,464
56.98	3,293	10,412	58.02	3,293	12,496
57.00	3,293	10,457	58.04	3,293	12,528
57.02	3,293	10,502	58.06	3,293	12,560
57.04	3,293	10,546	58.08	3,293	12,591
57.06	3,293	10,591	58.10	3,293	12,621
57.08	3,293	10,635	58.12	3,293	12,652
57.10	3,293	10,679	58.14	3,293	12,681
57.12	3,293	10,723	58.16	3,293	12,711
57.14	3,293	10,767	58.18	3,293	12,740
57.16	3,293	10,811	58.20	3,293	12,769
57.18	3,293	10,854	58.22	3,293	12,798
57.20	3,293	10,897	58.24	3,293	12,827
57.22	3,293	10,941	58.26	3,293	12,855
57.24	3,293	10,984	58.28	3,293	12,884
57.26	3,293	11,027	58.30	3,293	12,912
57.28	3,293	11,069	58.32	3,293	12,940
57.30	3,293	11,112	58.34	3,293	12,968
57.32	3,293	11,154	58.36	3,293	12,996
57.34	3,293	11,196	58.38	3,293	13,024
57.36	3,293	11,238	58.40	3,293	13,051
57.38	3,293	11,280	58.42	3,293	13,079
57.40	3,293	11,322	58.44	3,293	13,106
57.42	3,293	11,363	58.46	3,293	13,133
57.44	3,293	11,405	58.48	3,293	13,159
57.46	3,293	11,446	58.50	3,293	13,186
57.48	3,293	11,487	58.52	3,293	13,212
57.50	3,293	11,528	58.54	3,293	13,239
57.52	3,293	11,568	58.56	3,293	13,265
57.54	3,293	11,608	58.58	3,293	13,291
57.56	3,293	11,648	58.60	3,293	13,318
57.58	3,293	11,688	58.62	3,293	13,344
57.60	3,293	11,728	58.64	3,293	13,370
57.62	3,293	11,767	58.66	3,293	13,397
57.64	3,293	11,807	58.68	3,293	13,423
57.66	3,293	11,846	58.70	3,293	13,449
57.68	3,293	11,884	58.72	3,293	13,476

Stage-Area-Storage for Pond MC45: MC-4500 Chambers (continued)

Elevation (feet)	Horizontal (sq-ft)	Storage (cubic-feet)
58.74	3,293	13,502
58.76	3,293	13,528
58.78	3,293	13,555
58.80	3,293	13,581
58.82	3,293	13,607
58.84	3,293	13,634
58.86	3,293	13,660
58.88	3,293	13,686
58.90	3,293	13,713
58.92	3,293	13,739
58.94	3,293	13,765
58.96	3,293	13,792
58.98	3,293	13,818
59.00	3,293	13,845
59.02	3,293	13,871
59.04	3,293	13,897
59.06	3,293	13,924
59.08	3,293	13,950
59.10	3,293	13,976
59.12	3,293	14,003
59.14	3,293	14,029
59.16	3,293	14,055
59.18	3,293	14,082
59.20	3,293	14,108
59.22	3,293	14,134
59.24	3,293	14,161
59.26	3,293	14,187
59.28	3,293	14,213
59.30	3,293	14,240
59.32	3,293	14,266
59.34	3,293	14,292
59.36	3,293	14,319
59.38	3,293	14,345
59.40	3,293	14,371
59.42	3,293	14,398
59.44	3,293	14,424
59.46	3,293	14,450
59.48	3,293	14,477
59.50	3,293	**14,503**
59.52	3,293	14,503
59.54	3,293	14,503
59.56	3,293	14,503
59.58	3,293	14,503
59.60	3,293	14,503
59.62	3,293	14,503
59.64	3,293	14,503
59.66	3,293	14,503
59.68	3,293	14,503
59.70	3,293	14,503
59.72	3,293	14,503
59.74	3,293	14,503
59.76	3,293	14,503
59.78	3,293	14,503
59.80	3,293	14,503
59.82	3,293	14,503
59.84	3,293	14,503
59.86	3,293	14,503
59.88	3,293	14,503
59.90	3,293	14,503
59.92	3,293	14,503

2.2 Pre-Development Analysis

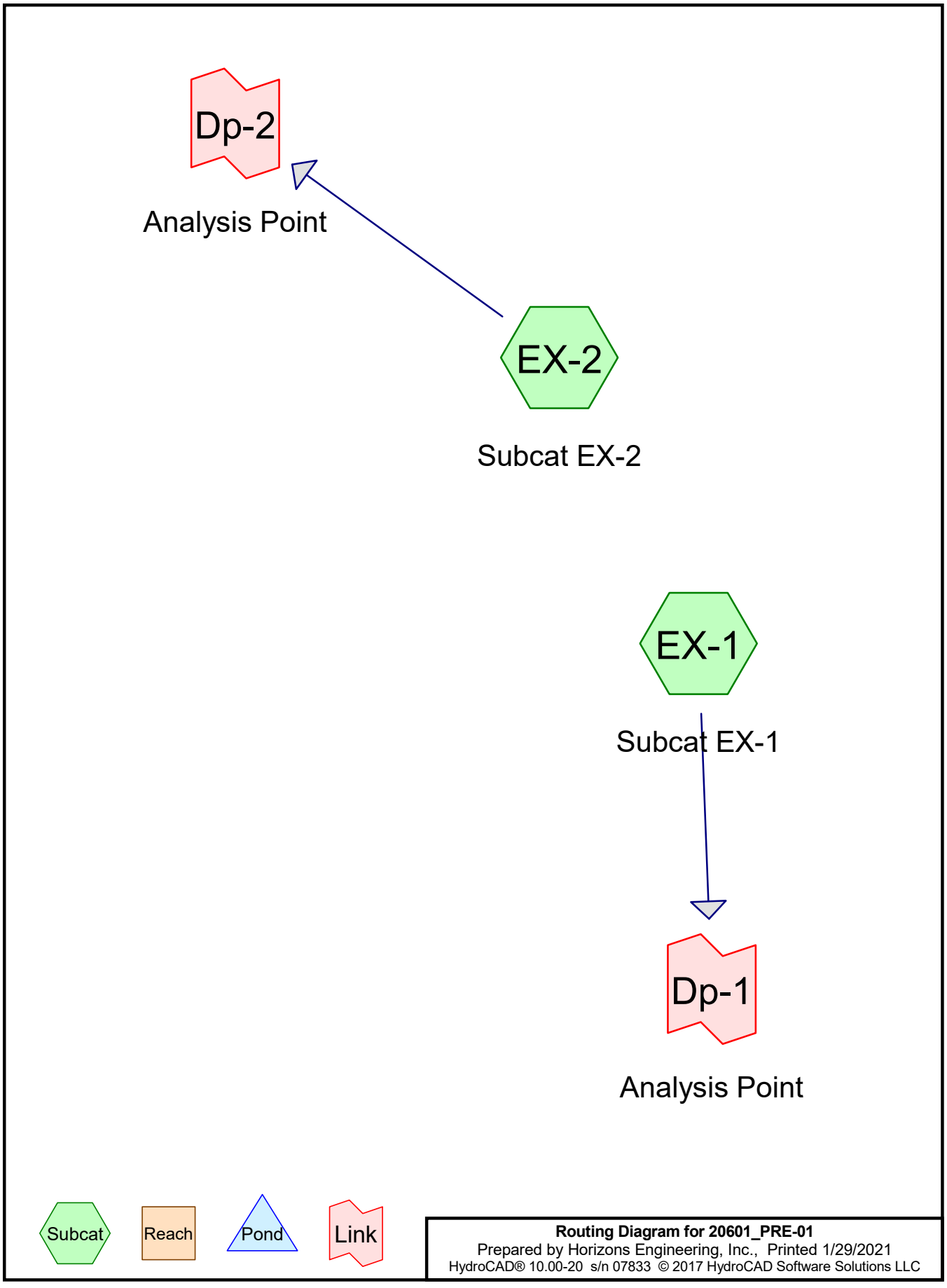
2.2 Pre-development Analysis

A pre-development analysis covering 128,764 square feet which includes the area to be disturbed by the proposed project. The site has been divided into two pre-development subcatchment area., Subcatchments EX-1 and EX-2 representing the areas draining directly to Drainage Point 1 (Dp-1) and Drainage Point 2 (Dp-2) respectively. EX-1 models area at the front of the site which drains to a point on Main Street, and consists primarily of the existing developed areas at the front of the project site. Drainage Point 2 is in the south of the site, and represents flow toward college brook. EX-2 represents the area draining to Dp-2, and consists primarily of forested slope, but includes a portion of the existing developed area at the north end of the project site.

For more detailed information on the pre-developed area, including watershed areas and drainage paths, see attached drainage plans found in **Section 3** and the HydroCAD area listing found in **Section 2.3.1**. A pre- versus post- development comparison flow rate table for the 1 inch; 2, 10, 25, 50, and 100 year storm events can be found in **Table 1.0** in **Section 1.1.1**.

A High Intensity Soil Survey (HISS) within the work area was completed by Joseph W. Noel, Certified Soil Scientist #017, on October 16, 2020. This information can be found included on the Existing Conditions Plan.

2.2.1 Pre Development
Diagram, Area Listing, Soil Listing



Routing Diagram for 20601_PRE-01
Prepared by Horizons Engineering, Inc., Printed 1/29/2021

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
6,205	61	>75% Grass cover, Good, HSG B (EX-1)
1,321	74	>75% Grass cover, Good, HSG C (EX-1, EX-2)
9,052	80	>75% Grass cover, Good, HSG D (EX-1, EX-2)
508	98	Existing Concrete Pads, HSG C (EX-2)
223	98	Existing Concrete Pads, HSG D (EX-1, EX-2)
25	98	Existing Decks and Steps, HSG B (EX-1)
6	98	Existing Decks and Steps, HSG C (EX-2)
493	98	Existing Decks and Steps, HSG D (EX-1, EX-2)
227	98	Paved parking, HSG B (EX-1)
2,767	98	Paved parking, HSG C (EX-2)
17,991	98	Paved parking, HSG D (EX-1, EX-2)
767	98	Roofs, HSG B (EX-1)
3,732	98	Roofs, HSG D (EX-1, EX-2)
18,332	55	Woods, Good, HSG B (EX-1)
65,194	70	Woods, Good, HSG C (EX-1)
1,919	77	Woods, Good, HSG D (EX-1)

Soil Listing (selected nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
25,556	HSG B	EX-1
69,797	HSG C	EX-1, EX-2
33,411	HSG D	EX-1, EX-2
0	Other	

2.2.2 Pre-Development
Node Listing for the 2, 10, 25, 50, and 100 Year Storm Events

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 EX-1: Subcat EX-1 Runoff Area=117,882 sf 15.74% Impervious Runoff Depth=0.01"
Flow Length=653' Tc=11.0 min CN=72 Runoff=0.00 cfs 118 cf

Subcatchment EX-2: Subcat EX-2 Runoff Area=10,882 sf 75.28% Impervious Runoff Depth=0.45"
Flow Length=154' Tc=6.0 min CN=93 Runoff=0.13 cfs 408 cf

Link Dp-1: Analysis Point Inflow=0.00 cfs 118 cf
Primary=0.00 cfs 118 cf

Link Dp-2: Analysis Point Inflow=0.13 cfs 408 cf
Primary=0.13 cfs 408 cf

Total Runoff Area = 128,764 sf Runoff Volume = 526 cf Average Runoff Depth = 0.05"
79.23% Pervious = 102,024 sf 20.77% Impervious = 26,741 sf

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 EX-1: Subcat EX-1 Runoff Area=117,882 sf 15.74% Impervious Runoff Depth=0.89"
Flow Length=653' Tc=11.0 min CN=72 Runoff=2.17 cfs 8,769 cf

Subcatchment EX-2: Subcat EX-2 Runoff Area=10,882 sf 75.28% Impervious Runoff Depth=2.39"
Flow Length=154' Tc=6.0 min CN=93 Runoff=0.66 cfs 2,166 cf

Link Dp-1: Analysis Point Inflow=2.17 cfs 8,769 cf
Primary=2.17 cfs 8,769 cf

Link Dp-2: Analysis Point Inflow=0.66 cfs 2,166 cf
Primary=0.66 cfs 2,166 cf

Total Runoff Area = 128,764 sf Runoff Volume = 10,935 cf Average Runoff Depth = 1.02"
79.23% Pervious = 102,024 sf 20.77% Impervious = 26,741 sf

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 EX-1: Subcat EX-1 Runoff Area=117,882 sf 15.74% Impervious Runoff Depth=2.01"
Flow Length=653' Tc=11.0 min CN=72 Runoff=5.29 cfs 19,792 cf

Subcatchment EX-2: Subcat EX-2 Runoff Area=10,882 sf 75.28% Impervious Runoff Depth=3.96"
Flow Length=154' Tc=6.0 min CN=93 Runoff=1.07 cfs 3,593 cf

Link Dp-1: Analysis Point Inflow=5.29 cfs 19,792 cf
Primary=5.29 cfs 19,792 cf

Link Dp-2: Analysis Point Inflow=1.07 cfs 3,593 cf
Primary=1.07 cfs 3,593 cf

Total Runoff Area = 128,764 sf Runoff Volume = 23,385 cf Average Runoff Depth = 2.18"
79.23% Pervious = 102,024 sf 20.77% Impervious = 26,741 sf

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 EX-1: Subcat EX-1 Runoff Area=117,882 sf 15.74% Impervious Runoff Depth=3.02"
Flow Length=653' Tc=11.0 min CN=72 Runoff=8.03 cfs 29,645 cf

Subcatchment EX-2: Subcat EX-2 Runoff Area=10,882 sf 75.28% Impervious Runoff Depth=5.21"
Flow Length=154' Tc=6.0 min CN=93 Runoff=1.38 cfs 4,727 cf

Link Dp-1: Analysis Point Inflow=8.03 cfs 29,645 cf
Primary=8.03 cfs 29,645 cf

Link Dp-2: Analysis Point Inflow=1.38 cfs 4,727 cf
Primary=1.38 cfs 4,727 cf

Total Runoff Area = 128,764 sf Runoff Volume = 34,372 cf Average Runoff Depth = 3.20"
79.23% Pervious = 102,024 sf 20.77% Impervious = 26,741 sf

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 EX-1: Subcat EX-1 Runoff Area=117,882 sf 15.74% Impervious Runoff Depth=4.02"
Flow Length=653' Tc=11.0 min CN=72 Runoff=10.72 cfs 39,463 cf

Subcatchment EX-2: Subcat EX-2 Runoff Area=10,882 sf 75.28% Impervious Runoff Depth=6.39"
Flow Length=154' Tc=6.0 min CN=93 Runoff=1.68 cfs 5,794 cf

Link Dp-1: Analysis Point Inflow=10.72 cfs 39,463 cf
Primary=10.72 cfs 39,463 cf

Link Dp-2: Analysis Point Inflow=1.68 cfs 5,794 cf
Primary=1.68 cfs 5,794 cf

Total Runoff Area = 128,764 sf Runoff Volume = 45,257 cf Average Runoff Depth = 4.22"
79.23% Pervious = 102,024 sf 20.77% Impervious = 26,741 sf

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 EX-1: Subcat EX-1 Runoff Area=117,882 sf 15.74% Impervious Runoff Depth=5.26"
Flow Length=653' Tc=11.0 min CN=72 Runoff=14.01 cfs 51,675 cf

Subcatchment EX-2: Subcat EX-2 Runoff Area=10,882 sf 75.28% Impervious Runoff Depth=7.80"
Flow Length=154' Tc=6.0 min CN=93 Runoff=2.03 cfs 7,072 cf

Link Dp-1: Analysis Point Inflow=14.01 cfs 51,675 cf
Primary=14.01 cfs 51,675 cf

Link Dp-2: Analysis Point Inflow=2.03 cfs 7,072 cf
Primary=2.03 cfs 7,072 cf

Total Runoff Area = 128,764 sf Runoff Volume = 58,746 cf Average Runoff Depth = 5.47"
79.23% Pervious = 102,024 sf 20.77% Impervious = 26,741 sf

2.2.3 Pre-Development
Full Summary 10 - Year Storm Event

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 EX-1: Subcat EX-1 Runoff Area=117,882 sf 15.74% Impervious Runoff Depth=2.01"
Flow Length=653' Tc=11.0 min CN=72 Runoff=5.29 cfs 19,792 cf

Subcatchment EX-2: Subcat EX-2 Runoff Area=10,882 sf 75.28% Impervious Runoff Depth=3.96"
Flow Length=154' Tc=6.0 min CN=93 Runoff=1.07 cfs 3,593 cf

Link Dp-1: Analysis Point Inflow=5.29 cfs 19,792 cf
Primary=5.29 cfs 19,792 cf

Link Dp-2: Analysis Point Inflow=1.07 cfs 3,593 cf
Primary=1.07 cfs 3,593 cf

Total Runoff Area = 128,764 sf Runoff Volume = 23,385 cf Average Runoff Depth = 2.18"
79.23% Pervious = 102,024 sf 20.77% Impervious = 26,741 sf

Summary for Subcatchment EX-1: Subcat EX-1

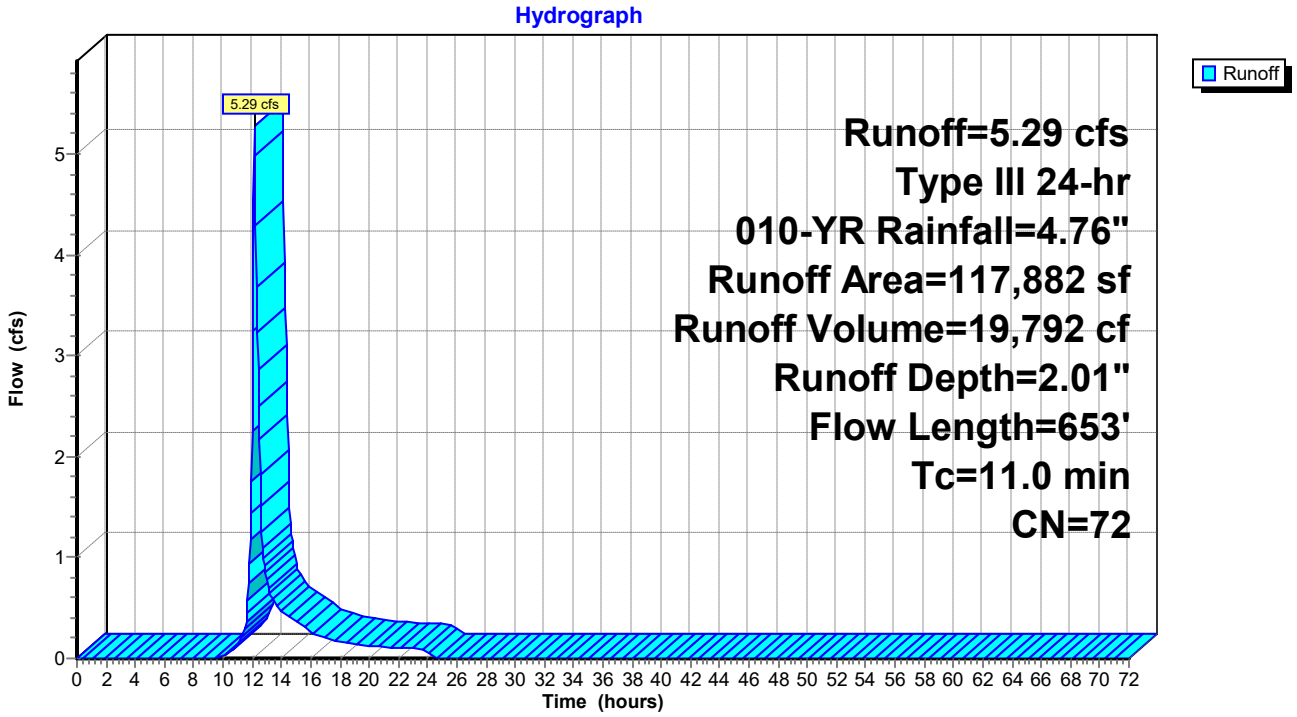
Runoff = 5.29 cfs @ 12.16 hrs, Volume= 19,792 cf, Depth= 2.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 010-YR Rainfall=4.76"

Area (sf)	CN	Description
6,205	61	>75% Grass cover, Good, HSG B
378	74	>75% Grass cover, Good, HSG C
7,305	80	>75% Grass cover, Good, HSG D
193	98	Existing Concrete Pads, HSG D
25	98	Existing Decks and Steps, HSG B
395	98	Existing Decks and Steps, HSG D
227	98	Paved parking, HSG B
14,494	98	Paved parking, HSG D
767	98	Roofs, HSG B
2,447	98	Roofs, HSG D
18,332	55	Woods, Good, HSG B
65,194	70	Woods, Good, HSG C
1,919	77	Woods, Good, HSG D
117,882	72	Weighted Average
99,333		84.26% Pervious Area
18,549		15.74% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.1	64	0.0435	0.21		**Sheet Flow, 1A** Grass: Short n= 0.150 P2= 3.14"
0.5	35	0.0291	1.28		**Sheet Flow, 1B** Smooth surfaces n= 0.011 P2= 3.14"
0.3	96	0.0528	4.66		**Shallow Concentrated Flow, 2A** Paved Kv= 20.3 fps
5.1	458	0.0879	1.48		**Shallow Concentrated Flow, 2B** Woodland Kv= 5.0 fps
11.0	653	Total			

Subcatchment EX-1: Subcat EX-1



Summary for Subcatchment EX-2: Subcat EX-2

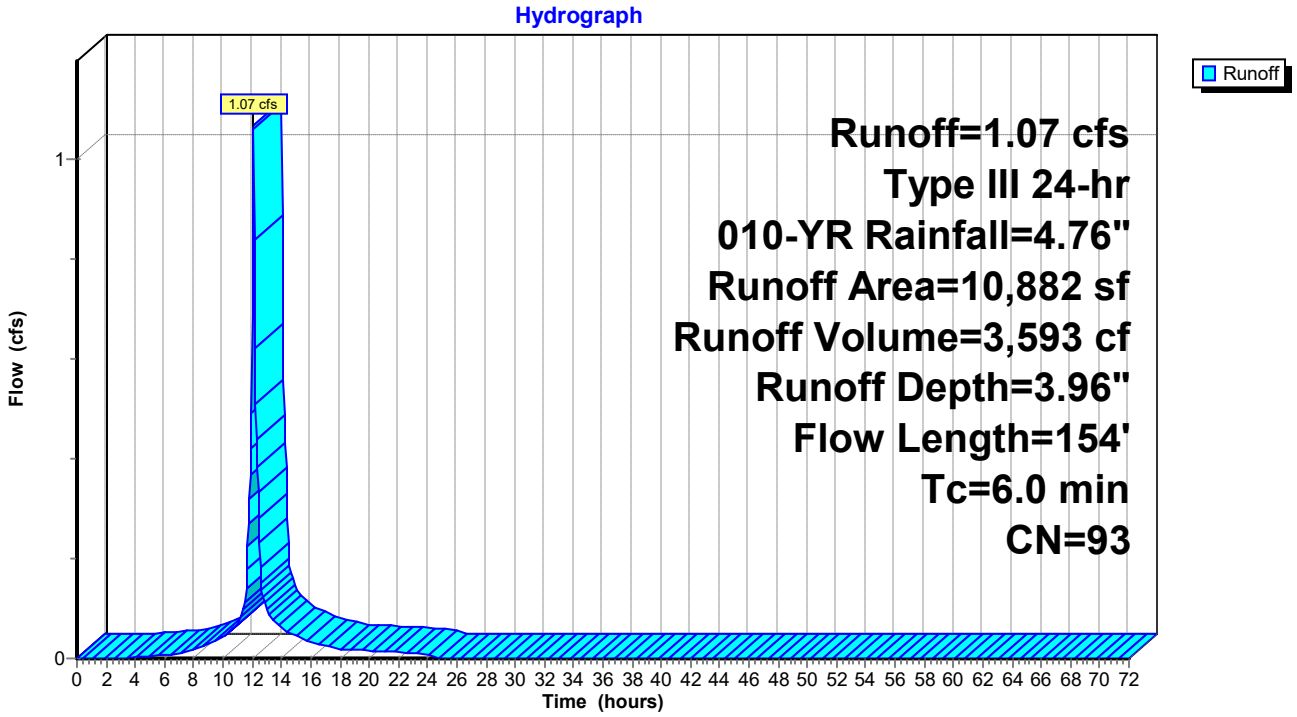
Runoff = 1.07 cfs @ 12.09 hrs, Volume= 3,593 cf, Depth= 3.96"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 010-YR Rainfall=4.76"

Area (sf)	CN	Description
943	74	>75% Grass cover, Good, HSG C
1,747	80	>75% Grass cover, Good, HSG D
508	98	Existing Concrete Pads, HSG C
30	98	Existing Concrete Pads, HSG D
6	98	Existing Decks and Steps, HSG C
97	98	Existing Decks and Steps, HSG D
2,767	98	Paved parking, HSG C
3,498	98	Paved parking, HSG D
1,285	98	Roofs, HSG D
10,882	93	Weighted Average
2,690		24.72% Pervious Area
8,192		75.28% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	14	0.2021	0.29		**Sheet Flow, 1A** Grass: Short n= 0.150 P2= 3.14"
0.6	140	0.0374	3.93		**Shallow Concentrated Flow, 2A** Paved Kv= 20.3 fps
4.6					**Direct Entry, CORRECT TO TR-55 MIN.**
6.0	154	Total			

Subcatchment EX-2: Subcat EX-2

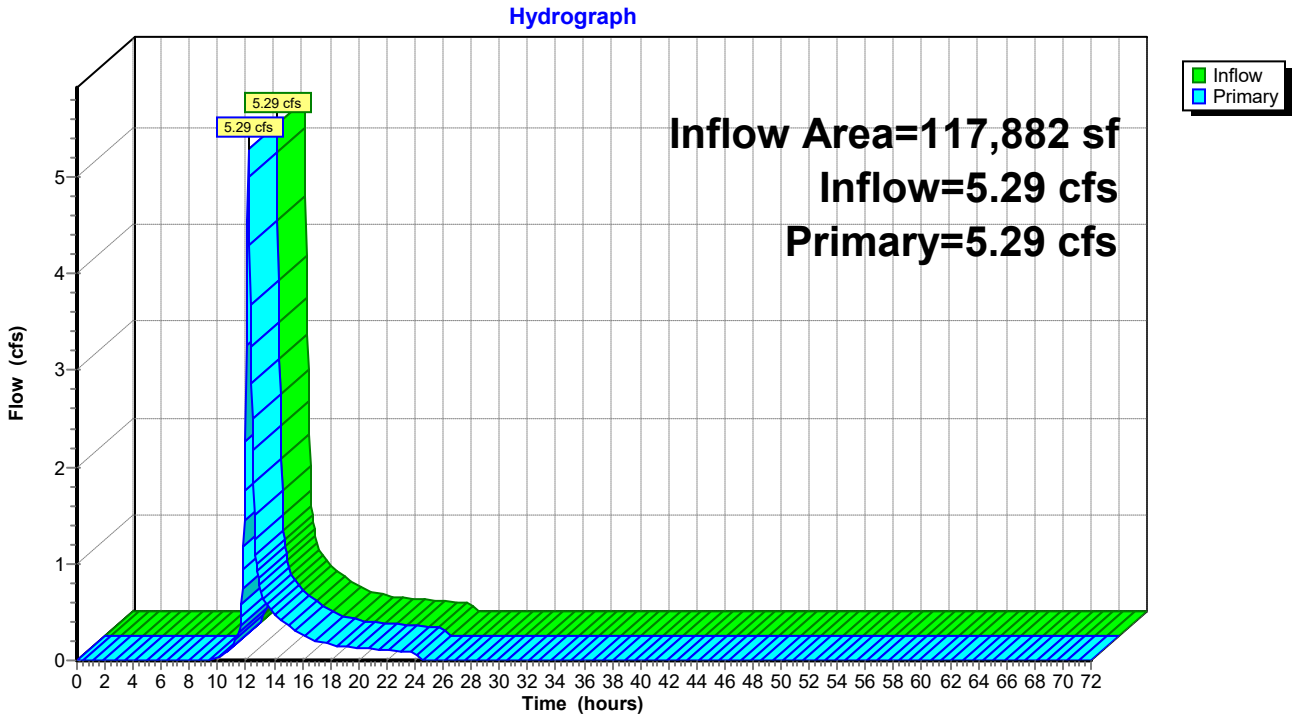


Summary for Link Dp-1: Analysis Point

Inflow Area = 117,882 sf, 15.74% Impervious, Inflow Depth = 2.01" for 010-YR event
Inflow = 5.29 cfs @ 12.16 hrs, Volume= 19,792 cf
Primary = 5.29 cfs @ 12.16 hrs, Volume= 19,792 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link Dp-1: Analysis Point

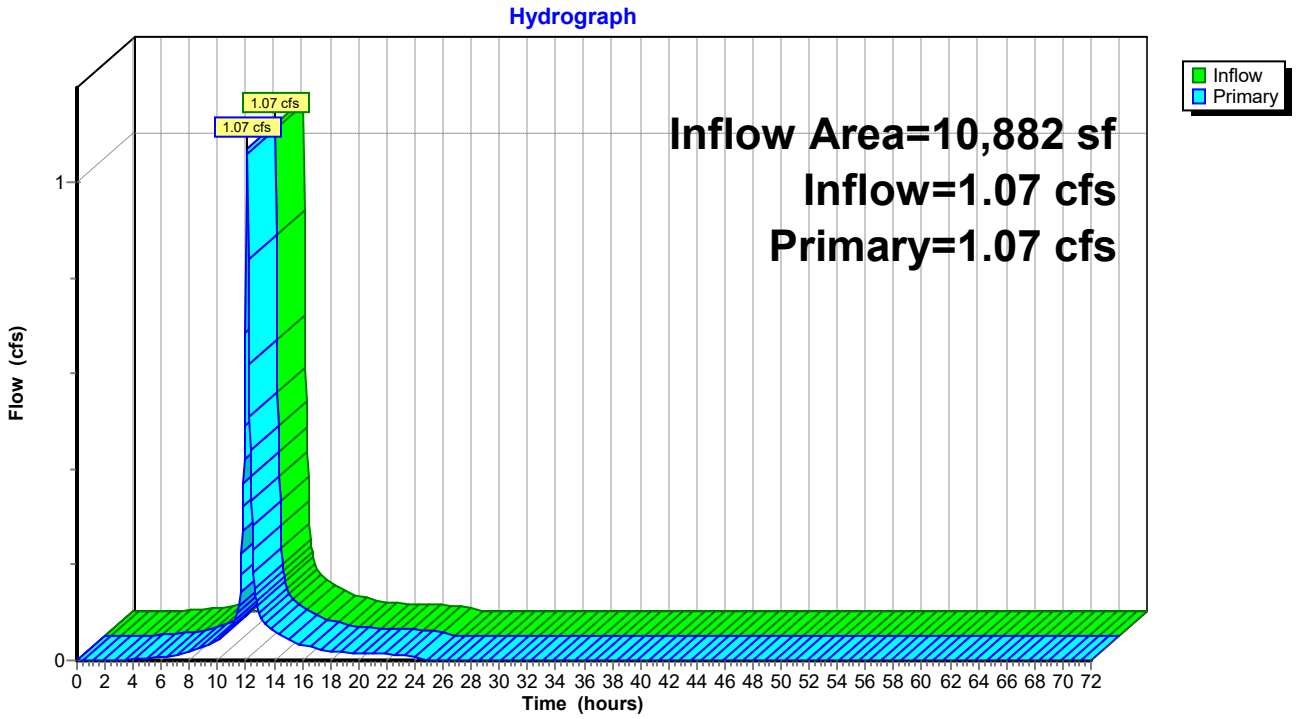


Summary for Link Dp-2: Analysis Point

Inflow Area = 10,882 sf, 75.28% Impervious, Inflow Depth = 3.96" for 010-YR event
Inflow = 1.07 cfs @ 12.09 hrs, Volume= 3,593 cf
Primary = 1.07 cfs @ 12.09 hrs, Volume= 3,593 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link Dp-2: Analysis Point



2.3 Post-Development Analysis

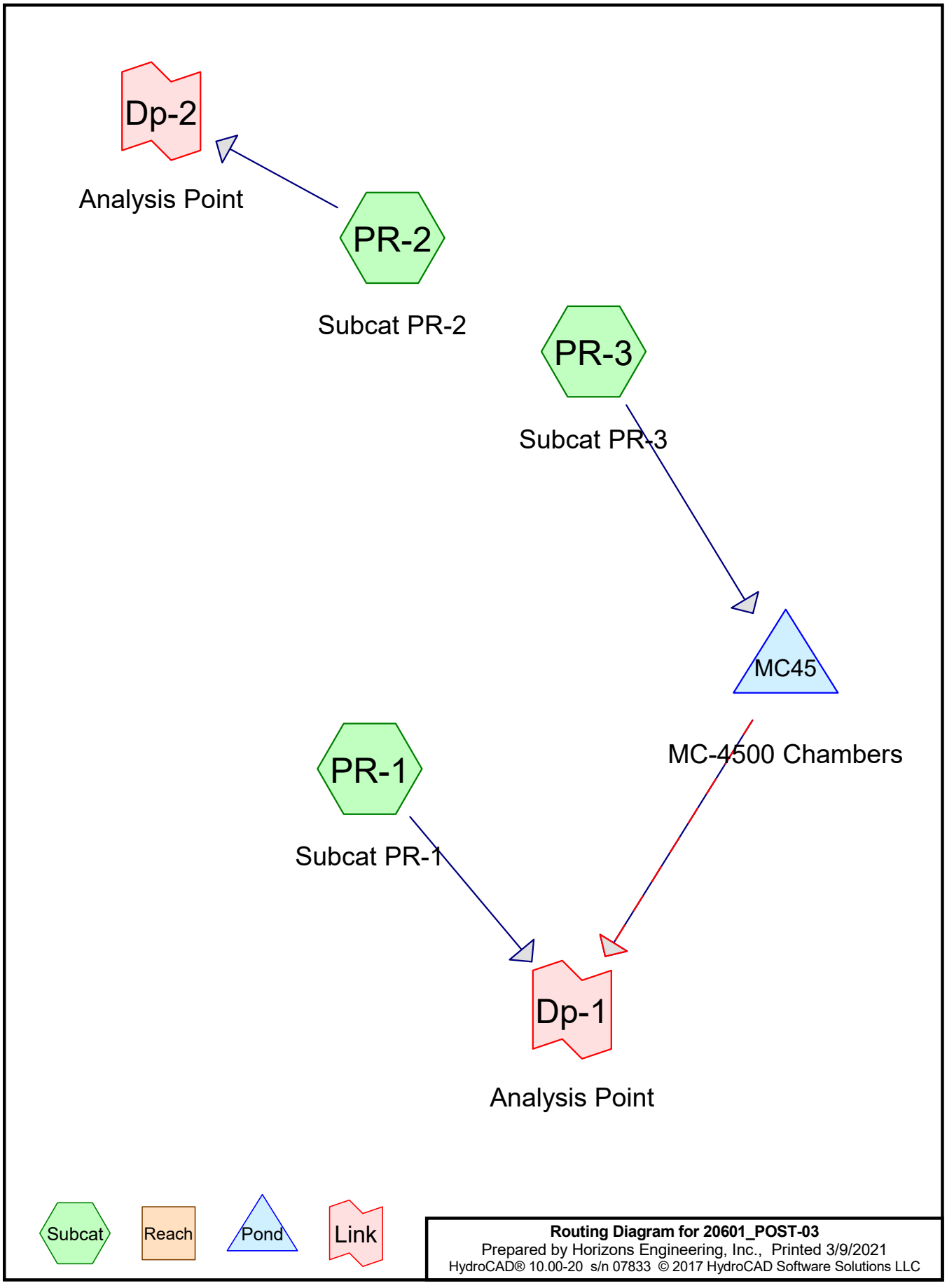
2.3 Post-Development Analysis

A post-development analysis covering 129,767 square feet includes the 79,700 square feet of disturbed area within the proposed project site as well as previously developed areas and undisturbed areas. The site has been divided into three post-development subcatchment area., Subcatchments PR-1 and PR-2 representing the areas draining directly to Drainage Point 1 (Dp-1) and Drainage Point 2 (Dp-2) respectively. PR-1 is modified from the pre-development condition by the reconstruction of the site driveway, resulting in a smaller area draining to Dp-1. PR-2 is smaller than the pre-development equivalent, EX-2, due to the exclusion of areas draining to an underground chamber system. A third subcatchment, PR-3, represents this flow contributing to the underground chamber system, and consists primarily of parking lot areas.

Stormwater from the proposed parking area will be conveyed via sheet flow to grass swale islands which lead to catch basins. These catchbasins then direct stormwater into the isolator row of an underground chamber system under the parking lot. The chamber system has been designed to detain a volume greater than the water quality volume. An overflow structure has been designed to maintain water levels within the profile of the chamber system during events up to the 100-year storm event. Orifices within the overflow structure additionally manage peak flow rates out of the system during storm events.

For more detailed information on the post-developed area, see attached drainage plans found in **Section 4** and the HydroCAD area listing found in **Section 3.4.1**. A pre- versus post-development comparison flow rate table for the 1 inch; 2, 10, 25, 50, and 100 year storm events can be found in **Table 1.0** in **Section 1.1.1**.

2.3.1 Diagram, Area Listing, Soil Listing


Dp-2
Analysis Point
PR-2
Subcat PR-2
PR-3
Subcat PR-3
MC45
MC-4500 Chambers
PR-1
Subcat PR-1
Dp-1
Analysis Point
Subcat
Reach
Pond
Link
Routing Diagram for 20601_POST-03
Prepared by Horizons Engineering, Inc., Printed 3/9/2021
HydroCAD® 10.00-20 s/n 07833 © 2017 HydroCAD Software Solutions LLC

Area Listing (selected nodes)

Area (sq-ft)	CN	Description (subcatchment-numbers)
6,263	61	>75% Grass cover, Good, HSG B (PR-1, PR-3)
10,566	74	>75% Grass cover, Good, HSG C (PR-1, PR-2, PR-3)
10,834	80	>75% Grass cover, Good, HSG D (PR-1, PR-2, PR-3)
40	98	Existing Concrete Pads, HSG B (PR-3)
584	98	Existing Concrete Pads, HSG C (PR-2)
3,050	98	Existing Concrete Pads, HSG D (PR-2, PR-3)
6	98	Existing Decks and Steps, HSG C (PR-2)
492	98	Existing Decks and Steps, HSG D (PR-2, PR-3)
17,828	98	Paved parking, HSG B (PR-3)
32,163	98	Paved parking, HSG C (PR-2, PR-3)
15,386	98	Paved parking, HSG D (PR-2, PR-3)
3,732	98	Roofs, HSG D (PR-2, PR-3)
1,424	55	Woods, Good, HSG B (PR-1, PR-3)
27,003	70	Woods, Good, HSG C (PR-1)
175	77	Woods, Good, HSG D (PR-1, PR-3)
129,547	**86**	**TOTAL AREA**

Soil Listing (selected nodes)

Area (sq-ft)	Soil Group	Subcatchment Numbers
0	HSG A	
25,555	HSG B	PR-1, PR-3
70,323	HSG C	PR-1, PR-2, PR-3
33,670	HSG D	PR-1, PR-2, PR-3
0	Other	
129,547		**TOTAL AREA**

Ground Covers (selected nodes)

HSG-A (sq-ft)	HSG-B (sq-ft)	HSG-C (sq-ft)	HSG-D (sq-ft)	Other (sq-ft)	Total (sq-ft)	Ground Cover	Su Nu
0	6,263	10,566	10,834	0	27,663	>75% Grass cover, Good	
0	40	584	3,050	0	3,675	Existing Concrete Pads	
0	0	6	492	0	499	Existing Decks and Steps	
0	17,828	32,163	15,386	0	65,377	Paved parking	
0	0	0	3,732	0	3,732	Roofs	
0	1,424	27,003	175	0	28,602	Woods, Good	
0	**25,555**	**70,323**	**33,670**	**0**	**129,547**	**TOTAL AREA**	

2.3.2 Post-Development
Node Listing for the 2, 10, 25, 50, and 100 Year Storm Events

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 PR-1: Subcat PR-1 Runoff Area=38,120 sf 0.00% Impervious Runoff Depth=0.79"
Flow Length=237' Tc=6.0 min CN=70 Runoff=0.71 cfs 2,520 cf

Subcatchment PR-2: Subcat PR-2 Runoff Area=9,503 sf 71.13% Impervious Runoff Depth=2.29"
Flow Length=154' Tc=6.0 min CN=92 Runoff=0.56 cfs 1,816 cf

Subcatchment PR-3: Subcat PR-3 Runoff Area=81,924 sf 81.20% Impervious Runoff Depth=2.49"
Tc=6.0 min CN=94 Runoff=5.14 cfs 16,970 cf

Pond MC45: MC-4500 Chambers Peak Elev=55.56' Storage=6,952 cf Inflow=5.14 cfs 16,970 cf
Discarded=0.11 cfs 10,478 cf Primary=1.78 cfs 6,492 cf Outflow=1.89 cfs 16,970 cf

Link Dp-1: Analysis Point Inflow=2.15 cfs 9,012 cf
Primary=2.15 cfs 9,012 cf

Link Dp-2: Analysis Point Inflow=0.56 cfs 1,816 cf
Primary=0.56 cfs 1,816 cf

Total Runoff Area = 129,547 sf Runoff Volume = 21,306 cf Average Runoff Depth = 1.97"
43.43% Pervious = 56,265 sf 56.57% Impervious = 73,282 sf

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 PR-1: Subcat PR-1 Runoff Area=38,120 sf 0.00% Impervious Runoff Depth=1.86"
Flow Length=237' Tc=6.0 min CN=70 Runoff=1.83 cfs 5,909 cf

Subcatchment PR-2: Subcat PR-2 Runoff Area=9,503 sf 71.13% Impervious Runoff Depth=3.86"
Flow Length=154' Tc=6.0 min CN=92 Runoff=0.92 cfs 3,053 cf

Subcatchment PR-3: Subcat PR-3 Runoff Area=81,924 sf 81.20% Impervious Runoff Depth=4.07"
Tc=6.0 min CN=94 Runoff=8.18 cfs 27,795 cf

Pond MC45: MC-4500 Chambers Peak Elev=56.67' Storage=9,701 cf Inflow=8.18 cfs 27,795 cf
Discarded=0.13 cfs 11,702 cf Primary=3.97 cfs 16,093 cf Outflow=4.10 cfs 27,795 cf

Link Dp-1: Analysis Point Inflow=5.28 cfs 22,002 cf
Primary=5.28 cfs 22,002 cf

Link Dp-2: Analysis Point Inflow=0.92 cfs 3,053 cf
Primary=0.92 cfs 3,053 cf

Total Runoff Area = 129,547 sf Runoff Volume = 36,757 cf Average Runoff Depth = 3.40"
43.43% Pervious = 56,265 sf 56.57% Impervious = 73,282 sf

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 PR-1: Subcat PR-1 Runoff Area=38,120 sf 0.00% Impervious Runoff Depth=2.83"
Flow Length=237' Tc=6.0 min CN=70 Runoff=2.83 cfs 8,987 cf

Subcatchment PR-2: Subcat PR-2 Runoff Area=9,503 sf 71.13% Impervious Runoff Depth=5.10"
Flow Length=154' Tc=6.0 min CN=92 Runoff=1.19 cfs 4,038 cf

Subcatchment PR-3: Subcat PR-3 Runoff Area=81,924 sf 81.20% Impervious Runoff Depth=5.33"
Tc=6.0 min CN=94 Runoff=10.54 cfs 36,363 cf

Pond MC45: MC-4500 Chambers Peak Elev=57.51' Storage=11,546 cf Inflow=10.54 cfs 36,363 cf
Discarded=0.15 cfs 12,240 cf Primary=5.11 cfs 24,123 cf Outflow=5.26 cfs 36,363 cf

Link Dp-1: Analysis Point Inflow=7.23 cfs 33,109 cf
Primary=7.23 cfs 33,109 cf

Link Dp-2: Analysis Point Inflow=1.19 cfs 4,038 cf
Primary=1.19 cfs 4,038 cf

Total Runoff Area = 129,547 sf Runoff Volume = 49,388 cf Average Runoff Depth = 4.57"
43.43% Pervious = 56,265 sf 56.57% Impervious = 73,282 sf

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 PR-1: Subcat PR-1 Runoff Area=38,120 sf 0.00% Impervious Runoff Depth=3.80"
Flow Length=237' Tc=6.0 min CN=70 Runoff=3.82 cfs 12,078 cf

Subcatchment PR-2: Subcat PR-2 Runoff Area=9,503 sf 71.13% Impervious Runoff Depth=6.27"
Flow Length=154' Tc=6.0 min CN=92 Runoff=1.45 cfs 4,967 cf

Subcatchment PR-3: Subcat PR-3 Runoff Area=81,924 sf 81.20% Impervious Runoff Depth=6.51"
Tc=6.0 min CN=94 Runoff=12.73 cfs 44,422 cf

Pond MC45: MC-4500 Chambers Peak Elev=58.43' Storage=13,093 cf Inflow=12.73 cfs 44,422 cf
Discarded=0.16 cfs 12,593 cf Primary=6.11 cfs 31,828 cf Outflow=6.27 cfs 44,422 cf

Link Dp-1: Analysis Point Inflow=9.04 cfs 43,906 cf
Primary=9.04 cfs 43,906 cf

Link Dp-2: Analysis Point Inflow=1.45 cfs 4,967 cf
Primary=1.45 cfs 4,967 cf

Total Runoff Area = 129,547 sf Runoff Volume = 61,466 cf Average Runoff Depth = 5.69"
43.43% Pervious = 56,265 sf 56.57% Impervious = 73,282 sf

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 PR-1: Subcat PR-1 Runoff Area=38,120 sf 0.00% Impervious Runoff Depth=5.02"
Flow Length=237' Tc=6.0 min CN=70 Runoff=5.04 cfs 15,944 cf

Subcatchment PR-2: Subcat PR-2 Runoff Area=9,503 sf 71.13% Impervious Runoff Depth=7.68"
Flow Length=154' Tc=6.0 min CN=92 Runoff=1.76 cfs 6,080 cf

Subcatchment PR-3: Subcat PR-3 Runoff Area=81,924 sf 81.20% Impervious Runoff Depth=7.92"
Tc=6.0 min CN=94 Runoff=15.34 cfs 54,060 cf

Pond MC45: MC-4500 Chambers Peak Elev=59.16' Storage=14,055 cf Inflow=15.34 cfs 54,060 cf
Discarded=0.17 cfs 12,930 cf Primary=10.41 cfs 41,130 cf Outflow=10.58 cfs 54,060 cf

Link Dp-1: Analysis Point Inflow=13.82 cfs 57,074 cf
Primary=13.82 cfs 57,074 cf

Link Dp-2: Analysis Point Inflow=1.76 cfs 6,080 cf
Primary=1.76 cfs 6,080 cf

Total Runoff Area = 129,547 sf Runoff Volume = 76,084 cf Average Runoff Depth = 7.05"
43.43% Pervious = 56,265 sf 56.57% Impervious = 73,282 sf

2.3.3 Post-Development
Full Summary 10 - Year Storm Event

Pipe Listing (selected 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	MC45	53.60	48.50	72.0	0.0708	0.013	24.0	0.0	0.0
2	MC45	58.50	58.92	21.1	-0.0199	0.013	18.0	0.0	0.0

Notes Listing (selected nodes)

Line#	Node Number	Notes
1	MC45	ADS Stormtech MC4500 chamber system.
2		Exfiltration rate based on published Ksat value (23.2833um/s) for Hollis-Charlton fine sandy loam, converted to in/hr with a 4X factor of safety applied via discharge multiplier.
3		Note: Due to program limitations, 80 chambers are included in this model. 81 chambers are depicted on the project plan. This should make the hydraulic model more conservative.

Time span=0.00-72.00 hrs, dt=0.05 hrs, 1441 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 PR-1: Subcat PR-1 Runoff Area=38,120 sf 0.00% Impervious Runoff Depth=1.86"
Flow Length=237' Tc=6.0 min CN=70 Runoff=1.83 cfs 5,909 cf

Subcatchment PR-2: Subcat PR-2 Runoff Area=9,503 sf 71.13% Impervious Runoff Depth=3.86"
Flow Length=154' Tc=6.0 min CN=92 Runoff=0.92 cfs 3,053 cf

Subcatchment PR-3: Subcat PR-3 Runoff Area=81,924 sf 81.20% Impervious Runoff Depth=4.07"
Tc=6.0 min CN=94 Runoff=8.18 cfs 27,795 cf

Pond MC45: MC-4500 Chambers Peak Elev=56.67' Storage=9,701 cf Inflow=8.18 cfs 27,795 cf
Discarded=0.13 cfs 11,702 cf Primary=3.97 cfs 16,093 cf Outflow=4.10 cfs 27,795 cf

Link Dp-1: Analysis Point Inflow=5.28 cfs 22,002 cf
Primary=5.28 cfs 22,002 cf

Link Dp-2: Analysis Point Inflow=0.92 cfs 3,053 cf
Primary=0.92 cfs 3,053 cf

Total Runoff Area = 129,547 sf Runoff Volume = 36,757 cf Average Runoff Depth = 3.40"
43.43% Pervious = 56,265 sf 56.57% Impervious = 73,282 sf

Summary for Subcatchment PR-1: Subcat PR-1

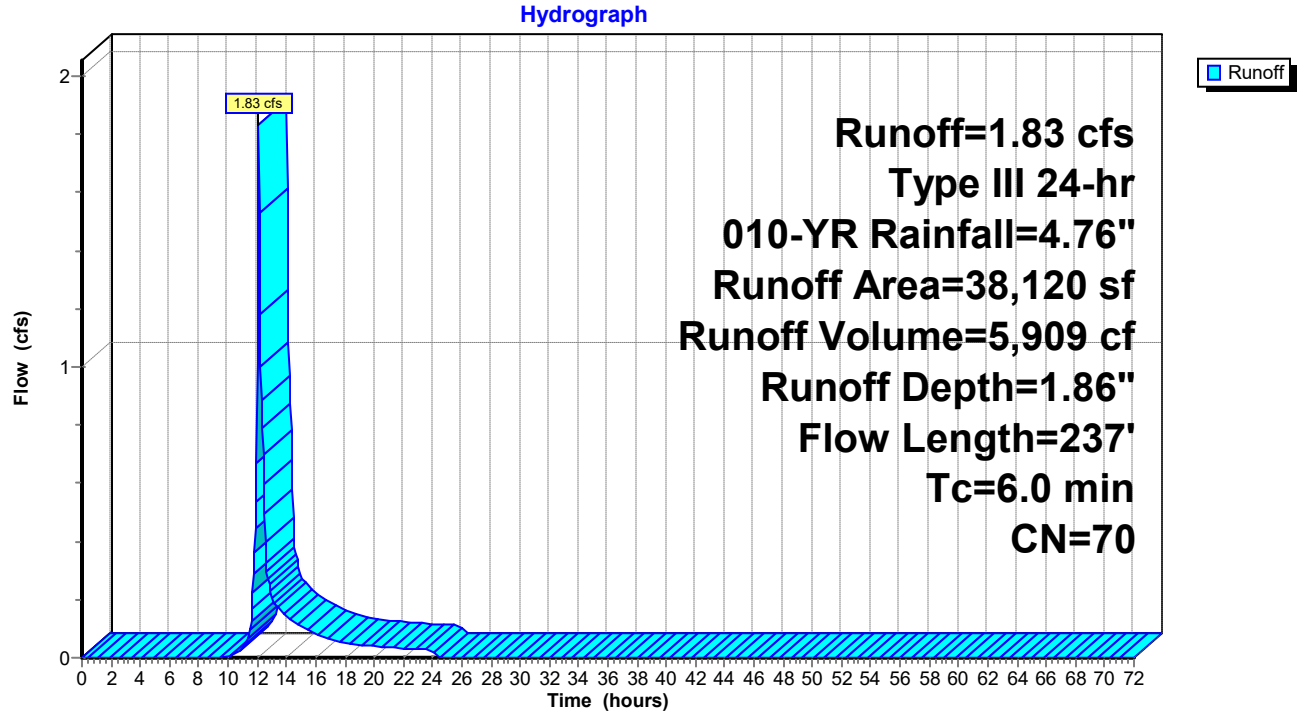
Runoff = 1.83 cfs @ 12.10 hrs, Volume= 5,909 cf, Depth= 1.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 010-YR Rainfall=4.76"

Area (sf)	CN	Description
3,221	61	>75% Grass cover, Good, HSG B
4,620	74	>75% Grass cover, Good, HSG C
1,709	80	>75% Grass cover, Good, HSG D
1,416	55	Woods, Good, HSG B
27,003	70	Woods, Good, HSG C
151	77	Woods, Good, HSG D
38,120	70	Weighted Average
38,120		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
2.7	36	0.0479	0.22		**Sheet Flow, 1A** Range n= 0.130 P2= 3.14"
1.8	201	0.1312	1.81		**Shallow Concentrated Flow, 2A** Woodland Kv= 5.0 fps
1.5					**Direct Entry, CORRECT TO TR-55 MIN.**
6.0	237	Total			

Subcatchment PR-1: Subcat PR-1



Summary for Subcatchment PR-2: Subcat PR-2

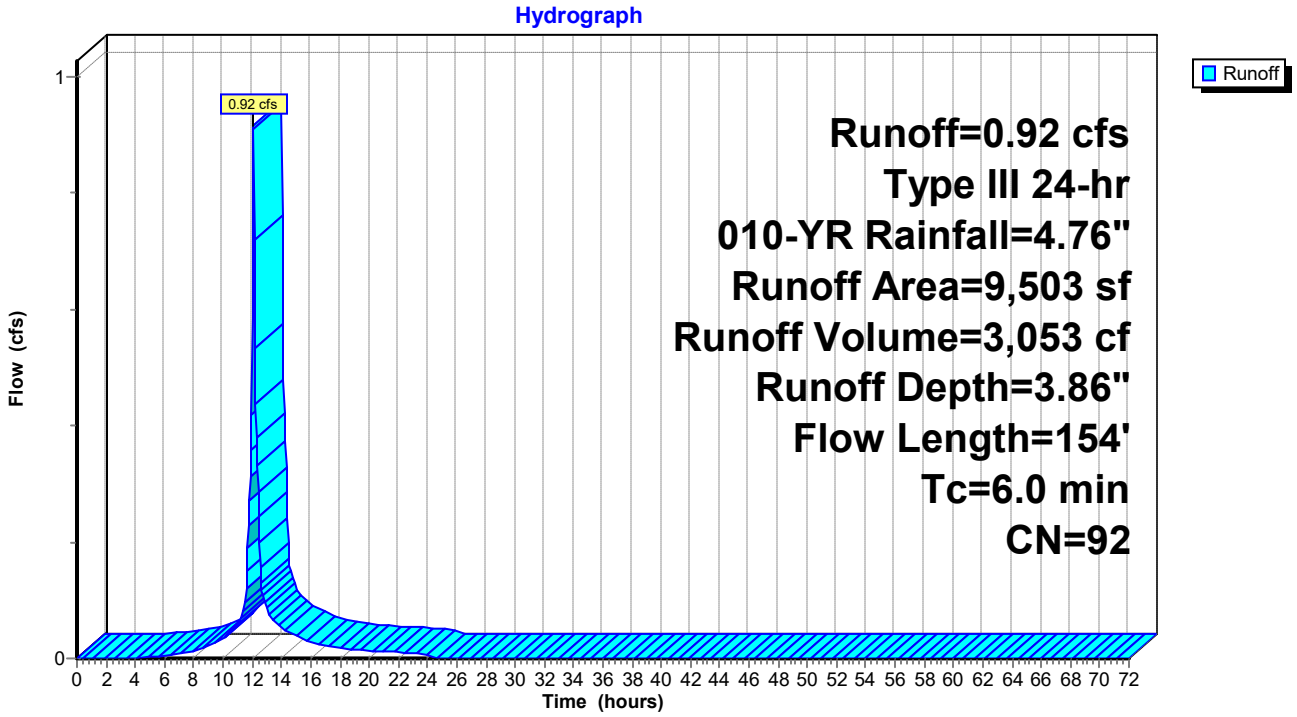
Runoff = 0.92 cfs @ 12.09 hrs, Volume= 3,053 cf, Depth= 3.86"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 010-YR Rainfall=4.76"

Area (sf)	CN	Description
875	74	>75% Grass cover, Good, HSG C
1,869	80	>75% Grass cover, Good, HSG D
584	98	Existing Concrete Pads, HSG C
1,089	98	Existing Concrete Pads, HSG D
6	98	Existing Decks and Steps, HSG C
97	98	Existing Decks and Steps, HSG D
2,759	98	Paved parking, HSG C
1,235	98	Paved parking, HSG D
988	98	Roofs, HSG D
9,503	92	Weighted Average
2,744		28.87% Pervious Area
6,759		71.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
0.8	14	0.2021	0.29		**Sheet Flow, 1A** Grass: Short n= 0.150 P2= 3.14"
0.6	140	0.0374	3.93		**Shallow Concentrated Flow, 2A** Paved Kv= 20.3 fps
4.6					**Direct Entry, CORRECT TO TR-55 MIN.**
6.0	154	Total			

Subcatchment PR-2: Subcat PR-2



Summary for Subcatchment PR-3: Subcat PR-3

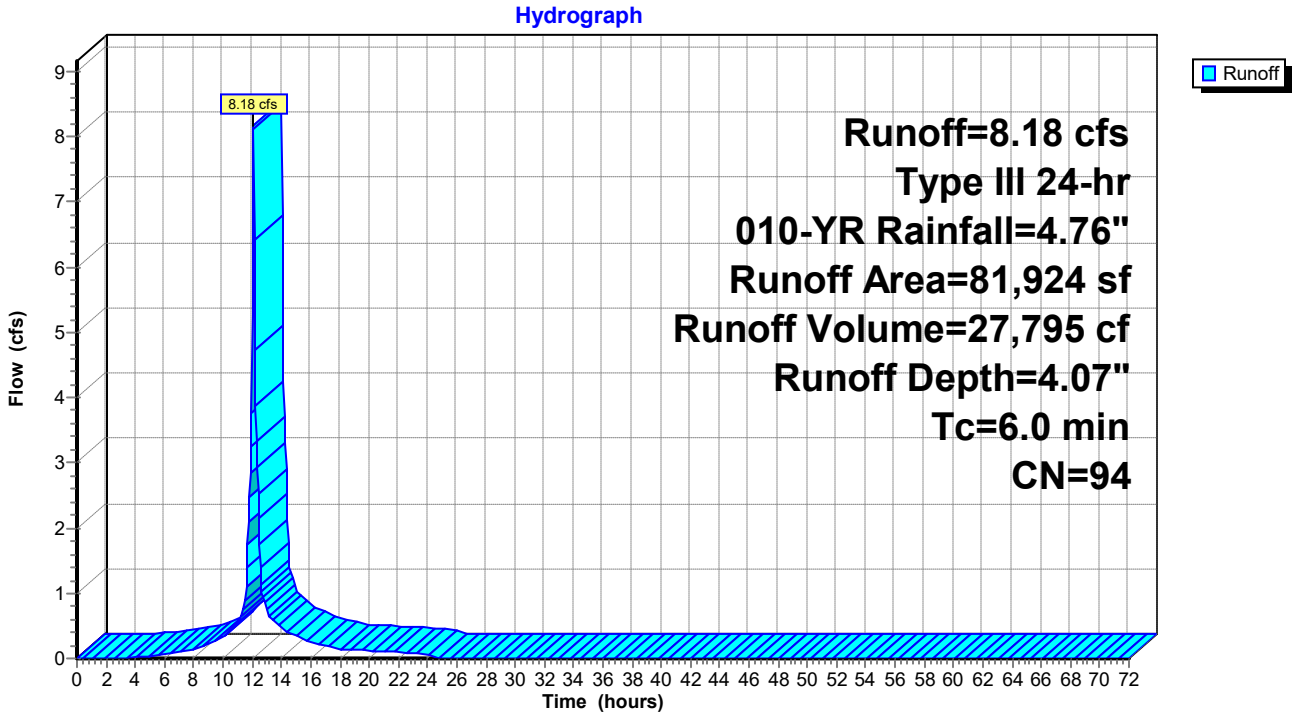
Runoff = 8.18 cfs @ 12.09 hrs, Volume= 27,795 cf, Depth= 4.07"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Type III 24-hr 010-YR Rainfall=4.76"

Area (sf)	CN	Description
3,042	61	>75% Grass cover, Good, HSG B
5,071	74	>75% Grass cover, Good, HSG C
7,256	80	>75% Grass cover, Good, HSG D
40	98	Existing Concrete Pads, HSG B
0	98	Existing Concrete Pads, HSG C
1,961	98	Existing Concrete Pads, HSG D
395	98	Existing Decks and Steps, HSG D
17,828	98	Paved parking, HSG B
29,404	98	Paved parking, HSG C
14,151	98	Paved parking, HSG D
2,744	98	Roofs, HSG D
8	55	Woods, Good, HSG B
24	77	Woods, Good, HSG D
81,924	94	Weighted Average
15,401		18.80% Pervious Area
66,523		81.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.0					**Direct Entry, TR-55 MINIMUM**

Subcatchment PR-3: Subcat PR-3



Summary for Pond MC45: MC-4500 Chambers

ADS Stormtech MC4500 chamber system.
Exfiltration rate based on published Ksat value (23.2833um/s) for Hollis-Charlton fine sandy loam, converted to in/hr with a 4X factor of safety applied via discharge multiplier.

Note: Due to program limitations, 80 chambers are included in this model. 81 chambers are depicted on the project plan. This should make the hydraulic model more conservative.

Inflow Area =	81,924 sf,	81.20% Impervious,	Inflow Depth =	4.07"	for 010-YR event
Inflow =	8.18 cfs @	12.09 hrs,	Volume=	27,795 cf	
Outflow =	4.10 cfs @	12.24 hrs,	Volume=	27,795 cf,	Atten= 50%, Lag= 9.2 min
Discarded =	0.13 cfs @	12.24 hrs,	Volume=	11,702 cf	
Primary =	3.97 cfs @	12.24 hrs,	Volume=	16,093 cf	

Routing by Stor-Ind method, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs
Peak Elev= 56.67' @ 12.24 hrs Surf.Area= 3,293 sf Storage= 9,701 cf

Plug-Flow detention time= 257.2 min calculated for 27,795 cf (100% of inflow)
Center-of-Mass det. time= 257.0 min (1,031.9 - 774.9)

Volume	Invert	Avail.Storage	Storage Description
#1A	52.50'	5,698 cf	**37.58'W x 87.62'L x 7.00'H Field A** 23,050 cf Overall - 8,805 cf Embedded = 14,246 cf x 40.0% Voids
#2A	53.50'	8,805 cf	**ADS_StormTech MC-4500 +Cap** x 80 Inside #1 Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap 4 Rows of 20 Chambers Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf
		14,503 cf	Total Available Storage

Storage Group A created with Chamber Wizard

Device	Routing	Invert	Outlet Devices
#1	Discarded	52.50'	**3.300 in/hr Exfiltration X 0.25 over Horizontal area** Conductivity to Groundwater Elevation = 48.67' Phase-In= 0.05'
#2	Device 5	54.95'	**20.0" W x 4.0" H Vert. Low Orifice 4"HX20"W** C= 0.600
#3	Device 5	55.95'	**12.0" W x 2.0" H Vert. Medium Flow 2"Hx12"W** C= 0.600
#4	Device 5	58.85'	**6.0' long Sharp-Crested Rectangular Weir** 2 End Contraction(s)
#5	Primary	53.60'	**24.0" Round 24" HDPE outlet** L= 72.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 53.60' / 48.50' S= 0.0708 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 3.14 sf
#6	Device 5	58.92'	**18.0" Round 18" BYPASS from CB-100** L= 21.1' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 58.50' / 58.92' S= -0.0199 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.77 sf

Discarded OutFlow Max=0.13 cfs @ 12.24 hrs HW=56.67' (Free Discharge)
└**1=Exfiltration** (Controls 0.13 cfs)

Primary OutFlow Max=3.97 cfs @ 12.24 hrs HW=56.67' (Free Discharge)
└**5=24" HDPE outlet** (Passes 3.97 cfs of 21.75 cfs potential flow)
  ├**2=Low Orifice 4"HX20"W** (Orifice Controls 3.33 cfs @ 5.99 fps)
  ├**3=Medium Flow 2"Hx12"W** (Orifice Controls 0.64 cfs @ 3.83 fps)
  ├**4=Sharp-Crested Rectangular Weir** (Controls 0.00 cfs)
  └**6=18" BYPASS from CB-100** (Controls 0.00 cfs)

Pond MC45: MC-4500 Chambers - Chamber Wizard Field A

Chamber Model = ADS_StormTech MC-4500 +Cap (ADS StormTech® MC-4500 with cap volume)
Effective Size= 90.4"W x 60.0"H => 26.46 sf x 4.03'L = 106.5 cf
Overall Size= 100.0"W x 60.0"H x 4.33'L with 0.31' Overlap
Cap Storage= +35.7 cf x 2 x 4 rows = 285.6 cf

100.0" Wide + 9.0" Spacing = 109.0" C-C Row Spacing

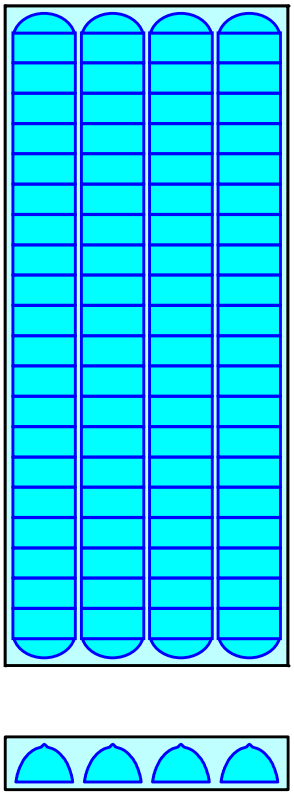
20 Chambers/Row x 4.02' Long +2.56' Cap Length x 2 = 85.62' Row Length +12.0" End Stone x 2 = 87.62' Base Length
4 Rows x 100.0" Wide + 9.0" Spacing x 3 + 12.0" Side Stone x 2 = 37.58' Base Width
12.0" Base + 60.0" Chamber Height + 12.0" Cover = 7.00' Field Height

80 Chambers x 106.5 cf + 35.7 cf Cap Volume x 2 x 4 Rows = 8,804.8 cf Chamber Storage

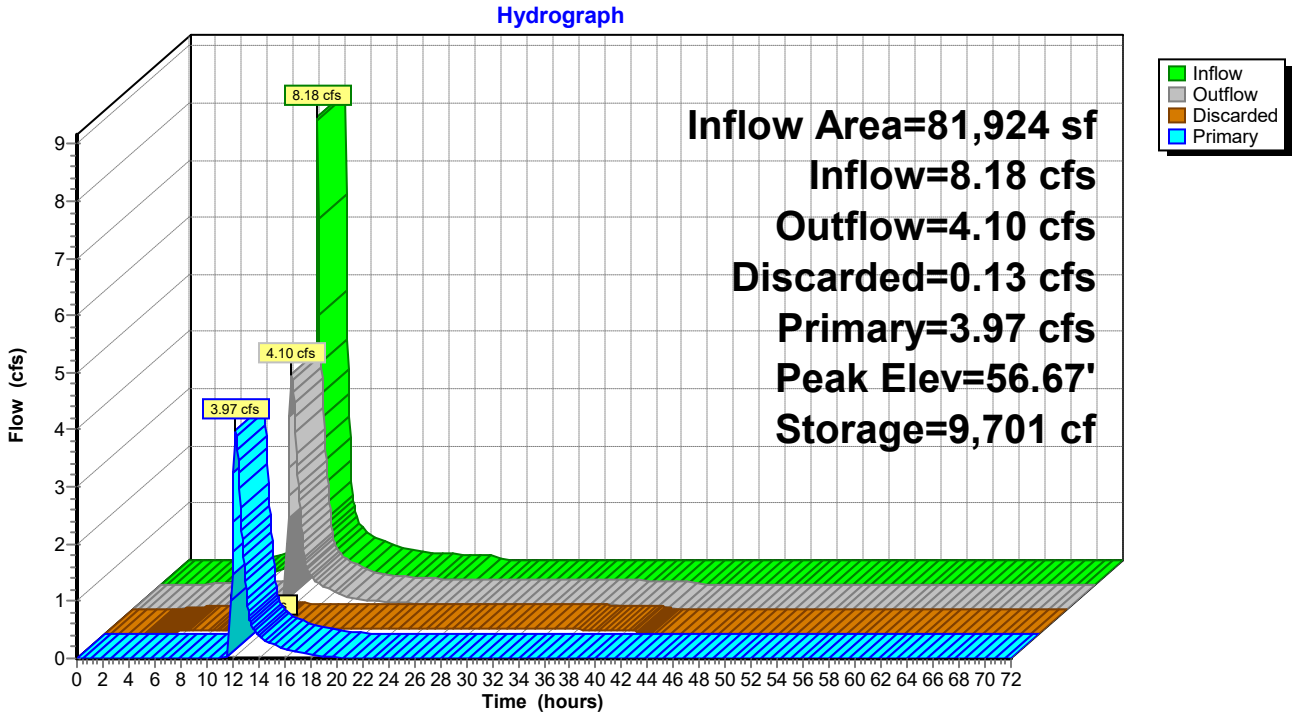
23,050.5 cf Field - 8,804.8 cf Chambers = 14,245.7 cf Stone x 40.0% Voids = 5,698.3 cf Stone Storage

Chamber Storage + Stone Storage = 14,503.1 cf = 0.333 af
Overall Storage Efficiency = 62.9%
Overall System Size = 87.62' x 37.58' x 7.00'

80 Chambers
853.7 cy Field
527.6 cy Stone



Pond MC45: MC-4500 Chambers

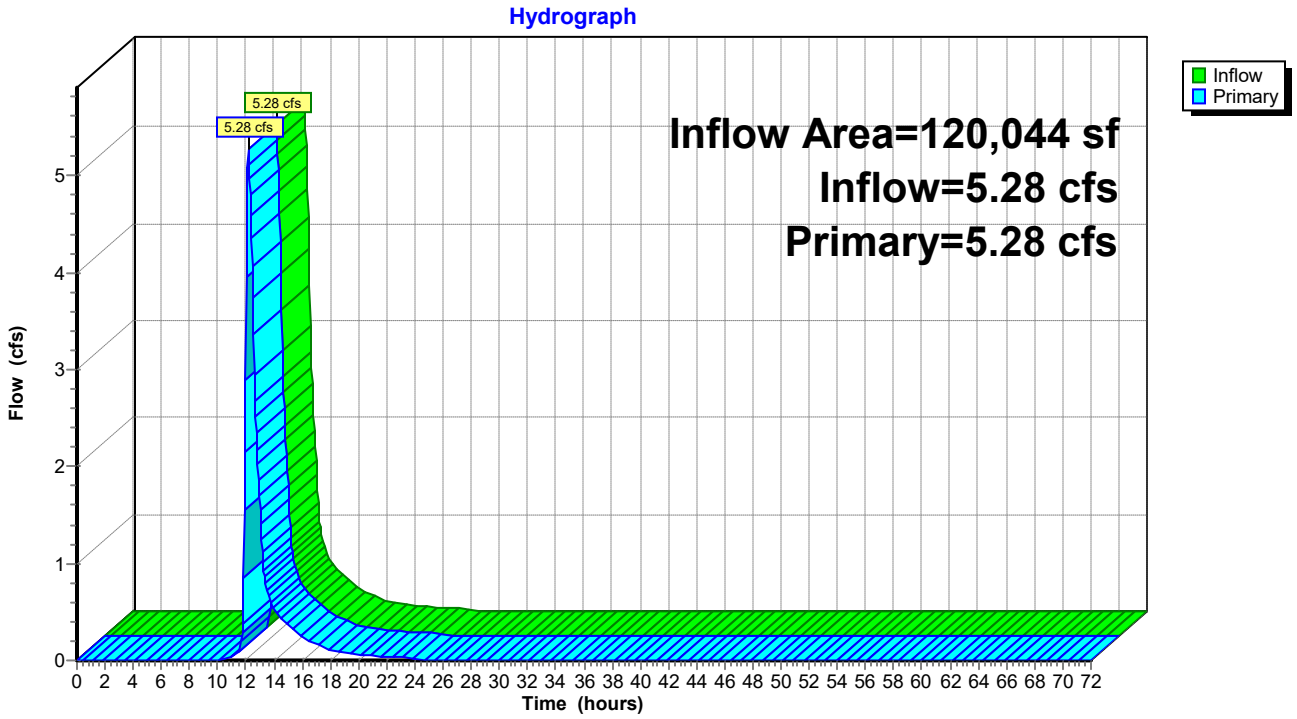


Summary for Link Dp-1: Analysis Point

Inflow Area = 120,044 sf, 55.42% Impervious, Inflow Depth = 2.20" for 010-YR event
Inflow = 5.28 cfs @ 12.15 hrs, Volume= 22,002 cf
Primary = 5.28 cfs @ 12.15 hrs, Volume= 22,002 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link Dp-1: Analysis Point

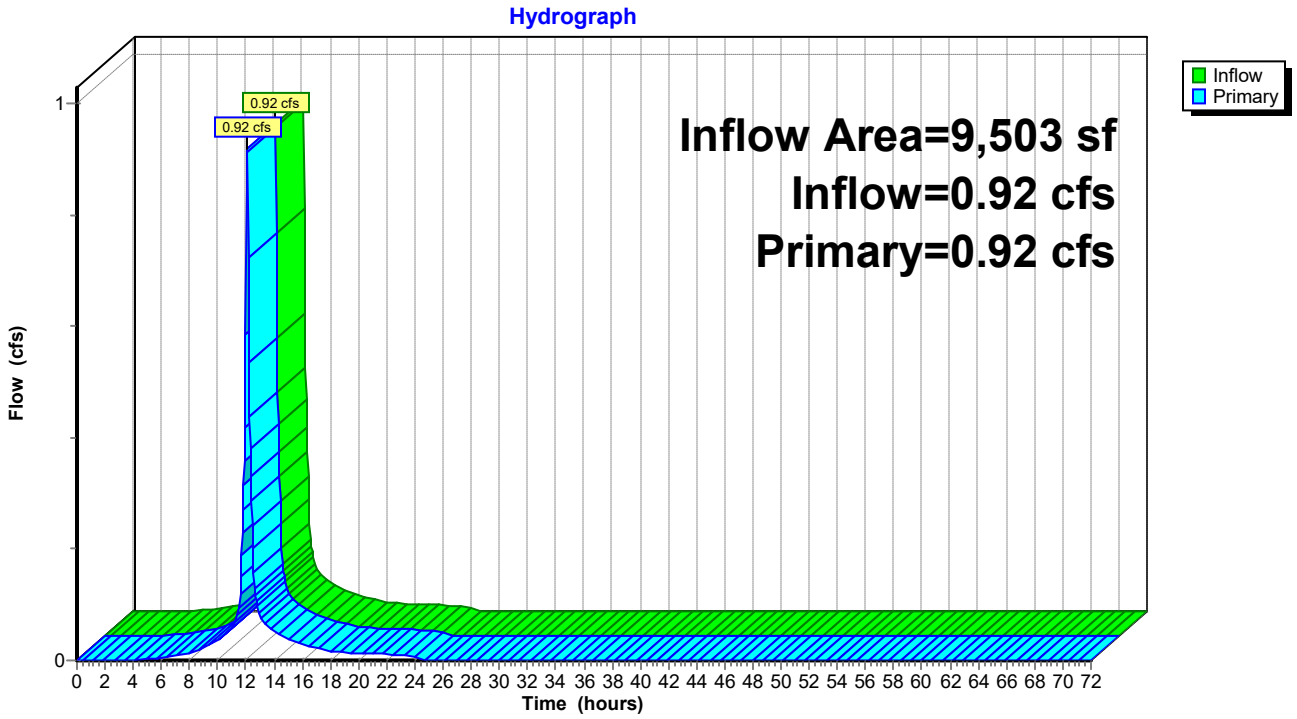


Summary for Link Dp-2: Analysis Point

Inflow Area = 9,503 sf, 71.13% Impervious, Inflow Depth = 3.86" for 010-YR event
Inflow = 0.92 cfs @ 12.09 hrs, Volume= 3,053 cf
Primary = 0.92 cfs @ 12.09 hrs, Volume= 3,053 cf, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 0.00-72.00 hrs, dt= 0.05 hrs

Link Dp-2: Analysis Point



2.4 Stone Riprap Calculations
(Energy Dissipation – Stability Calculations)

Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Monday, Feb 1 2021

P-300

Invert Elev Dn (ft)	=	48.50
Pipe Length (ft)	=	70.20
Slope (%)	=	7.26
Invert Elev Up (ft)	=	53.60
Rise (in)	=	24.0
Shape	=	Circular
Span (in)	=	24.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

Top Elevation (ft)	=	61.80
Top Width (ft)	=	6.30
Crest Width (ft)	=	10.00

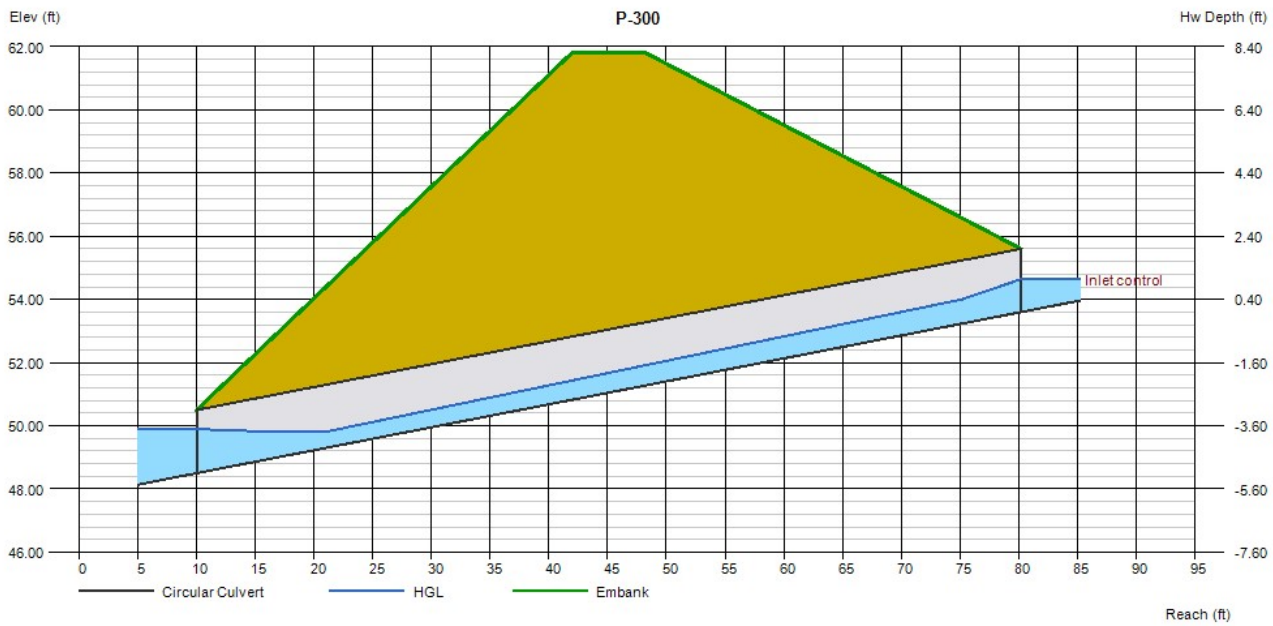
Calculations

Qmin (cfs)	=	5.06
Qmax (cfs)	=	5.06
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	5.06
Qpipe (cfs)	=	5.06
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.16
Veloc Up (ft/s)	=	4.37
HGL Dn (ft)	=	49.90
HGL Up (ft)	=	54.39
Hw Elev (ft)	=	54.64
Hw/D (ft)	=	0.52
Flow Regime	=	Inlet Control

DEPTH = HGLdn - INVdn
DEPTH = 49.90 - 48.50
DEPTH = 1.40 FT



Calculations 25 year storm

Project:	19 & 21 Main Street
Performed By:	CJH
Checked By:	
Date:	10/28/2020

Apron Length

When Tail water depth at pipe outlet is **less (<)** than 1/2 the dia. pipe

use **Eq 1**: $La = \frac{1.8 \times Q}{D^{3/2}} + 7 \times D$

When Tail water depth at pipe outlet is **greater (>)** than 1/2 the dia. pipe

use **Eq 2**: $La = \frac{3 \times Q}{D^{3/2}} + 7 \times D$

Apron Width at Outlet = 3 x D **Eq3** or channel bottom width, when there is a well defined channel

Downstream Apron Width when there is **NO** well defined channel at pipe outlet

and the Tailwater Depth is less (<) than the elevation of the center of the pipe use **Eq 4**

$W = 3D + La$

or if the Tailwater Depth is greater (>) than the elevation of the center of the pipe use **Eq 5**

$W = 3D + 0.4 \times La$

Where D= pipe Diameter La= apron length W= apron width

Q=Discharge from pipe CFS Tw=Tailwater

OUTFALL Outlet Protection

	CFS	Feet	Feet	Channel (Y or N)
Data:	Q= 5.06	D= 2	Tw= 1.4	n

1) Apron Width at Outlet
   Use Eq 3 — 6 Feet

2) Apron Length
   Use Eq 2 — 19 Feet

3) Downstream Apron Width
   Use Eq 5 — 14 Feet

4) Stone Size

$$d50 = \frac{0.02 \times Q^{4/3}}{Tw \times D}$$

0.06 Feet

Use NHDOT Class C Stone Fill

2.5 Site Specific Soil Survey

Soils included on Existing Conditions plan sheet

2.6 Inspection and Maintenance Manual

Inspection and Maintenance Plan

Toomerfs, LLC – 19 and 21 Main Street
Durham, NH

Introduction

This document is intended to provide a unified procedure for the party (ies) responsible for inspecting and maintaining the stormwater management device(s) that are located within the site development (see Design Plan for the device locations).

Responsible Parties

The ultimate responsibility for complying with this plan rests with the owners of the Property.

Owner's Name: Toomerfs, LLC

Prior to transfer of ownership to another entity the existing owner shall notify DES in writing of such transfer.

Parties assigned to complete inspection and maintenance tasks are presented in the following table:

DEVICE	TASK	PARTY RESPONSIBLE
Structural Stormwater Devices		
MC-4500 Chamber System	Inspection	OWNER
	Maintenance	OWNER
	Reporting	OWNER
Riprap/Stone Outlet Protections	Inspection	OWNER
	Maintenance	OWNER
	Reporting	OWNER
Grass Lined Swales	Inspection	OWNER
	Maintenance	OWNER
	Reporting	OWNER
Catchbasins and Manholes	Inspection	OWNER
	Maintenance	OWNER
	Reporting	OWNER

Frequency of Activities

The best time to perform inspections is during the onset of rain. To the extent practicable inspections should be timed to coincide with moderate storms that do not have the potential for severe (thunderstorms, etc.) precipitation. The frequency of inspection and maintenance will vary by intensity of use; however the recommended inspection frequency for each feature has been described in the protocol sheets to follow.

Maintenance frequencies will be determined based upon the results of the inspections and if specific maintenance thresholds are observed to have been crossed during inspections.

Records

A record of inspection and maintenance activities shall be recorded on the Inspection and Maintenance Log presented following. Records of Inspection and Maintenance Logs shall be made available upon request.

Control of Invasive Plants

Invasive plants are introduced, alien, or non-native plants, which have been moved by people from their native habitat to a new area. Some exotic plants are imported for human use such as landscaping, erosion control, or food crops. They also can arrive as "hitchhikers" among shipments of other plants, seeds, packing materials, or fresh produce. Some exotic plants become invasive and cause harm by:

- becoming weedy and overgrown;
- killing established shade trees;
- obstructing pipes and drainage systems;
- forming dense beds in water;
- lowering water levels in lakes, streams, and wetlands;
- destroying natural communities;
- promoting erosion on stream banks and hillsides; and
- resisting control except by hazardous chemical.

During maintenance activities, check for the presence of invasive plants and remove in a safe manner as described on the following pages. They should be controlled as described on the following pages.

____
Year

Stormwater BMP
Inspection and Maintenance Log

Toomerfs, LLC – 19 and 21 Main Street
Durham, NH

DEVICE/ LOCATION	**INSPECTION**		**FOLLOW UP ACTIVITY**	
	Date	Insp. Name	Date	Notes/Action Taken

CB- CATCH BASINS

(*To include trench drains, drain manholes, and double catchbasins, and drop inlets*)

Inspection Frequency:

Inspect 2 times per year (spring and fall-after leaf drop) unless otherwise described- maintain features as described below.

Maintenance Requirements:

- Remove debris from inlets grates.
- If an oily sheen or hydrocarbons are present on the water surface contact your supervisor
    - Skimming/absorbants should be used to remove to the material and disposed of in accordance with state and federal regulations.
- Remove accumulated sediment in sump if sediment has accumulated to ½ sump depth or is within 1 foot below invert out of basin.
    - If sediment has accumulated to pipe invert out, check discharge end of pipe for sediment accumulations and remove sediment from pipe.
    - Note such conditions and increase inspection frequency if it is determined that the loads of sediment to the basin are consistently high.
    - Address source of sediment if possible.
- For drop inlets with no sump sediments will typically only accumulate if there is an obstruction in the downstream culvert and/or culvert outlet. Therefore where sediments are present in structure:
    - Inspect culvert and culvert outlet and remove debris and sediments.
- Do not dispose of catch basin cleanings in wetland areas or within 40 feet of wetland areas- refer to Appendix b; pages B-2 and B-4 in NH DES guidance document http://des.nh.gov/organization/divisions/water/stormwater/documents/nh_idde_sop.pdf to determine where catchbasin cleanings and street sweepings may be disposed of.

GS-GRASS SWALES
(*Includes grass ditches, grass Pre-Treatment Swales, and grass Treatment Swales*)

Inspection Frequency:
Inspect once per year unless otherwise described.
Grassed channels should be inspected for sediment accumulation, vegetation loss, and presence of invasive species. Maintain features as described below.

Maintenance Requirements:

- Repairs, including vegetation replacement, should be made based on inspection.
    - Grass Treatment Swales require a relatively flat swale floor (both laterally (side to side), and longitudinally (along their length)) to spread water across the swale floor and slow flows down to enable sediments to settle in the swale. This may create areas of standing water and associated dead spots in the grass.
        - Reseed such areas by scratching in seed and applying mulch matting for areas that exceed 4 ft. in diameter.
        - If reseeding does not work or water is seen ponding for more than 48 hours turf aeration of the swale floor may rejuvenate it.
            - Re-seed and rake out plugs created by aeration activities.
- Remove sediment and debris annually, or more frequently as warranted by inspection.
    - Leaves should be raked from swales to avoid smothering grass.
- Mow vegetated channels at least once a year to control establishment of woody vegetation.
    - It is recommended to cut grass no shorter than 4 inches.
    - Rake/collect grass clippings from swales.

RR- RIP RAP OUTLET APRONS
(To include Rip Rap Channels/Swales)

Inspection Frequency:
Inspect once per year unless otherwise indicated or if apron is inlet to a stormwater Detention/treatment Pond or Bioretention Area (if so, see DP and BR, respectively). Maintain features as described below.

Maintenance Requirements:

- Remove debris accumulations if they redirect flow off of the apron or otherwise restrict flow or cause any backflow into the culvert outlet.
- Repair and replace gaps in stone coverage with stone of similar or larger size stone.
    - Refer to design plans for apron dimensions, stone size and any required geotextile underlayment.
    - Be careful not to extend apron into jurisdictional wetland areas or local wetland buffers.
- Ensure that any flared end sections are level to help spread water out onto apron. Re-level if needed.
- Ensure concrete or masonry headwalls are not undermined or have evidence of piping/voids; evidence that flow has bypassed culvert. If voids are found:
    - Check again during storms to determine what has caused voids and contact an engineer if water is flowing around/bypassing culvert.

ST- STORMTECH INFILTRATION CHAMBERS
(*To include stormtech isolator rows*)

Photo Credit: Stormtech

Inspection Frequency:
Isolator Rows shall be inspected immediately after completion of the site construction and cleaned out if necessary. The typical inspection schedule after construction for the Isolator Rows is a minimum of twice a year (spring & fall) - maintain features as described below.

Inspection of the Isolator Row shall involve a visual check using either the inspection ports or the access manholes

Maintenance Requirements:

- If upon visual inspection of the Isolator Row, it is found that sediment has accumulated to an average depth exceeding 3 inches throughout the length of the Isolator Row, cleanout is required.
- Cleanout of the accumulated material in the Isolator Row should be accomplished by vacuum pumping.
- Cleanout should be performed during dry weather and care should be taken to avoid tearing the fabric in the Isolator Rows.
- A site maintenance log will be kept. This log will record the dates when maintenance tasks were completed, the person who completed the task, and any observations of malfunctions in components of the stormwater management system. Call 1-888-892-2694 to speak with a Technical representative or visit www.stormtech.com.

2.7 References
Preparer's Certification
Reviewer's Certification

REFERENCES

Mays, Larry. *Stormwater Collection Systems Design Handbook*. McGraw-Hill. New York, NY. 2001

McCarthy, David. *Essentials of Soil Mechanics and Foundations: Sixth Edition*. Prentice Hall. Columbus, Ohio. 2002.

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NHDES. *New Hampshire Homeowner's Guide to Stormwater Management*. New Hampshire Department of Environmental Services. 2012

The UNH Stormwater Center, *The LID Stormwater Management Systems Demonstrate LID Stormwater Management Systems Demonstrate Superior Cold Climate Performance than Superior Cold Climate Performance than Conventional Stormwater Management Systems*,

UNH Stormwater Center, NEIWPCC 2007 NPS Conference, Newport, RI, May 2007

PREPARER'S CERTIFICATION

Prepared by Chris Hernick, P.E.

SECTION 3.0 – PLANS

3.1 Design Plans

(Unbound)

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(Plans Bound Separately)

3.2 Wetlands Plan

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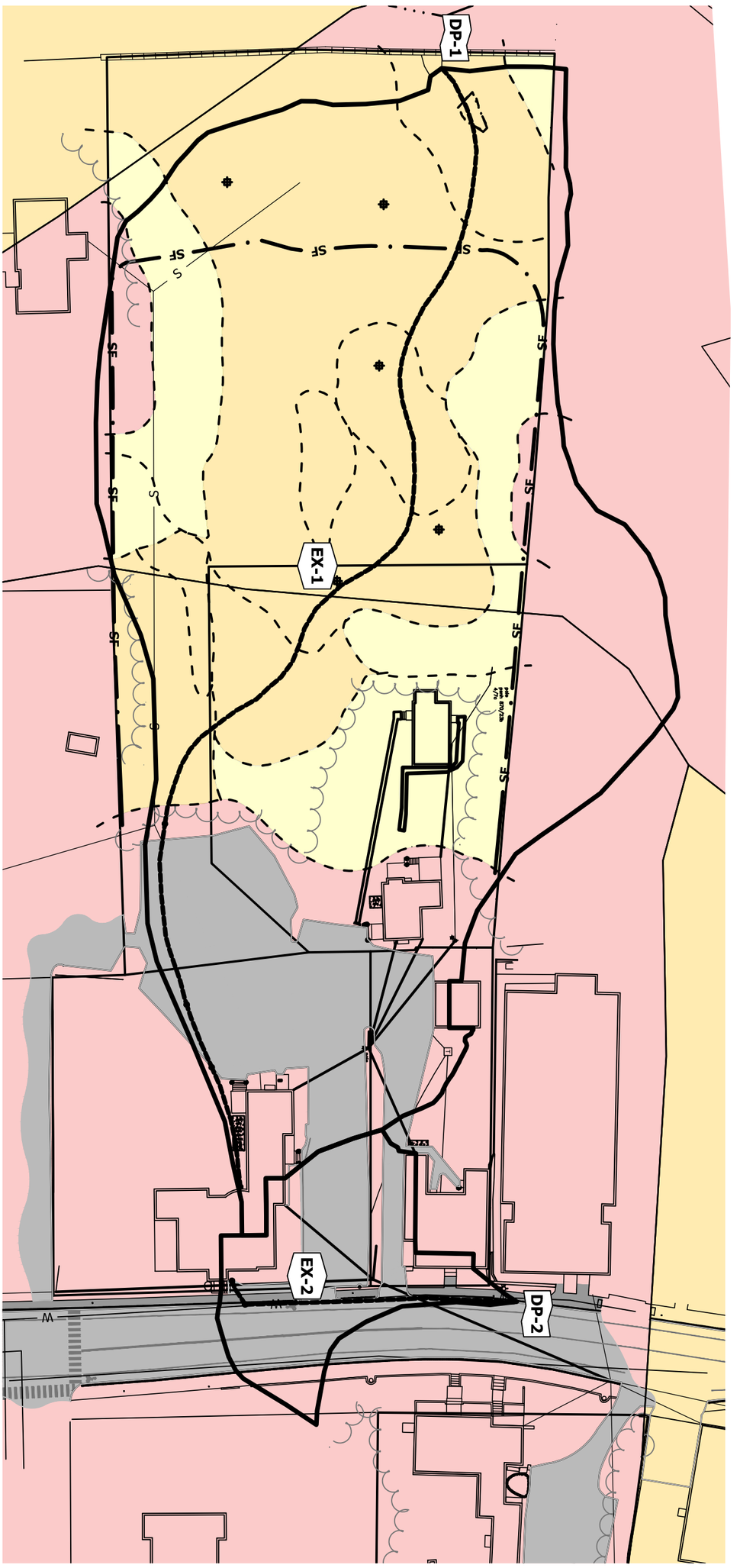
Wetlands included on Existing Conditions plan sheet

3.3 Color Coded Hydrologic Soils Group Plans



GRAPHIC SCALE

30 0 30 30 30 30

(IN FEET)
1 inch = 60 ft.

npa
nh-grid

DP-1 EX-2 ANALYSIS POINT
DRAINAGE AREA
HSG D
HSG C
HSG B

SOILS AREA BOUNDARY
DRAINAGE PATH
DRAINAGE AREA BOUNDARY

PRE-DEVELOPMENT COLOR-CODED SOIL PLAN

prepared for
TOOMERFS, LLC

TAX MAP 5, LOTS 1-9 AND 1-10
19 MAIN ST AND 21 MAIN ST DURHAM, NH

MJS ENGINEERING, P.C.
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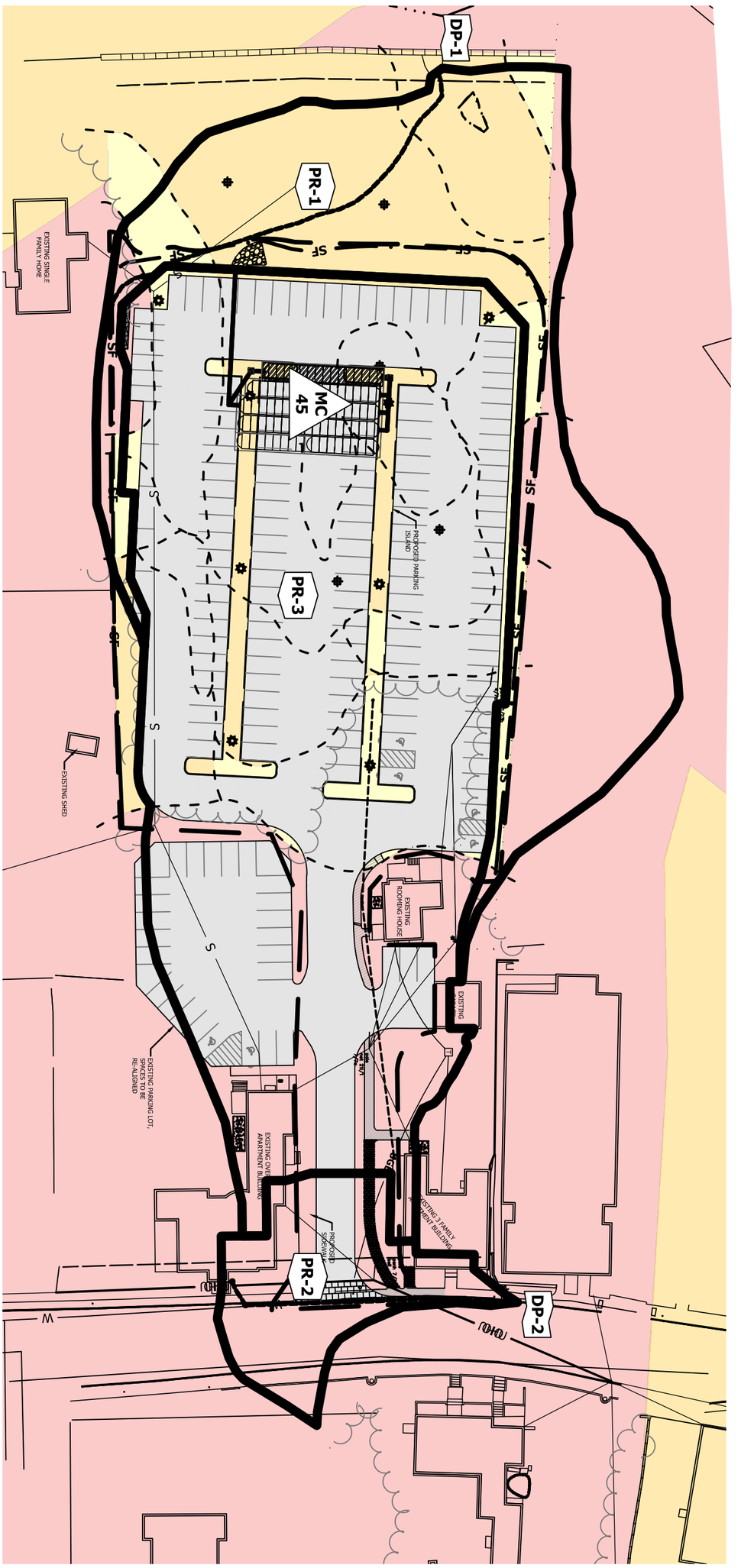
Newmarket, NH 03857
Phone: (603) 659-4979, Fax: (603) 659-4627
E-mail: mjs@mjs-engineering.com

DATE:	10/28/20
SCALE:	1"=60'
DESIGNED BY:	
DRAWN BY:	CJH
APPROVED BY:	
DWG FILE:	20601 CONCEPT 009.dwg

JOB: 18-041

C3.3.1



GRAPHIC SCALE

(IN FEET)
1 inch = 60 ft.

30 0 30 30 30 30

npa
nh-grid

DP-1
PR-2
MC 45

ANALYSIS POINT
TREATMENT SYSTEM
DRAINAGE AREA

HSG D
HSG C
HSG B

SOILS AREA BOUNDARY
DRAINAGE PATH
DRAINAGE AREA BOUNDARY

C3.3.2

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POST-DEVELOPMENT COLOR-CODED SOIL PLAN

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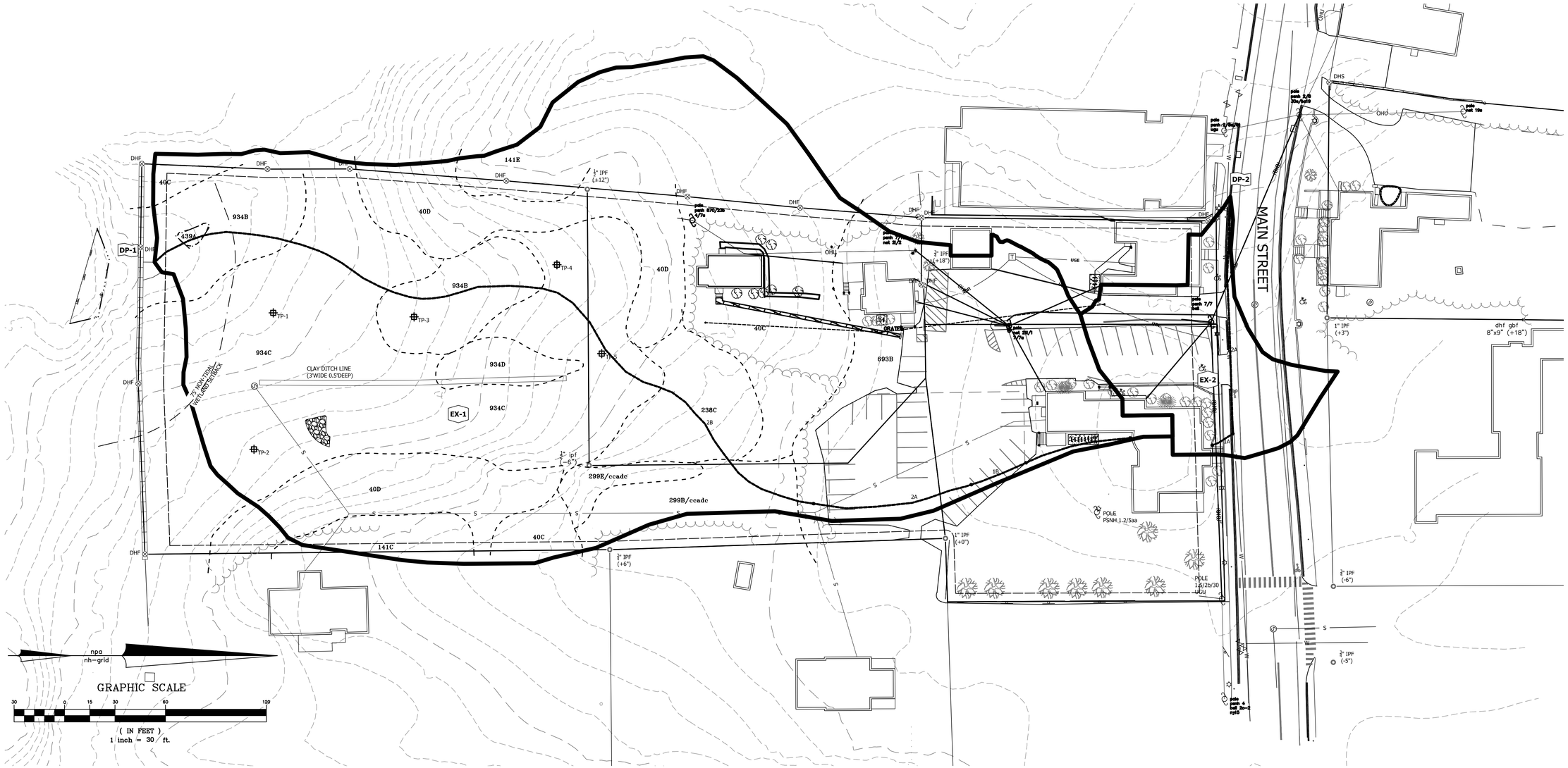
TOOMERFS, LLC

TAX MAP 5, LOTS 1-9 AND 1-10
19 MAIN ST AND 21 MAIN ST DURHAM, NH

DATE:	10/28/20
SCALE:	1"=60'
DESIGNED BY:	
DRAWN BY:	CJH
APPROVED BY:	
DWG FILE:	20601 CONCEPT 008.dwg

3.4 Pre- & Post-Development Drainage Area Plans



LEGEND

EX-2	DRAINAGE AREA
DP-1	ANALYSIS POINT
	DRAINAGE AREA BOUNDARY
	DRAINAGE PATH
	SOILS AREA BOUNDARY

AREA WITHIN WATERSHED

EXISTING BUILDING	4,499 SF
EXISTING DECK/STEPS	524 SF
EXISTING CONCRETE PAD	731 SF
EXISTING PAVEMENT/PARKING	20,985 SF

EX-1	TOTAL AREA:	117,882 SF
	IMPERVIOUS COVER:	15.74%
	TIME OF CONCENTRATION:	11.0 MIN
EX-2	TOTAL AREA:	10,882 SF
	IMPERVIOUS COVER:	75.28%
	TIME OF CONCENTRATION:	6.0* MIN

*CALCULATION METHOD MINIMAL TIME

NO.	REVISIONS	DATE	INT.

SEAL

DATE: 9/26/18
SCALE: 1"=30'
DESIGNED BY:
DRAWN BY:
APPROVED BY:
DWG FILE: 20601 CONCEPT 009.dwg

PRE-DEVELOPMENT DRAINAGE

prepared for
TOOMERFS, LLC

TAX MAP 5, LOTS 1-9 AND 1-10
19 MAIN ST AND 21 MAIN ST DURHAM, NH

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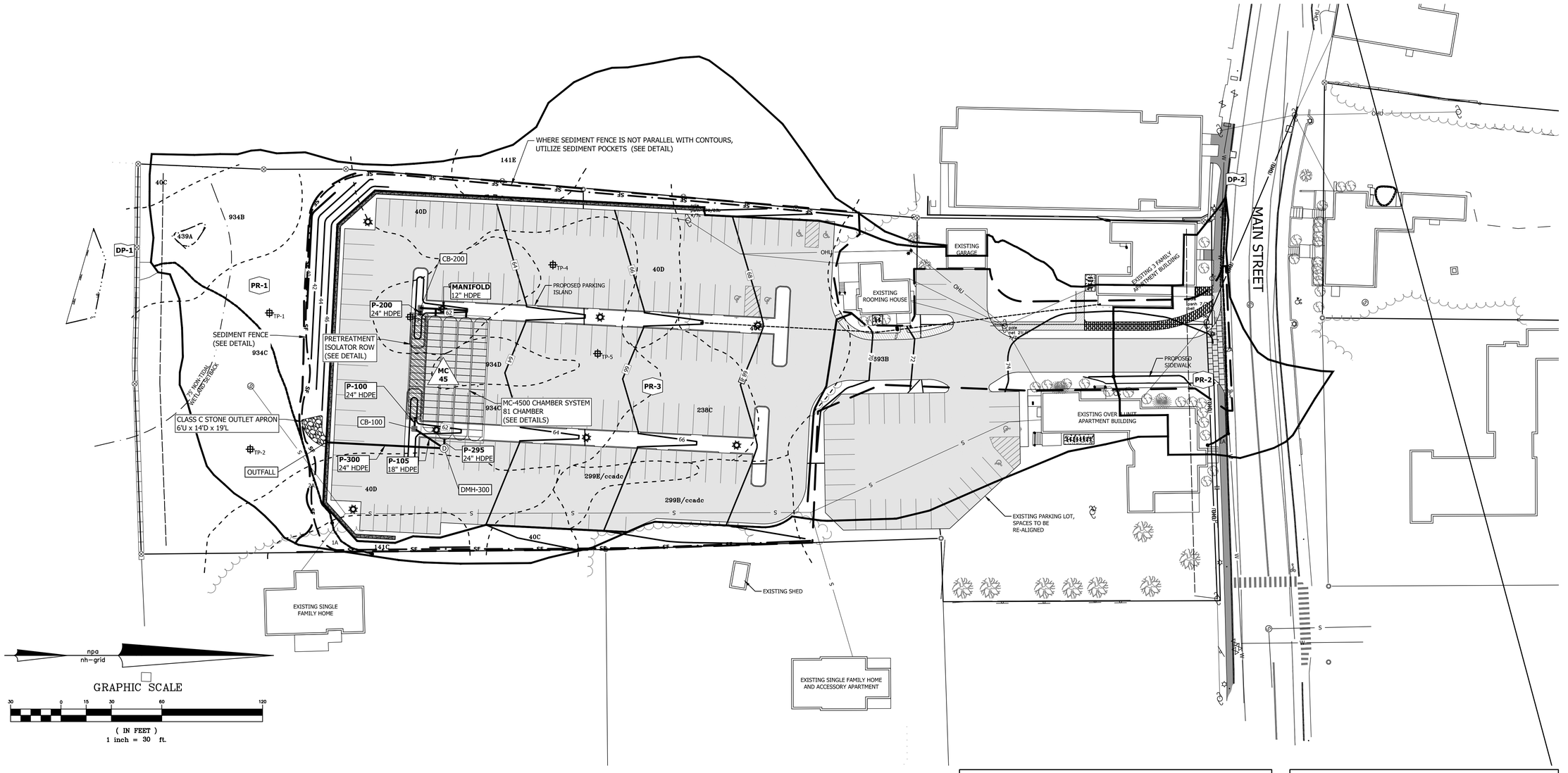
PRE



LEGEND

PR-2 / MC 45 / DP-1 — DRAINAGE AREA; TREATMENT SYSTEM; ANALYSIS POINT

DRAINAGE AREA BOUNDARY

DRAINAGE PATH

SOILS AREA BOUNDARY

LIMIT OF PROPOSED DISTURBANCE 79,700 SF

AREA WITHIN WATERSHED

POST-DEVELOPMENT BUILDING	3,732 SF
POST DEVELOPMENT DECK/STEPS	499 SF
POST DEVELOPMENT CONCRETE PAD AND SIDEWALK	3,674 SF
POST-DEVELOPMENT PAVEMENT/PARKING	65,377 SF

PR-1	TOTAL AREA:	37,822 SF
	IMPERVIOUS COVER:	0.28%
	TIME OF CONCENTRATION:	6.0* MIN
PR-2	TOTAL AREA:	9,503 SF
	IMPERVIOUS COVER:	71.13%
	TIME OF CONCENTRATION:	6.0* MIN
PR-3	TOTAL AREA:	82,224 SF
	IMPERVIOUS COVER:	80.78%
	TIME OF CONCENTRATION:	6.0* MIN

*CALCULATION METHOD MINIMAL TIME

DRAIN PIPE TABLE

PIPE NUMBER	START STRUCT	END STRUCT	SIZE / MATERIAL	LENGTH	SLOPE	INVERT IN	INVERT OUT
MANIFOLD	CB-200	MANIFOLD	12" HDPE	27.250	0.00%	56.47	56.47
P-100	CB-100	MC-IN-E	24" HDPE	6.580	1.00%	53.76	53.69
P-105	CB-100	DMH-300	18" HDPE	21.099	-2.00%	58.50	58.92
P-200	CB-200	MC-IN-W	24" HDPE	4.020	1.00%	53.73	53.69
P-295	MC-OUT	DMH-300	24" HDPE	5.250	1.00%	53.69	53.64
P-300	DMH-300	OUTFALL	24" HDPE	70.167	7.27%	53.60	48.50

DRAIN STRUCTURE TABLE

STRUCTURE ID	DETAILS:	PIPES IN:	PIPE OUT
CB-100	RIM: 61.80 INV OUT: 53.76 INV OUT: 58.50		P-100, 24" HDPE P-105, 18" HDPE
CB-200	RIM: 61.80 INV OUT: 53.73 INV OUT: 56.47		P-200, 24" HDPE MANIFOLD, 12" HDPE
DMH-300	RIM: 62.79 INV IN: 53.64 INV IN: 58.92 INV OUT: 53.60	P-295, 24" HDPE P-105, 18" HDPE	P-300, 24" HDPE
MANIFOLD	INV IN: 56.47	MANIFOLD, 12" HDPE	
MC-IN-E	INV IN: 53.69	P-100, 24" HDPE	
MC-IN-W	INV IN: 53.69	P-200, 24" HDPE	
MC-OUT	INV OUT: 53.69		P-295, 24" HDPE
OUTFALL	INV IN: 48.50	P-300, 24" HDPE	

NO.	REVISIONS	DATE	INT.

SEAL

DATE: 3/9/21
SCALE: 1"=30'
DESIGNED BY:
DRAWN BY:
APPROVED BY:
DWG FILE: 20601 CONCEPT 009.dwg

POST-DEVELOPMENT DRAINAGE

prepared for
TOOMERFS, LLC

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POST