ENGINEERING REPORT

STORMWATER MANAGEMENT PLAN
3 HUBBARD ROAD
WILTON, CONNECTICUT

January 20, 2020

Prepared for:

3 Hubbard Road, LLC
PO Box 692
South Norwalk, CT 06856

Prepared By:

Ricardo Ceballos, P.E.
Professional Engineering Consulting Services
245 Sturges Highway
Westport, CT 06880
(203)635-0922

STORMWATER MANAGEMENT PLAN
3 Hubbard Road
Wilton, CT

PROJECT DESCRIPTION

The descriptions and computations included within this Stormwater Management Plan and Appendix are provided in support of applications submitted by 3 Hubbard Road, LLC to the various regulatory agencies for permitting purposes. Since the property is tied into the Town's street drainage system, and there are changes in coverage of the existing property, the site's Storm water runoff system shall be sized to accommodate runoff from a 25-year design storm and the system shall be designed so as to prevent runoff from parking lots, roofs, and access drives from flowing into the street. Per Town requirements, the storm water management plan has been prepared by a Connecticut-licensed professional engineer.

Location

The project site is located at 3 Hubbard Road, Wilton, Connecticut (site); As shown in Figure 1 the site is located in the Wilton Center District. The 1.27-acre site is a fully developed urban area with vegetation established.

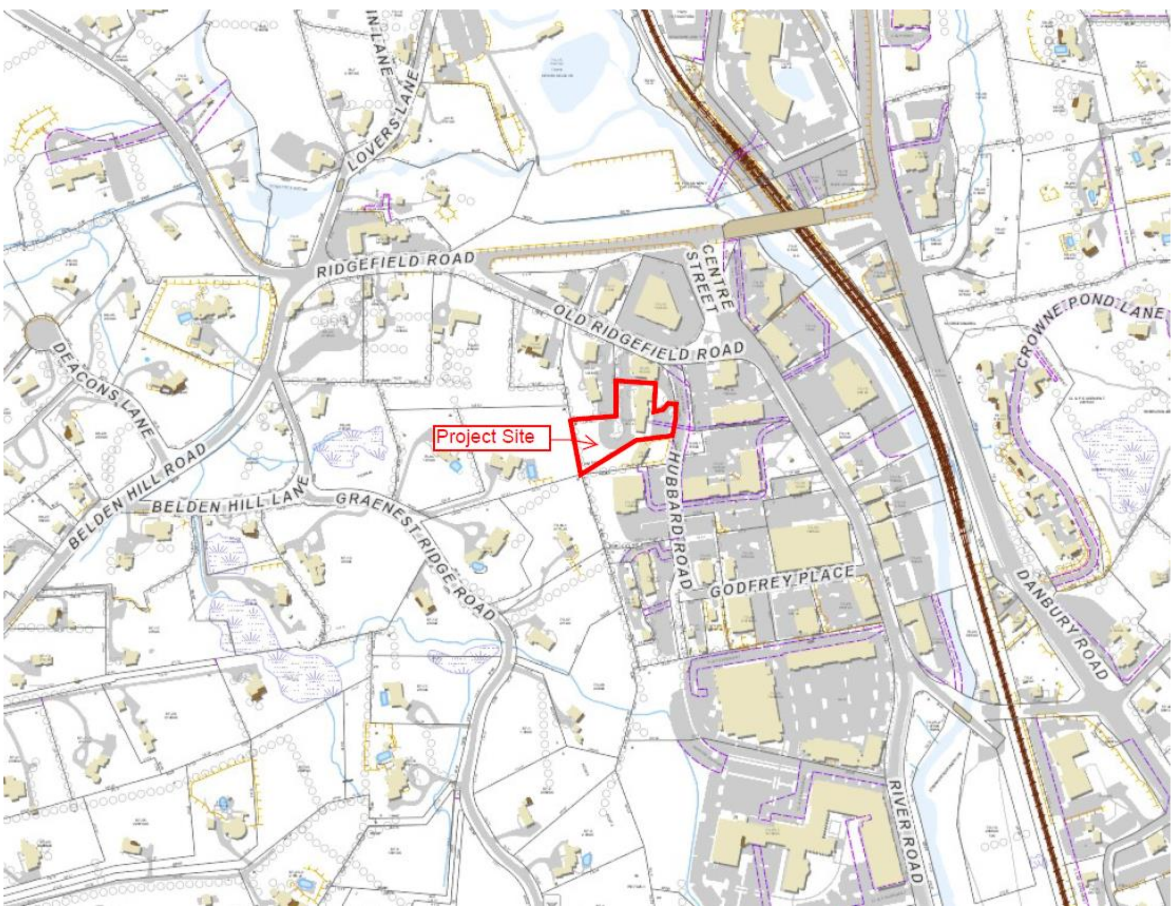


Figure 1 Project Location - 3 Hubbard Road, Wilton, CT.

Existing Conditions

The site has an existing apartment building built in 1943. The impervious area created by the existing building is 6,267 square feet. Other impervious areas in the property include driveways and parking areas, a patio, and access sidewalks. The site's open space are landscaped grass areas, and a woods area with slopes over 30%. The purpose of the proposed project is to build an additional three story high residential building with 17 units. The new building will be located in the existing woods area of the property and there will not be any other permanent modification to pervious or impervious areas on the site.

There are three separate watersheds (WS) in the property. As shown on Appendix A, WS-1 covers most of the rear of the property, West side. WS-1 includes a portion of the existing building, a patio, grass areas, driveways, parking areas, and wood areas; there is an existing on-site stormwater drain system that discharges to the Town's drain system on Old Ridgefield Road. WS-2 is a smaller area also in the back of the property and it is all wood areas. The front of the property is WS-3 and there are no proposed permanent modification or changes to the pervious or impervious areas in this watershed. WS-3 drains East to the Town's street drainage system on Hubbard Road.

Based upon FEMA's Flood Insurance Rate Map (FIRM) Map number 09001C0383F for Fairfield County, effective date June 18, 2010, the site is located entirely within Zone X, an area determined to be outside the 0.2% annual chance floodplain (See Appendix C).

According to the Soil Survey of Fairfield County, the site's soil type where the building will be Located and where the storm water management infiltration system will be installed is entirely Charlton-Chatfield complex, 15 to 45% slopes, very rocky land complex with a "well drained" natural drainage classification. Charlton soils belong to soil group B (See Appendix D). There are no wetlands or surface water bodies on site. Groundwater in the area is classified with a GA ground water quality class. The water quality classes are based on the "Water Quality Classification Norwalk, CT" map prepared by CT DEEP dated November 2015 (See Appendix E).

Proposed Project

The proposed stormwater management system for this project is designed to collect and direct runoff to a subsurface infiltration system. The system will provide infiltration, temporary storage of runoff, reduction of post development peak discharge rates, and meet groundwater recharge volume and pollutant reduction requirements. The system has been designed in accordance with the Town of Wilton Zoning Regulations, and the guidelines and procedures set forth in the 2004 Connecticut Storm Quality Manual.

The proposed development will impact WS-1 and WS-2 (Appendix B). The required grading and new building will modify the size of the watersheds and will increase the size of the impervious areas. The proposed WS-1 is 80% impervious (paved parking lot, roofs, etc.). The proposed stormwater management system includes a 12" storm pipe overflow that connects to the existing 12" storm drain in the parking lot. The existing system discharges on the North side of the property into the municipal storm sewer network. The proposed and existing 12" drains are sized to convey the peak runoff discharge of the 25-year storm. Details of the size and location of the stormwater management system can be found on drawing GD-1 of the design plans.

Based on our experience, soils group B throughout the Town of Wilton are very well drained with a typical percolation rate of 5-10 mpi (minutes per inch). Owner shall perform a percolation test during construction to verify site conditions.

The system has been designed to provide infiltration of the first inch of runoff, removing at least 80% of the average annual total suspended solids (TSS) load, removing at least 80% of floatable debris, providing peak runoff rate attenuation, and volume attenuation to improve the existing site hydrology, as well as to minimize sediment transport.

The area of the proposed WS-2 is about 50% smaller than the WS-2 area under existing conditions.

PEAK RUNOFF CALCULATIONS

Calculations for the existing and proposed conditions were analyzed using the US Department of Agriculture Natural Resources Conservation Service (NRCS, Formerly known as the Soil Conservation Service or SCS) TR-55 methodology which outlines procedures for calculating storm runoff volume, peak rate of discharge, and hydrographs on small watersheds. To complement the design results, the method utilized to predict the surface water runoff rate in this analysis and the impact of the proposed infiltration/detention system is a computer program entitled Hydraflow Hydrographs Extension for AutoCAD Civil 3D 2020. The Hydrographs computer modeling program utilizes the same methods for computing runoff rates that were originally developed by the US Department of Agriculture NRCS, and they are also utilized in the TR-20 computer modeling program and others. Calculations are included in Appendix F.

The runoff curve number is a land sensitive coefficient that dictates the relationship between total rainfall depth and direct storm runoff. The site as stated before is mostly fully developed urban area with paved parking lots, roofs, and driveways.

The time of concentration (Tc) is defined as the time for runoff to travel from the hydraulically most distant point in the watershed to a point of interest. Values of time of concentration were determined for both conditions based on land cover and slope of the flow path using methods outlined in TR-55. Considering the steep slopes, a time of concentration of 0.1 hours was used.

For this study, all rainfall depth and rainfall intensity were obtained from the National Oceanic and Atmospheric Administration (NOAA) Weather Service Hydrometeorological Design Studies Center Precipitation Frequency Data Server (PDFS). Enclosed for reference is a copy of the downloaded NOAA Atlas 14 table for rainfall depth and rainfall intensity (See Appendix G).

The peak flow and total runoff volume were determined for all frequency storms analyzed. The total runoff volumes, and peak flows are summarized below:

Table 1 Site Runoff Volume (cf) Comparison for WS-1

Storm Frequency	Existing Conditions Runoff Volume (cf)	Proposed Conditions Runoff Volume (cf)	% decrease
1-Year	4471	3300	-26%
2-Year	5810	4800	-17%
5-Year	8087	7383	-9%
10-Year	9973	9543	-4%
25-Year	12627	12600	-0.21%

Table 2 Site Peak Discharge (cfs) Comparison for WS-1

Storm Frequency	Existing Conditions Peak Discharge (cfs)	Proposed Conditions Peak Discharge (cfs)	% decrease
1-Year	1.94	1.21	-38%
2-Year	2.53	2.04	-19%
5-Year	3.52	2.54	-28%
10-Year	4.34	3.18	-27%
25-Year	5.49	4.06	-26%

Table 3 Site Runoff Volume (cf) Comparison for WS-2

Storm Frequency	Existing Conditions Runoff Volume (cf)	Proposed Conditions Runoff Volume (cf)	% decrease
1-Year	671	141	-79%
2-Year	247999	247	-75%
5-Year	1611	467	-71%
10-Year	2154	677	-69%
25-Year	2953	1003	-66%

Table 4 Site Peak Discharge (cfs) Comparison for WS-2

Storm Frequency	Existing Conditions Peak Discharge (cfs)	Proposed Conditions Peak Discharge (cfs)	% decrease
1-Year	0.28	0.04	-84%
2-Year	0.42	0.09	-78%
5-Year	0.68	0.19	-72%
10-Year	0.92	0.28	-70%
25-Year	1.28	0.42	-67%

As shown on the tables above, the reduction of the peak runoff rate and runoff volume off-site in WS-1 is achieved through the implementation of the underground infiltration/detention system which provides temporary storage for runoff. The proposed retention system will be surrounded by 12 inches of stone to provide a stable base and to increase the storage volume.

As stated earlier the size of WS-2 will be decreased by 50%, and replacing wood areas for grass landscaped areas also contributes to the reduction of the peak runoff rate and runoff volume off-site in WS-2.

The underground infiltration/detention system will be located under the parking lot area, and the system capacity is designed to also capture the stormwater runoff generated by the first inch of all rainfall events. The volume of the infiltration system meets the requirements of the groundwater recharge criteria and the pollutant reduction criteria set on the 2004 CTDEEP Stormwater Quality Manual.

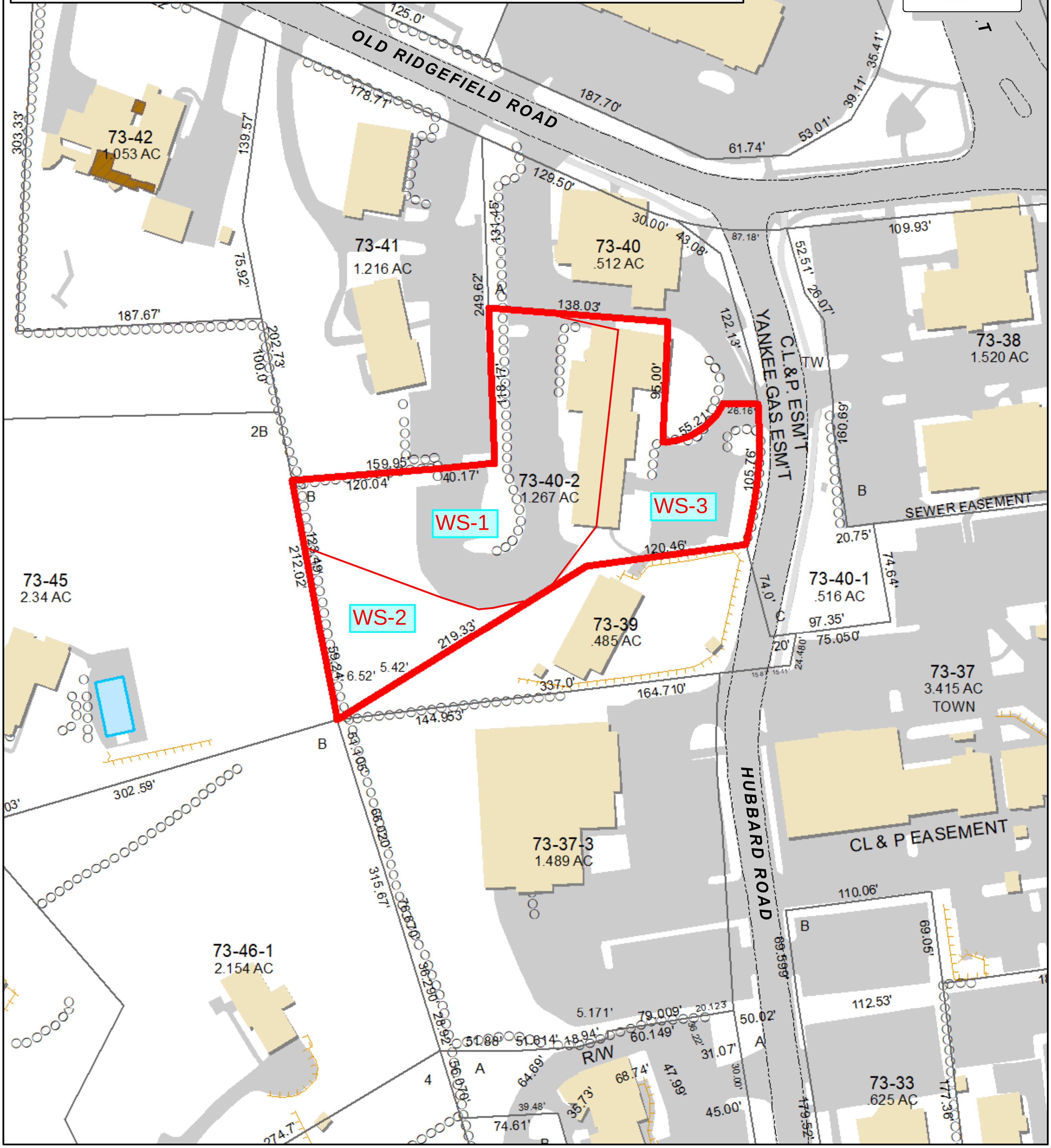
Included as Appendix H is a copy of the "Maintenance & Inspection Schedule" which has been prepared for the site to promote good housekeeping measures.

Design plans accompany this report to provide additional design detail regarding the underground storage system proposed.

APPENDIX A

Town of Wilton, Connecticut - Assessment Parcel Map

MBL: 73-40-2 **Address:** 3 HUBBARD RD



Approximate Scale:

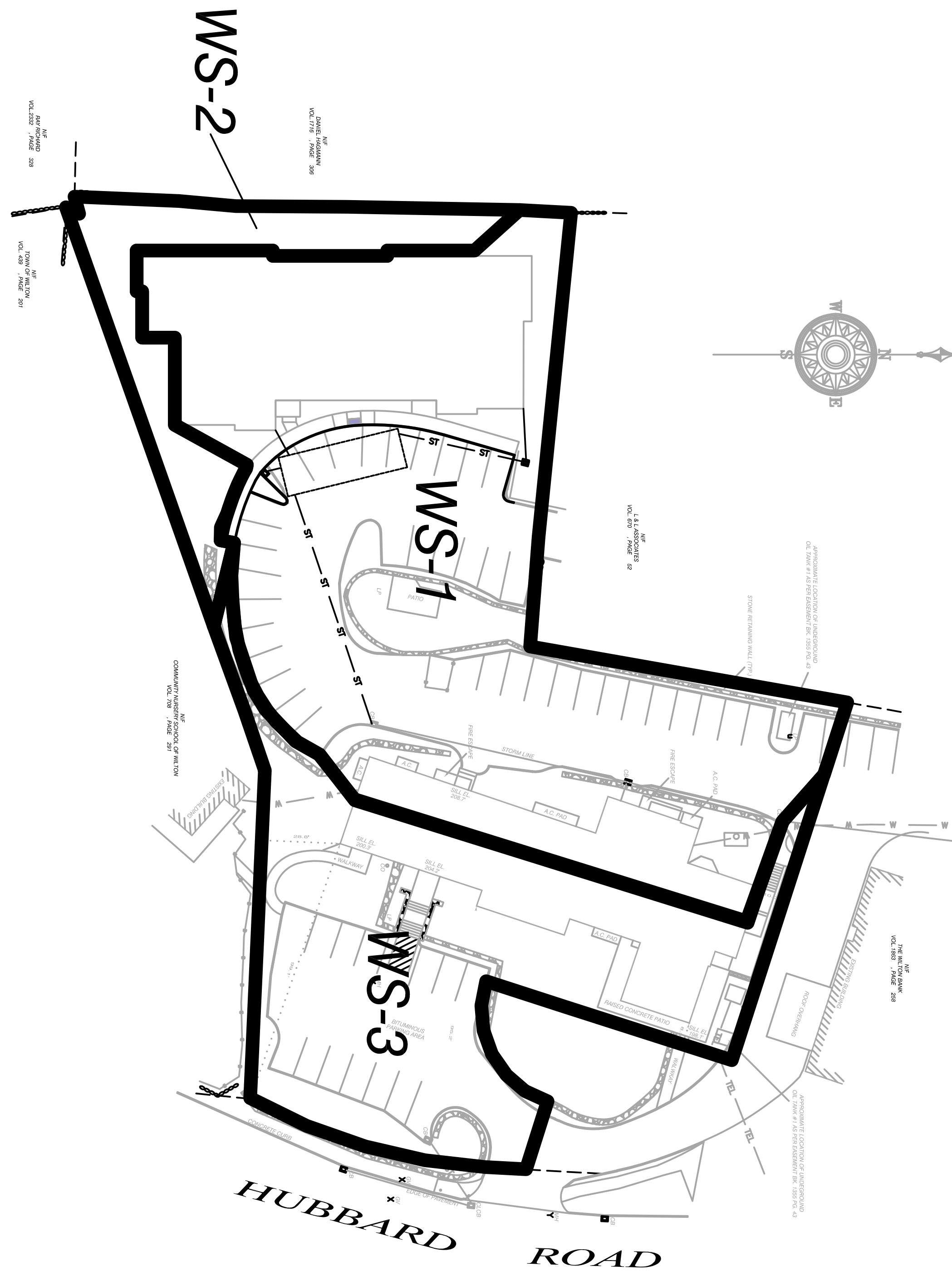
1 inch = 100 feet

Appendix A. Project Location and Existing Watershed Areas

Map Grand List Date: Oct 2017

0 50 100 150 Feet

APPENDIX B



PROPOSED CONDITIONS WATERSHED MAP

3 HUBBARD ROAD

WILTON, CONNECTICUT

No.	DATE	REVISION	BY

PREPARED FOR:

THREE HUBBARD ROAD, LLC

RICARDO CEBALLOS, P.E.
PROFESSIONAL ENGINEERING CONSULTING SERVICES
rceballos100@gmail.com | 203-635-0922

Date	1/16/20
Scale	1" = XX'
Sheet No.	SP-1
Project No.	19-36

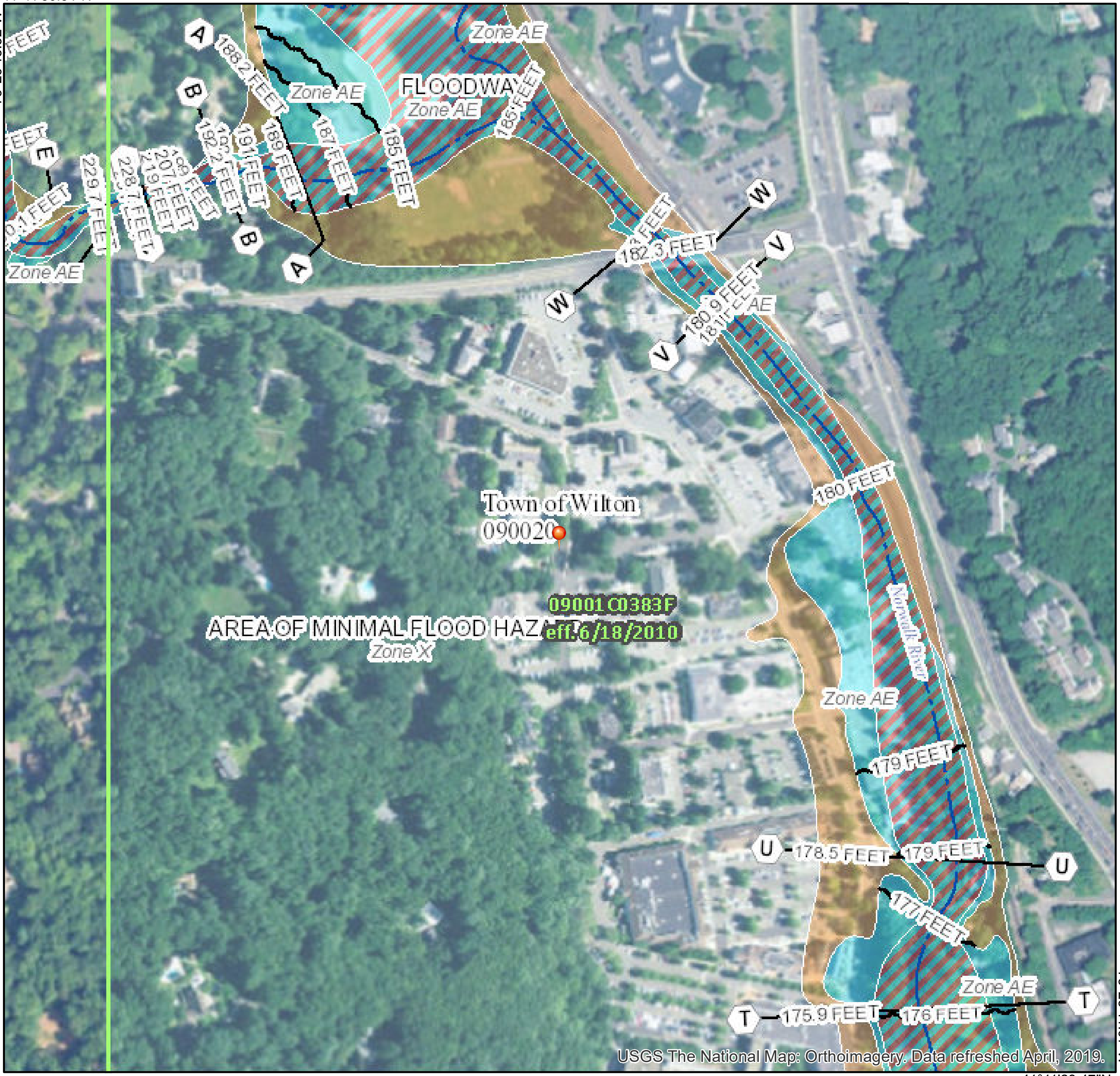
APPENDIX C

National Flood Hazard Layer FIRMette

FEMA

41°11'50.54"N

73°26'18.52"W



73°25'41.07"W

41°11'23.47"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Legend

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

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

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

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

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

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

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/18/2020 at 9:34:47 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

APPENDIX D

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

State of Connecticut

3 Hubbard Rd, Wilton CT

January 13, 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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

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.

Soil Map

Map Scale: 1:899 if printed on A portrait (8.5" x 11") sheet.

Meters: 0, 10, 20, 40, 60

Feet: 0, 40, 80, 160, 240

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N 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 1:12,000.

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: State of Connecticut
Survey Area Data: Version 19, Sep 13, 2019

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—Oct 5, 2016

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
60D	Canton and Charlton soils, 15 to 25 percent slopes	1.4	43.8%
73E	Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky	0.7	22.2%
307	Urban land	1.1	34.0%
Totals for Area of Interest		**3.2**	**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.

State of Connecticut

60D—Canton and Charlton soils, 15 to 25 percent slopes

Map Unit Setting

National map unit symbol: 9lpq
Elevation: 0 to 1,200 feet
Mean annual precipitation: 43 to 54 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 140 to 185 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton and similar soils: 45 percent
Charlton and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy and gravelly melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 3 inches: gravelly fine sandy loam
Bw1 - 3 to 15 inches: gravelly loam
Bw2 - 15 to 24 inches: gravelly loam
Bw3 - 24 to 30 inches: gravelly loam
2C - 30 to 60 inches: very gravelly loamy sand

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Charlton

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 4 inches: fine sandy loam
Bw1 - 4 to 7 inches: fine sandy loam
Bw2 - 7 to 19 inches: fine sandy loam
Bw3 - 19 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 25 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

Minor Components

Leicester

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Chatfield

Percent of map unit: 5 percent
Landform: Ridges, hills
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Sutton

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hollis

Percent of map unit: 5 percent
Landform: Hills, ridges
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

73E—Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky

Map Unit Setting

National map unit symbol: 9lql
Elevation: 0 to 1,200 feet
Mean annual precipitation: 43 to 56 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 140 to 185 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Charlton

Setting

Landform: Hills
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

Typical profile

Ap - 0 to 4 inches: fine sandy loam
Bw1 - 4 to 7 inches: fine sandy loam
Bw2 - 7 to 19 inches: fine sandy loam
Bw3 - 19 to 27 inches: gravelly fine sandy loam
C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 45 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water storage in profile: Low (about 5.9 inches)

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

Description of Chatfield

Setting
Landform: Ridges, hills
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Coarse-loamy melt-out till derived from granite and/or schist and/or gneiss

Typical profile
Oa - 0 to 1 inches: highly decomposed plant material
A - 1 to 6 inches: gravelly fine sandy loam
Bw1 - 6 to 15 inches: gravelly fine sandy loam
Bw2 - 15 to 29 inches: gravelly fine sandy loam
2R - 29 to 80 inches: unweathered bedrock

Properties and qualities
Slope: 15 to 45 percent
Percent of area covered with surface fragments: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Low to high (0.01 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water storage in profile: Low (about 3.3 inches)

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

Minor Components

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

Leicester
Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Sutton

Percent of map unit: 5 percent
Landform: Drainageways, depressions
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hollis

Percent of map unit: 3 percent
Landform: Hills, ridges
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Unnamed, sandy subsoil

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

Unnamed, red parent material

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

307—Urban land

Map Unit Setting

National map unit symbol: 9lmh
Elevation: 0 to 2,000 feet
Mean annual precipitation: 43 to 56 inches
Mean annual air temperature: 45 to 55 degrees F
Frost-free period: 120 to 185 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Typical profile

H - 0 to 6 inches: material

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Unnamed, undisturbed soils

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

Udorthents, wet substratum

Percent of map unit: 10 percent
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

References

American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.

American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Cowardin, L.M., V. Carter, F.C. Golet, and E.T. LaRoe. 1979. Classification of wetlands and deep-water habitats of the United States. U.S. Fish and Wildlife Service FWS/OBS-79/31.

Federal Register. July 13, 1994. Changes in hydric soils of the United States.

Federal Register. September 18, 2002. Hydric soils of the United States.

Hurt, G.W., and L.M. Vasilas, editors. Version 6.0, 2006. Field indicators of hydric soils in the United States.

National Research Council. 1995. Wetlands: Characteristics and boundaries.

Soil Survey Division Staff. 1993. Soil survey manual. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_054262

Soil Survey Staff. 1999. Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys. 2nd edition. Natural Resources Conservation Service, U.S. Department of Agriculture Handbook 436. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053577

Soil Survey Staff. 2010. Keys to soil taxonomy. 11th edition. U.S. Department of Agriculture, Natural Resources Conservation Service. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053580

Tiner, R.W., Jr. 1985. Wetlands of Delaware. U.S. Fish and Wildlife Service and Delaware Department of Natural Resources and Environmental Control, Wetlands Section.

United States Army Corps of Engineers, Environmental Laboratory. 1987. Corps of Engineers wetlands delineation manual. Waterways Experiment Station Technical Report Y-87-1.

United States Department of Agriculture, Natural Resources Conservation Service. National forestry manual. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/home/?cid=nrcs142p2_053374

United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/scientists/?cid=nrcs142p2_054242

United States Department of Agriculture, Natural Resources Conservation Service. 2006. Land resource regions and major land resource areas of the United States, the Caribbean, and the Pacific Basin. U.S. Department of Agriculture Handbook 296. http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/soils/?cid=nrcs142p2_053624

United States Department of Agriculture, Soil Conservation Service. 1961. Land capability classification. U.S. Department of Agriculture Handbook 210. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_052290.pdf

APPENDIX E

WATER QUALITY CLASSIFICATIONS
NORWALK, CT

SURFACE WATER QUALITY CLASSES

A	A
AA	AA
B, B*	B, B*
SA	SA
SB	SB

NOTES:
Surface Water Classifications beginning with S refer to Coastal and Marine Surface Water.
B* is a subset of Class B where no direct wastewater discharges are allowed other than those consistent with Class AA, A and SA surface waters.

GROUND WATER QUALITY CLASSES

- GA (white background)
- GAA, GAAs
- GA, GAA may not meet current standards
- GB
- GC
- Area of Contribution to Public Supply Well
- Final Aquifer Protection Area (Level A)
- Major Basin Boundary

EXPLANATION

WATER QUALITY CLASSIFICATIONS (WQC) MAPS are one of the elements of the Water Quality Standards (WQS) for the State of Connecticut. The WQS are a part of Connecticut's clean water program and are essential for protecting and improving water quality. The WQS follow the principles of Connecticut's Clean Water Act which is in Chapter 446K of the Connecticut General Statutes. The WQS provide policy guidance in many areas, for example decisions on acceptable discharges to water resources, siting of landfills, remediation or prioritization of municipal sewerage system projects. The first two elements of the WQS are the Standards, which set an overall policy for management of water quality, and the Criteria, which are descriptive and numerical standards that describe the allowable parameters and goals for various water quality classifications. A discussion of these two elements is found in the Water Quality Standards document available on the CT DEEP website. The third element is the Classifications and the Water Quality Classification Maps which show the Classification assigned to each surface and groundwater resource throughout the State. The WQS are adopted using a public participation process. The WQC maps are also adopted using a public participation process but go through hearings separately from the Standards and Criteria hearings. Revision and adoption of the WQC data occurs in accordance with the public participation procedures contained in Section 22a-426 of the Connecticut General Statutes. Ground WQC is subject to Connecticut regulation and changes must be reviewed and adopted. All changes to the Surface WQC require an adoption process which is subject to federal review and approval in addition to CT regulation. The adoption dates for the WQC by major drainage basin are: Housatonic River, Hudson River and Southwest Coastal Basins - March 1999; Connecticut River and South Central Coastal Basins - February 1993; Thames River, Pawcatuck River and Southeast Coastal Basins - December 1986. Surface Water Classifications do not change after the adoption date until the next major revision. Ground Water Classifications may change after the adoption date under specific circumstances. The map may have more than one WQC adoption date because a town may be in more than one major drainage basin.

SURFACE WATERS in Connecticut are divided into freshwater classified as AA, A, B or B* and saline waters classified as SA or SB. Class AA designated uses are existing or proposed drinking water supplies; habitat for fish and other aquatic life and wildlife; recreation; and water supply for industry and agriculture. Class A designated uses are habitat for fish and other aquatic life and wildlife; potential drinking water supplies; recreation; navigation; and water supply for industry and agriculture. Class SA designated uses are habitat for marine fish, other aquatic life and wildlife; shellfish harvesting for direct human consumption; recreation; industrial water supply; and navigation. Class B designated uses are habitat for fish and aquatic life and wildlife; recreation; navigation; and industrial and agricultural water supply. Class B*, applicable to Candlewood Lake, is a subset of Class B and is identical in all ways to the designated uses, criteria and standards for Class B waters except for the restriction on direct discharges. Class SB designated uses are habitat for marine fish and aquatic life and wildlife; commercial shellfish harvesting; recreation; industrial water supply; and navigation.

Surface waters which are not specifically classified shall be considered as Class A or Class AA. Surface waters in GA ground water areas are assumed Class A or Class SA unless otherwise indicated. Surface waters in GAA ground water areas are assumed Class AA unless otherwise indicated.

On the WQC map a surface water quality goal of A is represented by blue colored water bodies. Surface water quality goal of AA is represented by purple colored water bodies. Surface water quality goal of B is represented by gold colored water bodies.

GROUND WATERS in Connecticut are classified as GAA, GA, GB and GC. Class GAA designated uses are existing or potential public supply of water suitable for drinking without treatment and baseflow for hydraulically-connected surface water bodies. The Class GAAs is a subclass of GAA for ground water that is tributary to a public water supply reservoir. The area of contribution to a public water supply well is represented by a 500-foot radius around the well and is assumed to be Class GAA unless otherwise classified. Class GA designated uses are existing private and potential public or private supplies of water suitable for drinking without treatment and baseflow for hydraulically-connected surface water bodies. All ground waters not specifically classified are considered as Class GA. Class GB designated uses are industrial process water and cooling waters and baseflow for hydraulically-connected water bodies and is presumed not suitable for human consumption without treatment. Class GC designated uses are assimilation of discharges authorized by the Commissioner pursuant to Section 22a-430 of the General Statutes.

On the WQC map GA is represented by white colored land areas. Class GAA and class GAAs are represented by blue colored land areas. The area of contribution to a public water supply well is shown by a blue cross-hatch overprint. A notation of GAA followed by a state abbreviation indicates a watershed that contributes to the public water supply for a state other than Connecticut. Class GA or Class GAA areas that currently may not be meeting the GA or GAA standards are represented on the WQC maps by tan colored land areas. Class GB is represented by green colored land areas. Class GC is represented by magenta colored land areas.

FINAL AQUIFER PROTECTION AREAS (Level A) are included on the WQC maps for informational purposes. These areas are anticipated to be reclassified GAA during the next major basin updates, subject to public participation. The Aquifer Protection Program helps protect Connecticut's public drinking water resources by delineating aquifer protection areas (also called wellhead protection areas) for public supply wells and establishing land use regulations within these areas. These areas represent the land area contributing ground water to active public water supply wells or well fields that serve more than 1000 people and are set in sand and gravel aquifers (stratified drift deposits).

DATA SOURCES

WATER QUALITY CLASSIFICATIONS DATA – Water quality classifications shown on this map are based on information from the following digital spatial datasets that are typically shown together – Ground Water Quality Classifications Poly, Surface Water Quality Classifications Line, and Surface Water Quality Classifications Poly. The map legend above reflects the content of these three data sources. These WQC data were initially compiled on 1:24,000-scale 7.5 minute USGS topographic quadrangle maps and later digitized at 1:24,000 scale. For example, the Surface Water Quality Classifications Line and Surface Water Quality Classifications Poly digital data assigns surface water quality classifications to water bodies such as rivers, streams, reservoirs, lakes, ponds and coves found in 1:24,000-scale hydrography data available from CT DEEP. The hydrography may not include all the waterbodies in Connecticut. The Ground Water Quality Classifications Poly data assigns ground water quality classifications, at 1:24,000 scale, to the remaining land areas in Connecticut.

AQUIFER PROTECTION AREA DATA – Aquifer Protection Areas shown on this map are from the Aquifer Protection Area digital dataset which contains polygon data intended to be used at 1:24,000 scale. The dataset contains regulated areas classified as Level A Aquifer Protection Area (Final) and Level B Aquifer Protection Area (Preliminary). The Level B areas are not shown on the WQC maps. The data was collected from 1991 to the present and is actively updated as Final area mapping replaces earlier Preliminary areas. The Aquifer Protection Areas are delineated by the individual water companies owning the well fields and submitted to the CT DEEP for approval. Preliminary mapping provides a general estimate of the area contributing ground water to the well field. Final mapping is based on extensive, site-specific, detailed modeling of the ground water flow system. CT DEEP may adjust Final area boundaries to be consistent with 1:24,000 scale topography and base map data where appropriate during the approval process.

MAJOR DRAINAGE BASIN DATA – Major drainage basins shown on this map are from Major Basin Line data developed by CT DEEP and intended to be used at 1:24,000 scale.

BASE MAP DATA - Based on data originally from 1:24,000-scale USGS 7.5 minute topographic quadrangle maps published between 1969 and 1992. It includes political boundaries, railroads, airports, hydrography, geographic names and geographic places. Streets and street names are from Tele Atlas® copyrighted data. Base map information is neither current nor complete.

RELATED INFORMATION
This map is intended to be printed at its original dimensions in order to maintain the 1:24,000 scale (1 inch = 2000 feet).
WATER QUALITY STANDARDS - Go to the CT DEEP website for a summary and the full text of the "Water Quality Standards" and for other information on water quality.
AQUIFER PROTECTION AREAS - Go to the CT DEEP website for more information.

ADOPTED DATES

Water Quality Standards
February 25, 2011

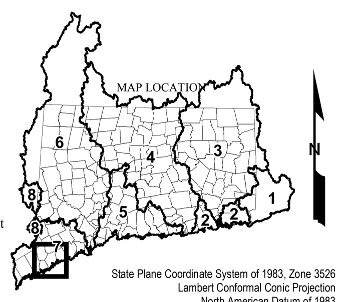
Thames River, Pawcatuck River and Southeast Coastal Basins: December 1986

Connecticut River and South Central Coastal Basins: February 1993

Housatonic River, Hudson River and Southwest Coastal Basins: March 1999

MAJOR BASINS

1 Pawcatuck
2 Southeast Coast
3 Thames
4 Connecticut
5 South Central Coast
6 Housatonic
7 Southwest Coast
8 Hudson



State Plane Coordinate System of 1983, Zone 3526
Lambert Conformal Conic Projection
North American Datum of 1983

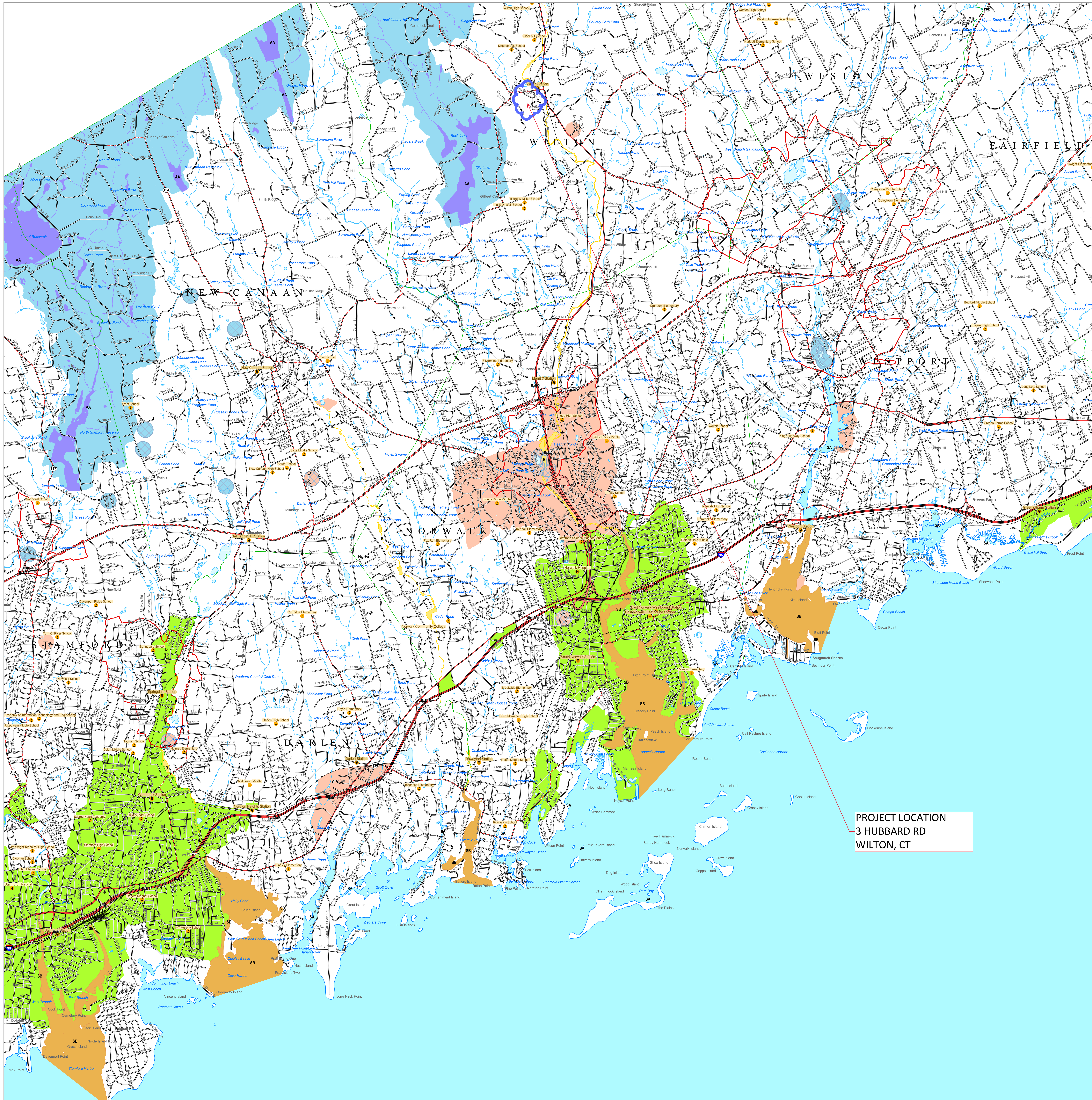
1 0.5 0 1 Miles
1000 0 1000 2000 3000 4000 5000 6000 7000 Feet
1 0.5 0 1 Kilometers

SCALE 1:24,000 (1 inch = 2000 feet) when map is printed at original size

STATE OF CONNECTICUT
DEPARTMENT OF
ENERGY & ENVIRONMENTAL PROTECTION
79 Elm Street
Hartford, CT 06106-5127

Map created by CT DEEP
October 2017

Map is not colorfast
Protect from light and moisture



APPENDIX F

TR 55 PEAK RUNOFF CALCULATION (GRAPHICAL METHOD)

ver 12-2010

CLIENT:	**3 HUBBARD RD**	CITY	**WILTON**	DATE:	1/16/2020
DSN BY:	**RCEBALLOS**	CHK BY:		DATE:	
COMMENTS:	**Existing Conditions - WS-1**				

Drainage Area	0.64156	Acres
Runoff Curve Number	90	

Time of Concentration	0.100	Hours

Frequency	yr	**1**	**2**	**5**	**10**	**25**	**50**	**100**
Rainfall, P (24 hour)	in	2.93	3.55	4.58	5.42	6.59	7.46	8.39
Initial Abstraction, Ia	in	0.222	0.222	0.222	0.222	0.222	0.222	0.222
Ia/P ratio		0.076	0.063	0.048	0.041	0.034	0.030	0.026
Unit Peak Discharge, qu	cfs/ac/in	1.578	1.578	1.578	1.578	1.578	1.578	1.578
Runoff	in	1.92	2.50	3.47	4.28	5.42	6.27	7.19
Runoff Volume	ac-ft	0.103	0.133	0.186	0.229	0.290	0.335	0.384
Peak Discharge, qp	cfs	**1.94**	**2.53**	**3.52**	**4.34**	**5.49**	**6.35**	**7.28**

Runoff Volume	cf	4471.76	5810.51	8087.26	9973.52	12627.00	14613.05	16744.38

GROUNDWATER RECHARGE CALCULATIONS

CLIENT:	**3 HUBBARD RD**	CITY	**WILTON**	0	DATE:	1/16/2020
DSN BY:	**RCEBALLOS**	CHK BY:		0	DATE:	
COMMENTS:	**Existing Conditions - WS-1**					

Impervious Drainage Area	17654	sf
Hydrologic Soil Group	B	

HYDROLOGIC GROUP VOLUME TO RECHARGE (x TOTAL IMPERVIOUS AREA)

Hydrologic Group	Volume to Recharge x Total Impervious Area	
A	0.6	inches of runoff
B	0.35	inches of runoff
C	0.25	inches of runoff
D	0.1	inches of runoff

Volume of Recharge	514.9083	cf

STORMWATER INFILTRATION SYSTEM SIZING

CLIENT:	**3 HUBBARD RD**	CITY	**WILTON**	0	DATE:	1/16/2020
DSN BY:	**RCEBALLOS**	CHK BY:		0	DATE:	
COMMENTS:	**Existing Conditions - WS-1**					

Sizing of the proposed stormwater infiltration system will be based on the stormwater runoff volume generated by the 1-inch rainfall event and the stormwater runoff generated by the first inch of all larger rainfall events. The sizing methodology meets the City's runoff reduction and water quality protection

Frequency	yr	ALL
Rainfall, P	in	1
Initial Abstraction, Ia	in	0.222
Ia/P ratio		0.222
Unit Peak Discharge, qu	cfs/ac/in	1.58
Runoff	in	0.32
Runoff Volume	ac-ft	0.02
Peak Discharge, qp	cfs	0.32
Infiltrator VOLUME	cf	746.2

TR 55 PEAK RUNOFF CALCULATION (GRAPHICAL METHOD)

ver 12-2010

CLIENT:	**3 HUBBARD RD**	CITY	**WILTON**	DATE:	1/16/2020
DSN BY:	**RCEBALLOS**	CHK BY:		DATE:	
COMMENTS:	**Existing Conditions - WS-2**				

Drainage Area	0.227	Acres
Runoff Curve Number	73	
Time of Concentration	0.100	Hours

Frequency	yr	**1**	**2**	**5**	**10**	**25**	**50**	**100**
Rainfall, P (24 hour)	in	2.93	3.55	4.58	5.42	6.59	7.46	8.39
Initial Abstraction, Ia	in	0.74	0.74	0.74	0.74	0.74	0.74	0.74
Ia/P ratio		0.253	0.208	0.162	0.137	0.112	0.099	0.088
Unit Peak Discharge, qu	cfs/ac/in	1.489	1.514	1.542	1.556	1.571	1.578	1.578
Runoff	in	0.81	1.21	1.96	2.61	3.58	4.33	5.16
Runoff Volume	ac-ft	0.015	0.023	0.037	0.049	0.068	0.082	0.098
Peak Discharge, qp	cfs	**0.28**	**0.42**	**0.68**	**0.92**	**1.28**	**1.55**	**1.85**

Runoff Volume	cf	671.13	999.67	1611.77	2154.03	2953.27	3571.58	4249.25

TR 55 PEAK RUNOFF CALCULATION (GRAPHICAL METHOD)

ver 12-2010

CLIENT:	**3 HUBBARD RD**	CITY	**WILTON**	DATE:	1/16/2020
DSN BY:	**RCEBALLOS**	CHK BY:		DATE:	
COMMENTS:	**Proposed Conditions - WS-1**				

Drainage Area	0.7523	Acres
Runoff Curve Number	87	
Time of Concentration	0.100	Hours

Frequency	yr	**1**	**2**	**5**	**10**	**25**	**50**	**100**
Rainfall, P (24 hour)	in	2.93	3.55	4.58	5.42	6.59	7.46	8.39
Initial Abstraction, Ia	in	0.299	0.299	0.299	0.299	0.299	0.299	0.299
Ia/P ratio		0.102	0.084	0.065	0.055	0.045	0.040	0.036
Unit Peak Discharge, qu	cfs/ac/in	1.577	1.578	1.578	1.578	1.578	1.578	1.578
Runoff	in	1.68	2.23	3.17	3.96	5.08	5.92	6.83
Runoff Volume	ac-ft	0.105	0.140	0.199	0.249	0.319	0.371	0.428
Peak Discharge, qp	cfs	**1.99**	**2.64**	**3.77**	**4.71**	**6.04**	**7.03**	**8.11**
Runoff Volume	cf	4582.36	6082.36	8665.97	10825.82	13882.39	16179.51	18650.85

GROUNDWATER RECHARGE CALCULATIONS

CLIENT:	**3 HUBBARD RD**	CITY	**WILTON**	0	DATE:	1/16/2020
DSN BY:	**RCEBALLOS**	CHK BY:		0	DATE:	
COMMENTS:	**Proposed Conditions - WS-1**					

Impervious Drainage Area	26558	sf
Hydrologic Soil Group	B	

HYDROLOGIC GROUP VOLUME TO RECHARGE (x TOTAL IMPERVIOUS AREA)

Hydrologic Group	Volume to Recharge x Total Impervious Area	
A	0.6	inches of runoff
B	0.35	inches of runoff
C	0.25	inches of runoff
D	0.1	inches of runoff

Volume of Recharge	774.6083	cf

STORMWATER INFILTRATION SYSTEM SIZING

CLIENT:	**3 HUBBARD RD**	CITY	**WILTON**	0	DATE:	1/16/2020
DSN BY:	**RCEBALLOS**	CHK BY:		0	DATE:	
COMMENTS:	**Proposed Conditions - WS-1**					

Sizing of the proposed stormwater infiltration system will be based on the stormwater runoff volume generated by the 1-inch rainfall event and the stormwater runoff generated by the first inch of all larger rainfall events. The sizing methodology meets the City's runoff reduction and water quality protection

Frequency	yr	ALL
Rainfall, P	in	1
Initial Abstraction, Ia	in	0.299
Ia/P ratio		0.299
Unit Peak Discharge, qu	cfs/ac/in	1.58
Runoff	in	0.22
Runoff Volume	ac-ft	0.01
Peak Discharge, qp	cfs	0.27
Infiltrator VOLUME	cf	611.3

TR 55 PEAK RUNOFF CALCULATION (GRAPHICAL METHOD)

ver 12-2010

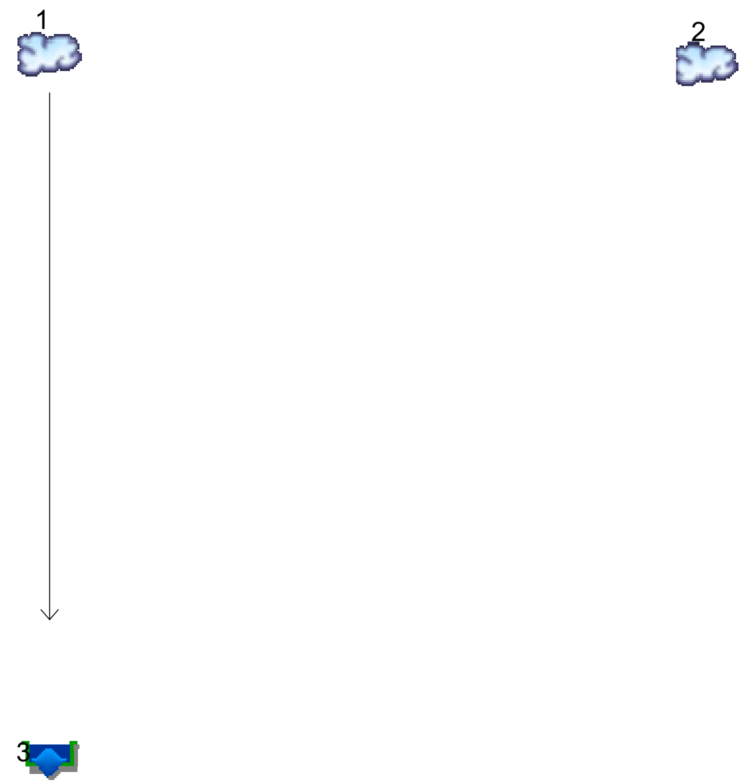
CLIENT:	**3 HUBBARD RD**	CITY	**WILTON**	DATE:	1/16/2020
DSN BY:	**RCEBALLOS**	CHK BY:		DATE:	
COMMENTS:	**Proposed Conditions - WS-2**				

Drainage Area	0.1147	Acres
Runoff Curve Number	61	
Time of Concentration	0.100	Hours

Frequency	yr	**1**	**2**	**5**	**10**	**25**	**50**	**100**
Rainfall, P (24 hour)	in	2.93	3.55	4.58	5.42	6.59	7.46	8.39
Initial Abstraction, Ia	in	1.279	1.279	1.279	1.279	1.279	1.279	1.279
Ia/P ratio		0.437	0.360	0.279	0.236	0.194	0.171	0.152
Unit Peak Discharge, qu	cfs/ac/in	1.126	1.356	1.474	1.499	1.523	1.536	1.547
Runoff	in	0.34	0.60	1.12	1.63	2.41	3.04	3.74
Runoff Volume	ac-ft	0.003	0.006	0.011	0.016	0.023	0.029	0.036
Peak Discharge, qp	cfs	**0.04**	**0.09**	**0.19**	**0.28**	**0.42**	**0.54**	**0.66**
Runoff Volume	cf	141.08	247.84	467.99	677.75	1003.39	1265.02	1559.03

Watershed Model Schematic

Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020

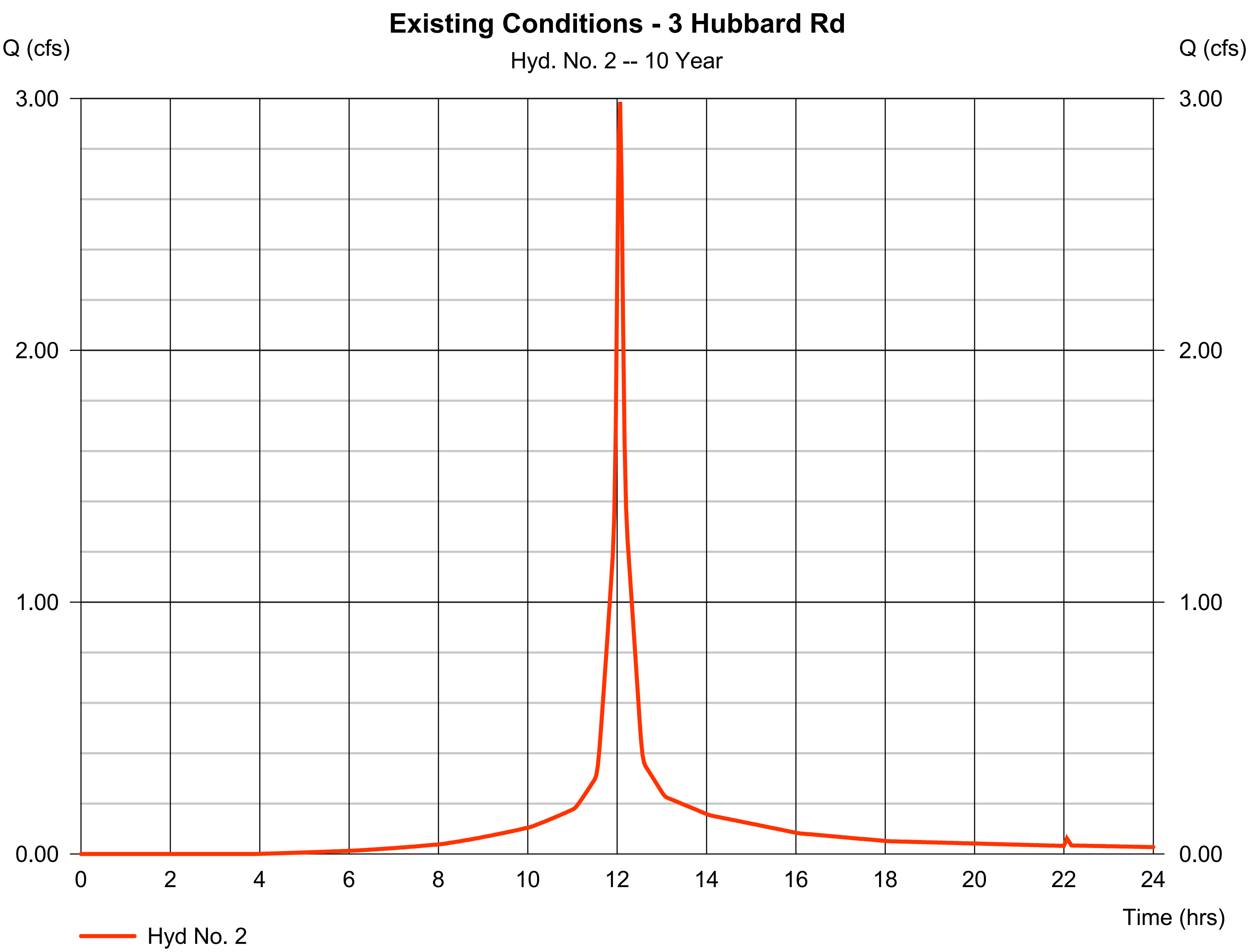


Hydrograph Report

Hyd. No. 2

Existing Conditions - 3 Hubbard Rd

Hydrograph type	= SCS Runoff	Peak discharge	= 2.986 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 9,349 cuft
Drainage area	= 0.641 ac	Curve number	= 90
Basin Slope	= 9.1 %	Hydraulic length	= 375 ft
Tc method	= LAG	Time of conc. (Tc)	= 3.39 min
Total precip.	= 5.42 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

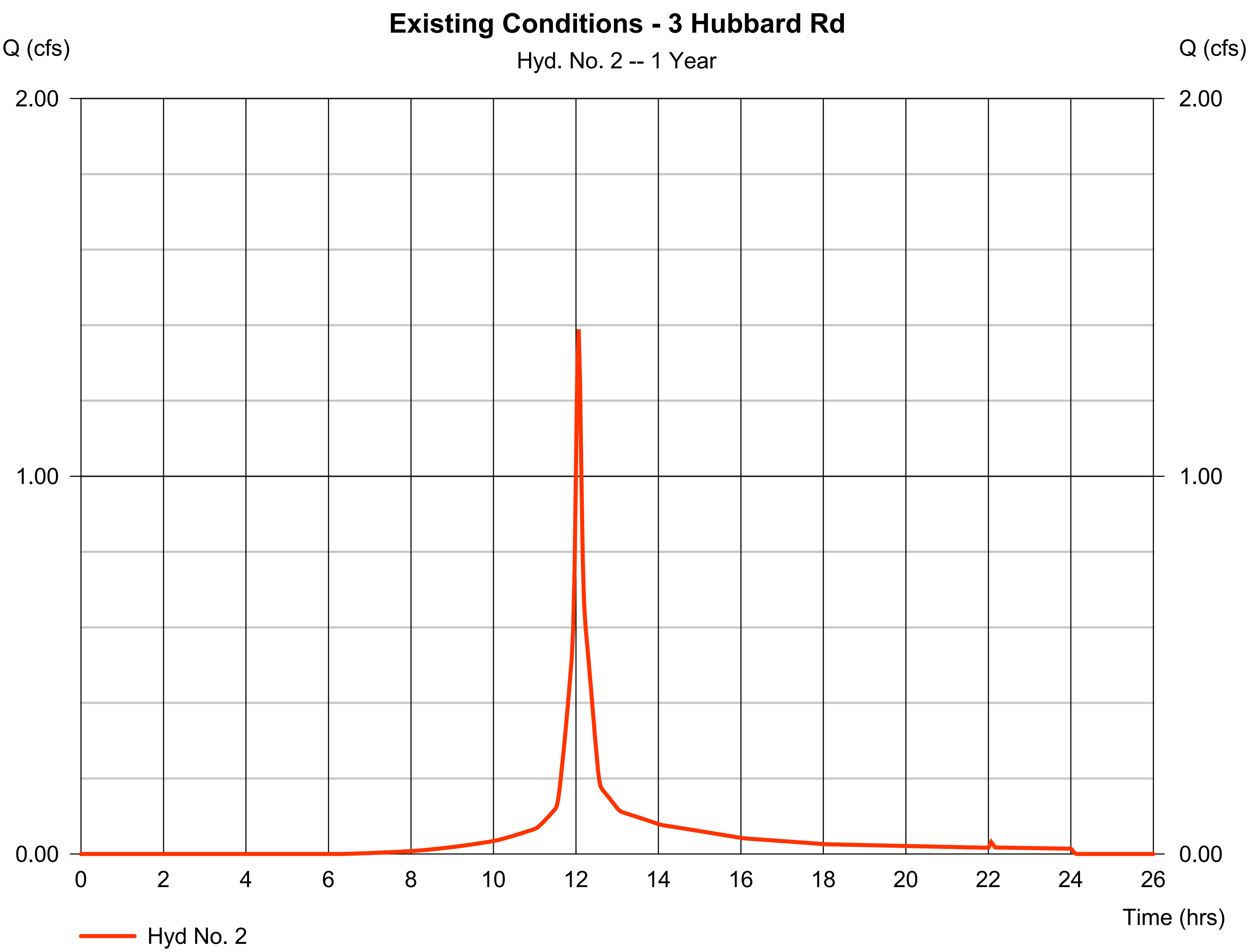


Hydrograph Report

Hyd. No. 2

Existing Conditions - 3 Hubbard Rd

Hydrograph type	= SCS Runoff	Peak discharge	= 1.389 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 4,191 cuft
Drainage area	= 0.641 ac	Curve number	= 90
Basin Slope	= 9.1 %	Hydraulic length	= 375 ft
Tc method	= LAG	Time of conc. (Tc)	= 3.39 min
Total precip.	= 2.93 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

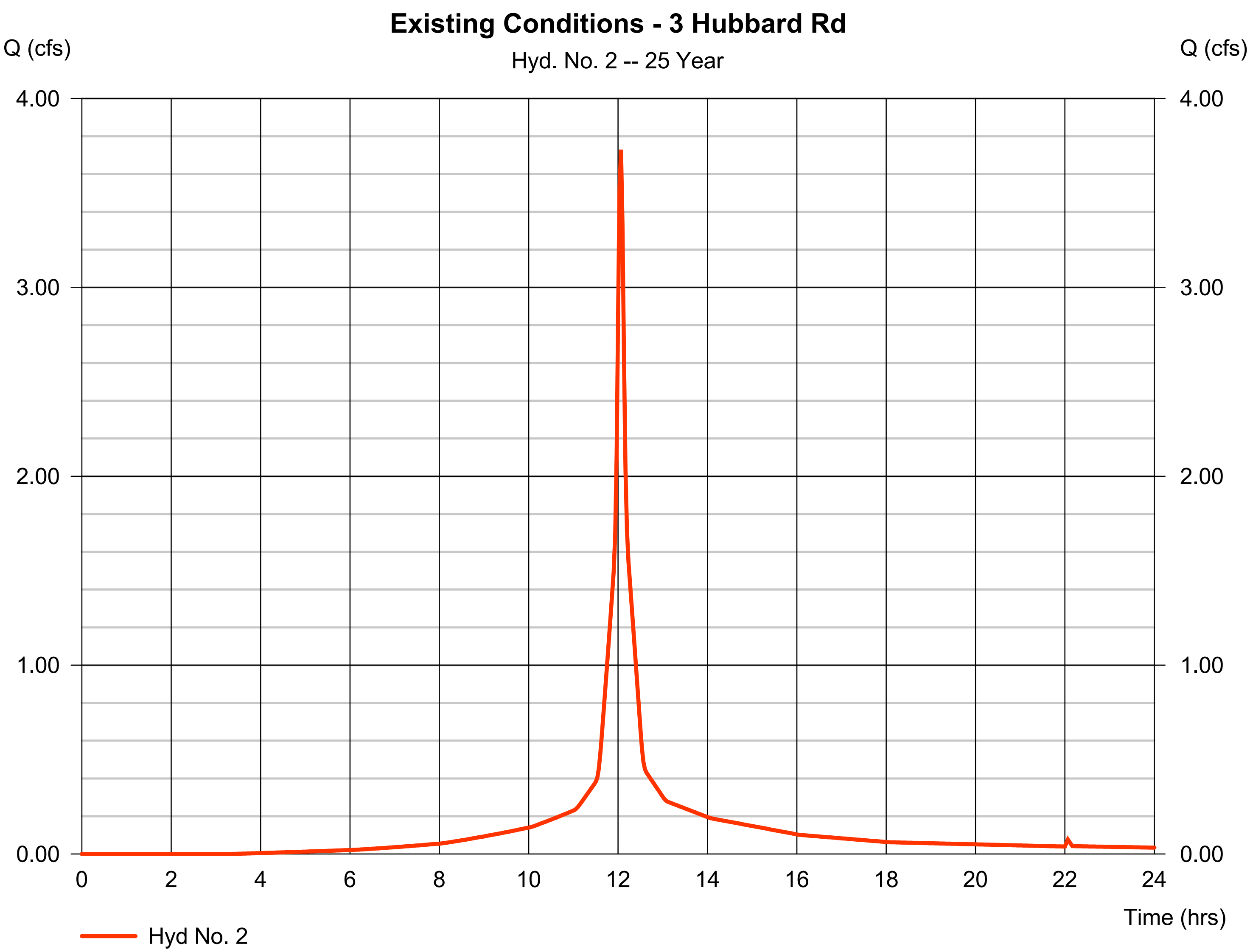


Hydrograph Report

Hyd. No. 2

Existing Conditions - 3 Hubbard Rd

Hydrograph type	= SCS Runoff	Peak discharge	= 3.729 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 11,836 cuft
Drainage area	= 0.641 ac	Curve number	= 90
Basin Slope	= 9.1 %	Hydraulic length	= 375 ft
Tc method	= LAG	Time of conc. (Tc)	= 3.39 min
Total precip.	= 6.59 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

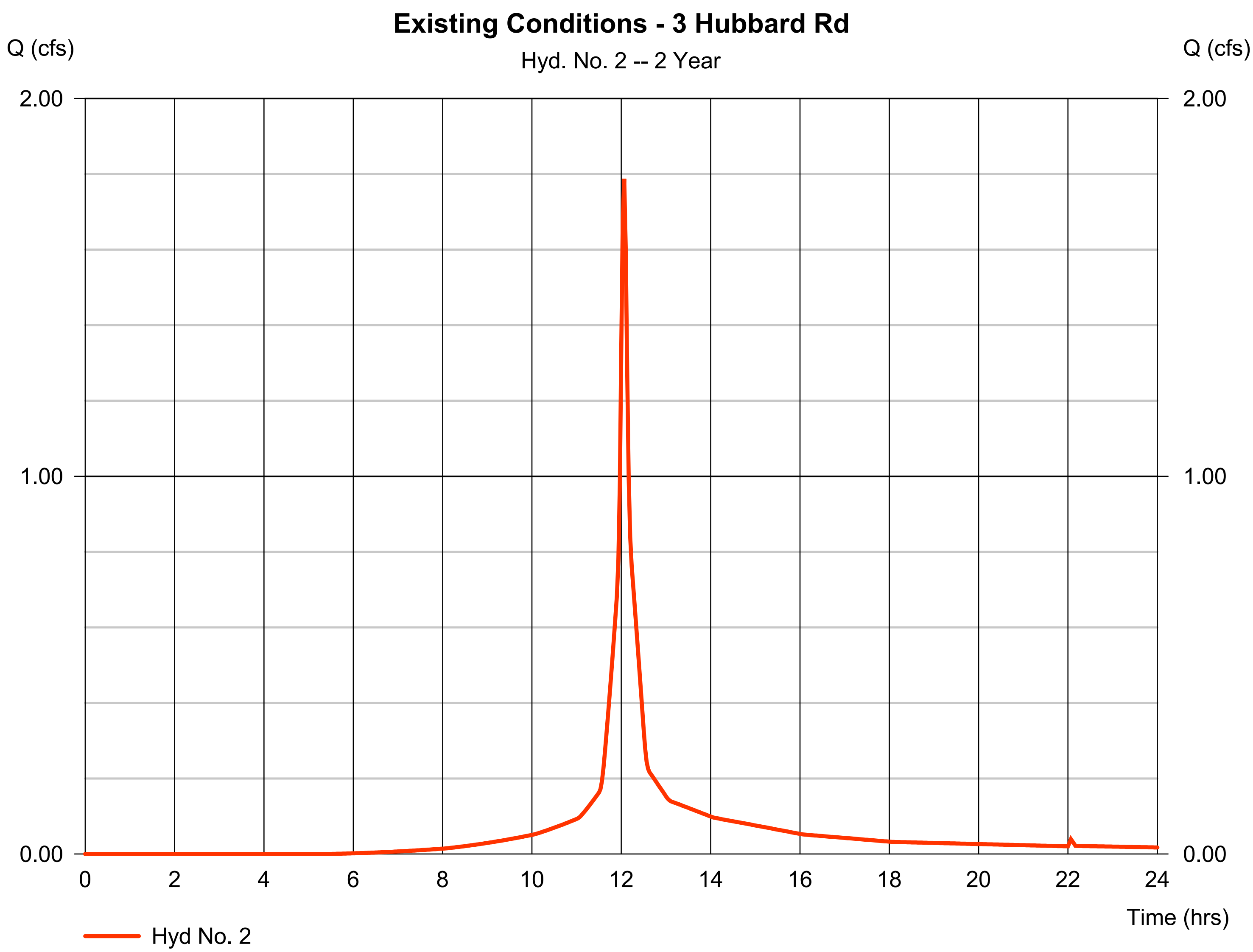


Hydrograph Report

Hyd. No. 2

Existing Conditions - 3 Hubbard Rd

Hydrograph type	= SCS Runoff	Peak discharge	= 1.787 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 5,446 cuft
Drainage area	= 0.641 ac	Curve number	= 90
Basin Slope	= 9.1 %	Hydraulic length	= 375 ft
Tc method	= LAG	Time of conc. (Tc)	= 3.39 min
Total precip.	= 3.55 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

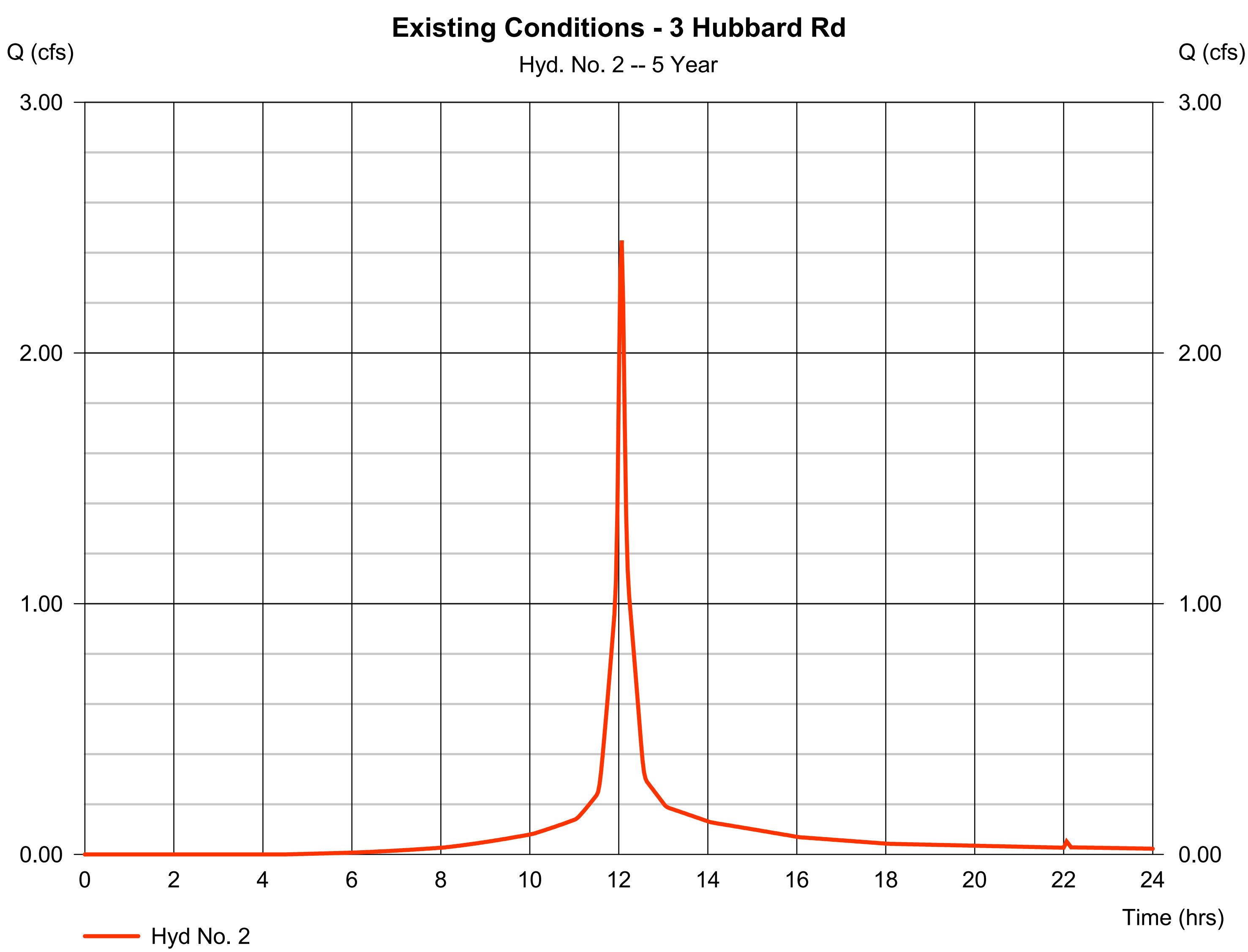


Hydrograph Report

Hyd. No. 2

Existing Conditions - 3 Hubbard Rd

Hydrograph type	= SCS Runoff	Peak discharge	= 2.449 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 7,581 cuft
Drainage area	= 0.641 ac	Curve number	= 90
Basin Slope	= 9.1 %	Hydraulic length	= 375 ft
Tc method	= LAG	Time of conc. (Tc)	= 3.39 min
Total precip.	= 4.58 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484



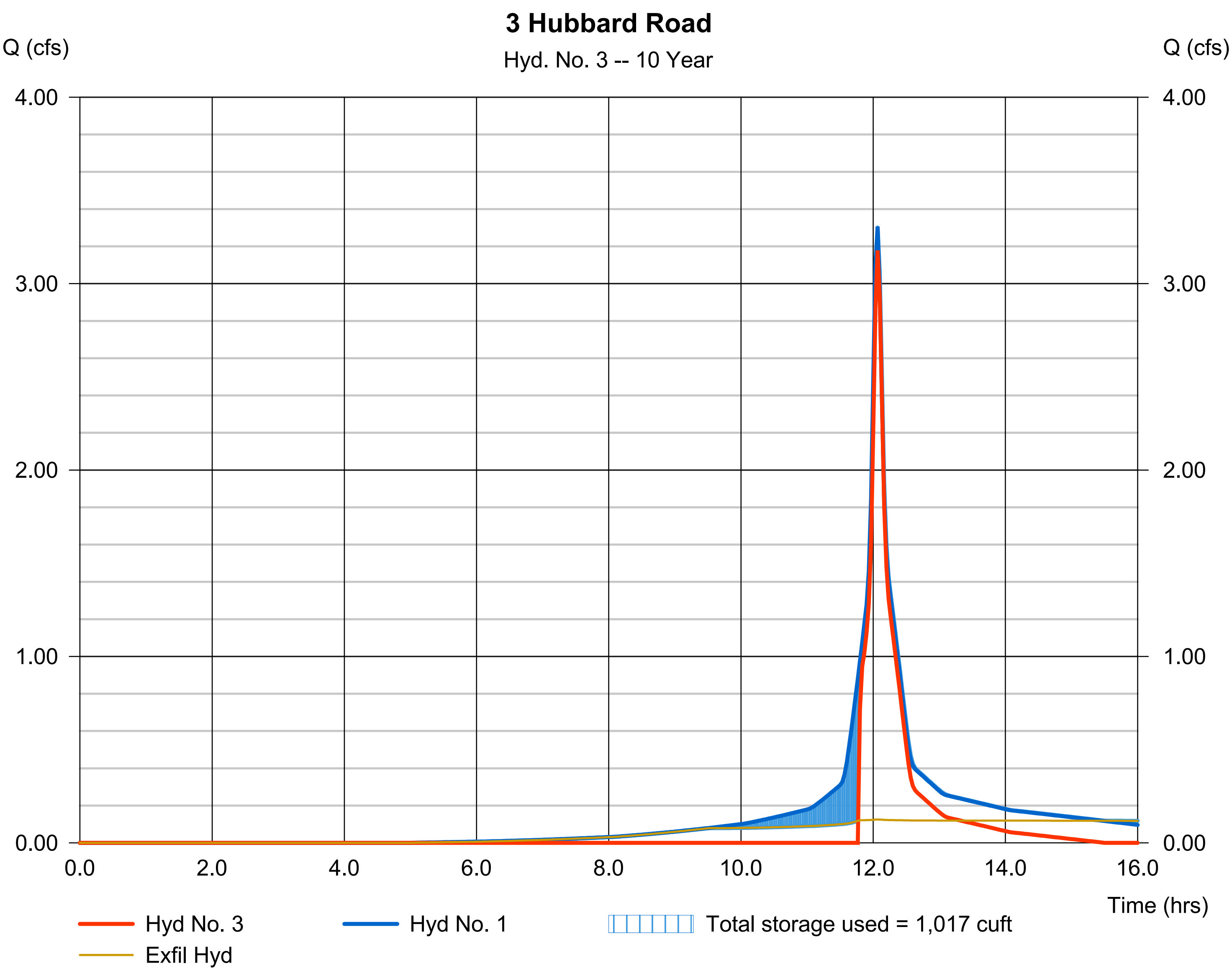
Hydrograph Report

Hyd. No. 3

3 Hubbard Road

Hydrograph type	= Reservoir	Peak discharge	= 3.178 cfs
Storm frequency	= 10 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 4,795 cuft
Inflow hyd. No.	= 1 - Proposed Condition - 3 Hubbard Road	Max. Elevation	= 211.72 ft
Reservoir name	= Cultec Chambers	Max. Storage	= 1,017 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

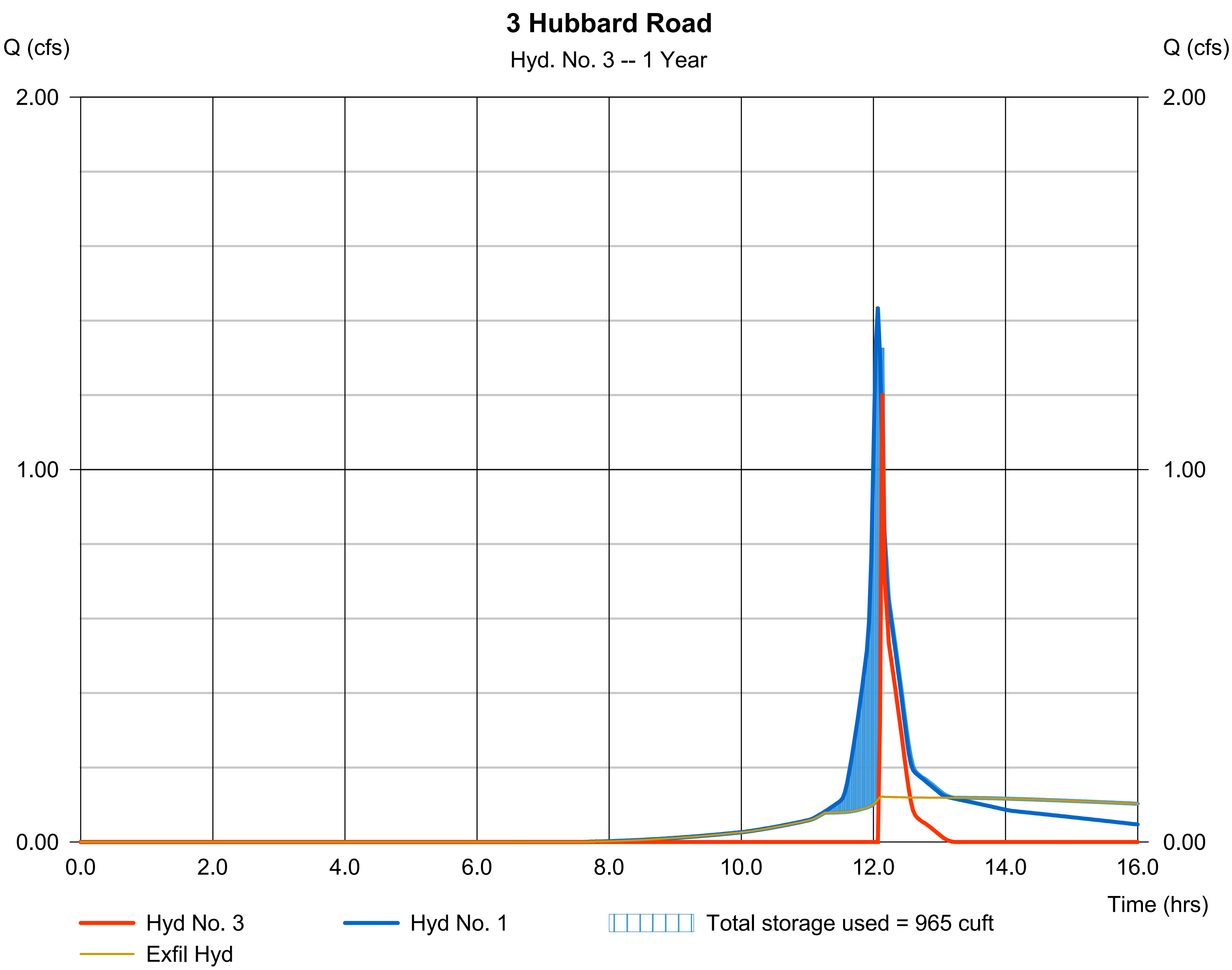
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Sunday, 01 / 19 / 2020

Hyd. No. 3

3 Hubbard Road

Hydrograph type	= Reservoir	Peak discharge	= 1.205 cfs
Storm frequency	= 1 yrs	Time to peak	= 12.13 hrs
Time interval	= 2 min	Hyd. volume	= 845 cuft
Inflow hyd. No.	= 1 - Proposed Condition - 3 Hubbard Rd	Max. Elevation	= 211.49 ft
Reservoir name	= Cultec Chambers	Max. Storage	= 965 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



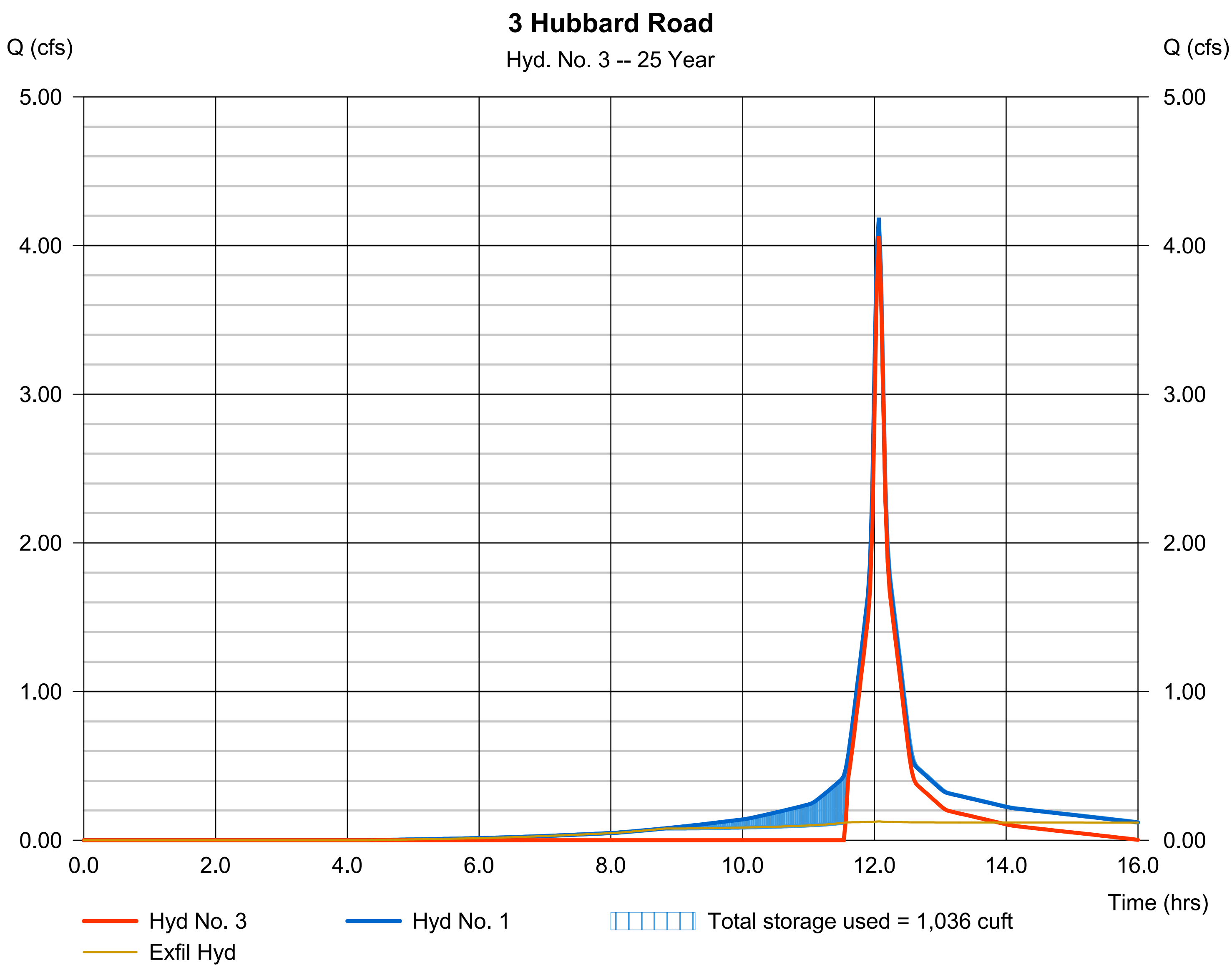
Hydrograph Report

Hyd. No. 3

3 Hubbard Road

Hydrograph type	= Reservoir	Peak discharge	= 4.062 cfs
Storm frequency	= 25 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 6,990 cuft
Inflow hyd. No.	= 1 - Proposed Condition - 3 Hubbard Rd	Max. Elevation	= 211.80 ft
Reservoir name	= Cultec Chambers	Max. Storage	= 1,036 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



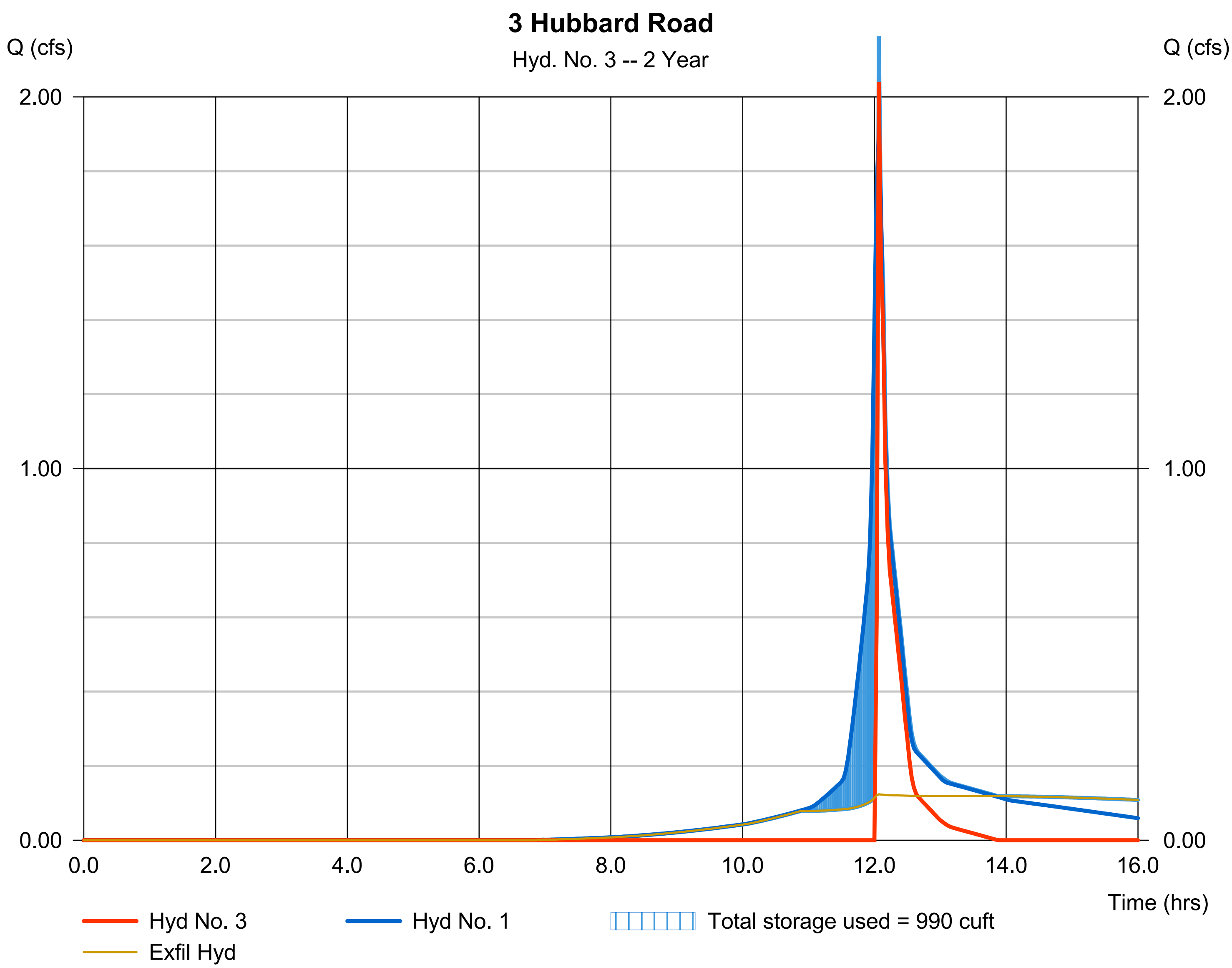
Hydrograph Report

Hyd. No. 3

3 Hubbard Road

Hydrograph type	= Reservoir	Peak discharge	= 2.039 cfs
Storm frequency	= 2 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 1,688 cuft
Inflow hyd. No.	= 1 - Proposed Condition - 3 Hubbard Rd	Max. Elevation	= 211.60 ft
Reservoir name	= Cultec Chambers	Max. Storage	= 990 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



Hydrograph Report

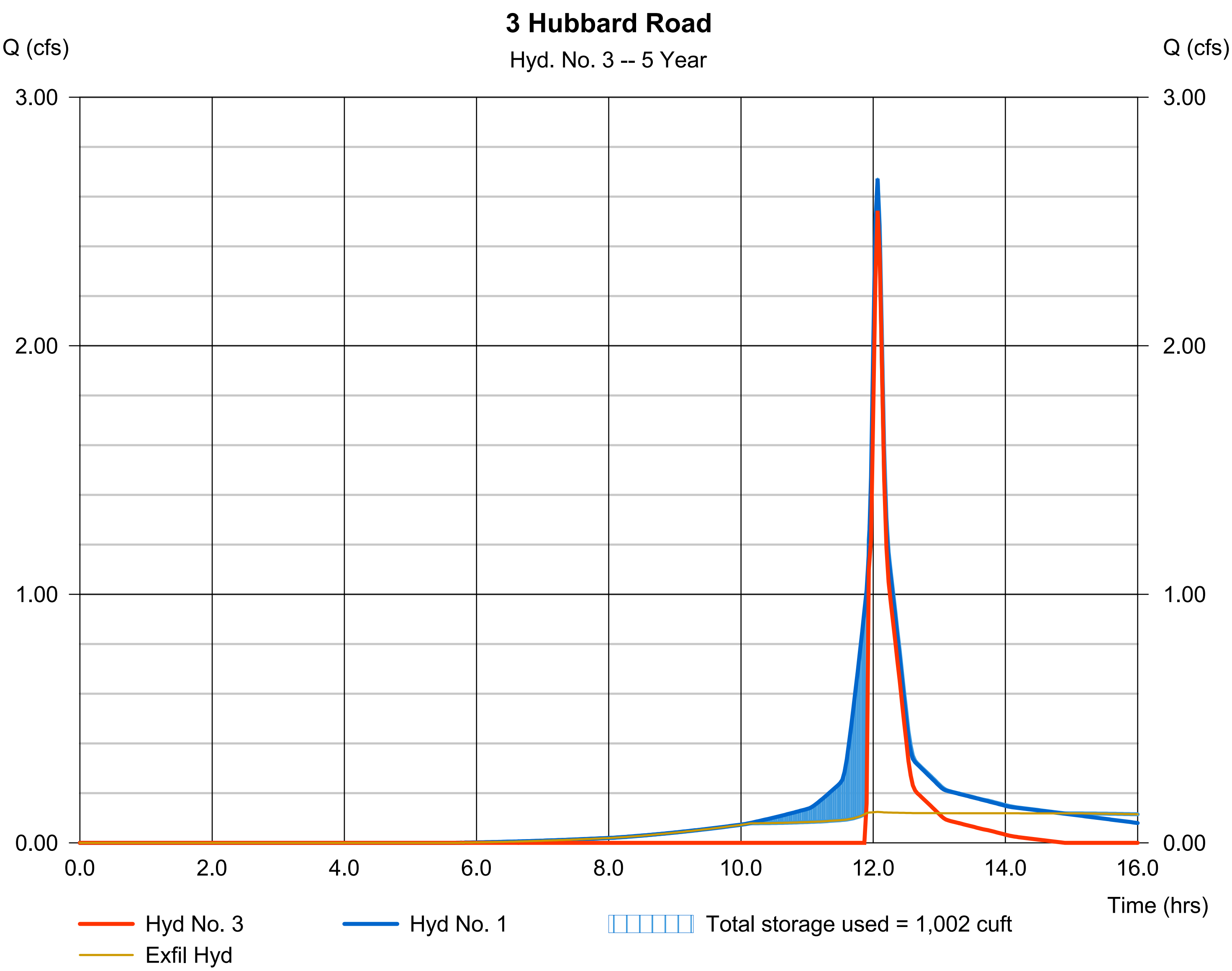
Hydraflow Hydrographs Extension for Autodesk® Civil 3D® by Autodesk, Inc. v2020 Sunday, 01 / 19 / 2020

Hyd. No. 3

3 Hubbard Road

Hydrograph type	= Reservoir	Peak discharge	= 2.543 cfs
Storm frequency	= 5 yrs	Time to peak	= 12.07 hrs
Time interval	= 2 min	Hyd. volume	= 3,316 cuft
Inflow hyd. No.	= 1 - Proposed Condition - 3 Hubbard Road	Max. Elevation	= 211.65 ft
Reservoir name	= Cultec Chambers	Max. Storage	= 1,002 cuft

Storage Indication method used. Exfiltration extracted from Outflow.



CULTEC

Founder of Plastic Chamber Technology
Stormwater and Septic Solutions
Since 1986

1-800-4-CULTEC
custservice@cultec.com

Prepared For:	Project Information:		Engineer:	Calculations Performed By:
Andy ayala	Name	3 Hubbard Rd	Ricardo Ceballos	Ricardo Ceballos
Workforce Partners, LLC			Professional Engineering Consulting services	Professional Engineering Consulting services
	Wilton		245 Sturges Hwy	245 Sturges Hwy
Norwalk	CT		Westport	Westport
CT 06851			CT 06880	CT 06880
Phone	Date:	January 13, 2020	203-635-0922	203-635-0922
Fax				Fax
Email			rceballos100@gmail.com	rceballos100@gmail.com

Input Given Parameters

Unit of Measure	English	
Select Model	Recharger 330XLHD	
Stone Porosity	40.0%	
Number of Header Systems	1 Header	
Stone Depth **Above** Chamber	6	inches
Stone Depth **Below** Chamber	6	inches
Workable Bed Depth	6.00	feet
Max. Bed Width	15.00	feet
Storage Volume Required	1255.00	cu. feet

Chamber Specifications

Height	30.5	inches
Width	52.00	inches
Length	8.50	feet
Installed Length	7.00	feet
Bare Chamber Volume	52.21	cu. feet
Installed Chamber Volume	79.26	cu. feet

Image for visual reference only.May not reflect selected model.

Bed Depth	4.63	feet
Bed Width	11.17	feet
Storage Volume Provided	1282.81	cu. feet

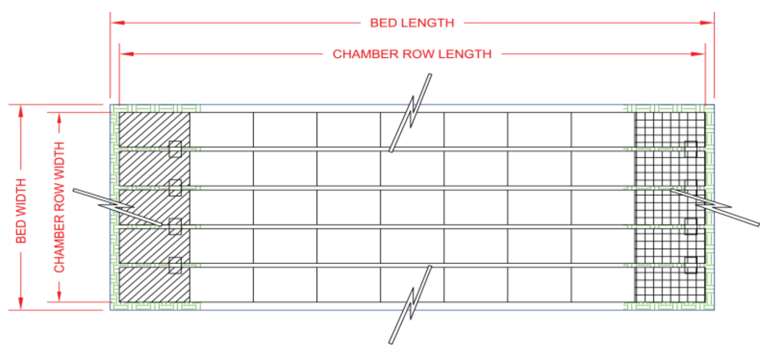
Materials List

Recharger 330XLHD Stormwater System by CULTEC, Inc.

Approx. Unit Count - not for construction	15	pieces
Actual Number of Chambers Required	14	pieces
Starter Chambers	2	pieces
Intermediate Chambers	10	pieces
End Chambers	2	pieces

HVLV FC-24 Feed Connector	1	pieces
CULTEC No. 410™ Filter Fabric	198.42	sq. yards
CULTEC No. 20L Polyethylene Liner	11.17	feet
Stone	48.98	cu. yards

Bed Detail



Number of Rows Wide	2	pieces
Number of Chambers Long	7	pieces
Chamber Row Width	9.17	feet
Chamber Row Length	50.50	feet
Bed Width	11.17	feet
Bed Length	52.50	feet
Bed Area Required	586.25	sq. feet

Bed detail for reference only. Not project specific. Not to scale. Use CULTEC StormGenie to output project specific detail.

CULTEC

Founder of Plastic Chamber Technology
Stormwater and Septic Solutions
Since 1986

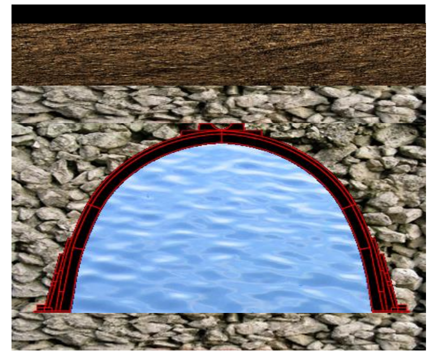
1-800-4-CULTEC
custservice@cultec.com

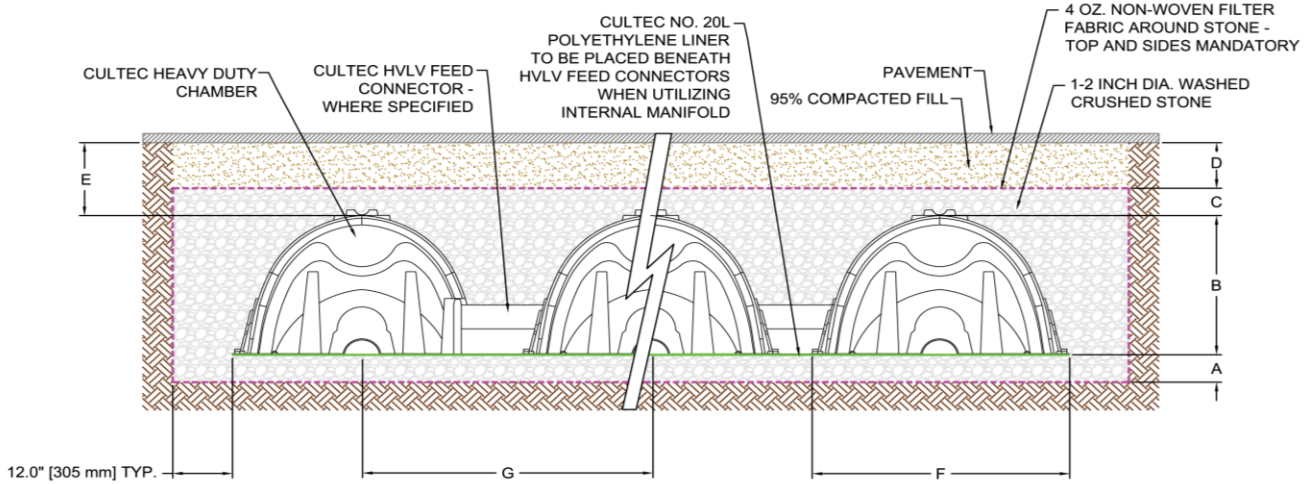
Project Name: Name **Date:** January 13, 2020

Cross Section Detail

Conceptual graphic only. Not job specific.

Recharger 330XLHD		
Pavement	**3**	inches
95% Compacted Fill	**10**	inches
Stone Above	**6**	inches
Chamber Height	**30.5**	inches
Stone Below	**6**	inches
Effective Depth	**42.5**	inches
Bed Depth	**55.5**	inches





A	Depth of Stone Base	**6.0**	inches
B	Chamber Height	**30.5**	inches
C	Depth of Stone Above Units	**6.0**	inches
D	Depth of 95% Compacted Fill	**10.0**	inches
E	Max. Depth of Cover Allowed Above Crown of Chamber	**12.0**	feet
F	Chamber Width	**52.0**	inches
G	Center to Center Spacing	**4.83**	feet

Breakdown of Storage Provided by Recharger 330XLHD Stormwater System		
Chambers	**753.36**	cu. feet
Feed Connectors	**0.46**	cu. feet
Stone	**529.00**	cu. feet
Total Storage Provided	**1282.81**	cu. feet

CULTEC, Inc.
P.O. Box 280, Brookfield, CT 06804 USA
Phone: 203-775-4416 - Fax: 203-775-1462 - **www.cultec.com**

CULTEC Recharger® 330XLHD Stormwater Chamber

The Recharger® 330XLHD is a 30.5" (775 mm) tall, high capacity chamber. Typically when using this model, fewer chambers are required resulting in less labor and a smaller installation area. The Recharger® 330XLHD has the side portal internal manifold feature. HVLV® FC-24 Feed Connectors are inserted into the side portals to create the internal manifold.

Size (L x W x H)	8.5' x 52" x 30.5" 2.59 m x 1321 mm x 775 mm
Installed Length	7' 2.13 m
Length Adjustment per Run	1.50' 0.46 m
Chamber Storage	7.46 ft^3/ft 0.69 m^3/m 52.21 ft^3/unit 1.48 m^3/unit
Min. Installed Storage	11.32 ft^3/ft 1.05 m^3/m 79.26 ft^3/unit 2.24 m^3/unit
Min. Area Required	33.83 ft^2 3.14 m^2
Chamber Weight	73.0 lbs 33.11 kg
Shipping	30 chambers/skid 2,335 lbs/skid 10 skids/48' flatbed
Min. Center-to-Center Spacing	4.83' 1.47 m
Max. Allowable Cover	12' 3.66 m
Max. Inlet Opening in End Wall	24" HDPE, PVC 600 mm HDPE, PVC
Max. Allowable O.D. in Side Portal	10" HDPE, 12" PVC 250 mm HDPE, 300 mm PVC
Compatible Feed Connector	HVLV FC-24 Feed Connector

Calculations are based on installed chamber length.
All above values are nominal.
Min. installed storage includes 6" (152 mm) stone base, 6" (152 mm) stone above crown of chamber and typical stone surround at 58" (1473 mm) center-to-center spacing.

	Stone Foundation Depth		
	6" 152 mm	12" 305 mm	18" 457 mm
Chamber and Stone Storage Per Chamber	79.26 ft^3 2.24 m^3	86.03 ft^3 2.44 m^3	92.79 ft^3 2.63 m^3
Min. Effective Depth	3.54' 1.08 m	4.04' 1.23 m	4.54' 1.38 m
Stone Required Per Chamber	2.50 yd^3 1.91 m^3	3.13 yd^3 2.39 m^3	3.76 yd^3 2.87 m^3

Calculations are based on installed chamber length.
Includes 6" (305 mm) stone above crown of chamber and typical stone surround at 58"(1473 mm) center-to-center spacing and stone foundation as listed in table.
Stone void calculated at 40%.

Recharger® 330XLHD Bare Chamber Storage Volumes

Elevation		Incremental Storage Volume				Cumulative Storage	
in.	mm	ft^3/ft	m^3/m	ft^3	m^3	ft^3	m^3
30.5	775	0.000	0.000	0.000	0.000	52.213	1.479
30	762	0.019	0.002	0.133	0.004	52.213	1.479
29	737	0.051	0.005	0.357	0.010	52.080	1.475
28	711	0.084	0.008	0.588	0.017	51.723	1.465
27	686	0.124	0.012	0.868	0.025	51.135	1.448
26	660	0.150	0.014	1.05	0.030	50.267	1.424
25	635	0.173	0.016	1.211	0.034	49.217	1.394
24	609	0.191	0.018	1.337	0.038	48.006	1.360
23	584	0.207	0.019	1.449	0.041	46.669	1.322
22	559	0.221	0.021	1.547	0.044	45.220	1.281
21	533	0.233	0.022	1.631	0.046	43.673	1.237
20	508	0.244	0.023	1.708	0.048	42.042	1.191
19	483	0.254	0.024	1.778	0.050	40.334	1.142
18	457	0.264	0.025	1.848	0.052	38.556	1.092
17	432	0.271	0.025	1.897	0.054	36.708	1.040
16	406	0.283	0.026	1.981	0.056	34.811	0.986
15	381	0.294	0.027	2.058	0.058	32.830	0.930
14	356	0.296	0.027	2.072	0.059	30.772	0.871
13	330	0.299	0.028	2.093	0.059	28.700	0.813
12	305	0.301	0.028	2.107	0.060	26.607	0.754
11	279	0.303	0.028	2.121	0.060	24.500	0.694
10	254	0.304	0.028	2.128	0.060	22.379	0.634
9	229	0.306	0.028	2.142	0.061	20.251	0.574
8	203	0.313	0.029	2.191	0.062	18.109	0.513
7	178	0.321	0.030	2.247	0.064	15.918	0.451
6	152	0.322	0.030	2.254	0.064	13.671	0.387
5	127	0.323	0.030	2.261	0.064	11.417	0.323
4	102	0.324	0.030	2.268	0.064	9.156	0.259
3	76	0.325	0.030	2.275	0.064	6.888	0.195
2	51	0.327	0.030	2.289	0.065	4.613	0.131
1	25	0.332	0.031	2.324	0.066	2.324	0.066
Total		**7.459**	**0.693**	**52.213**	**1.479**	**52.213**	**1.479**

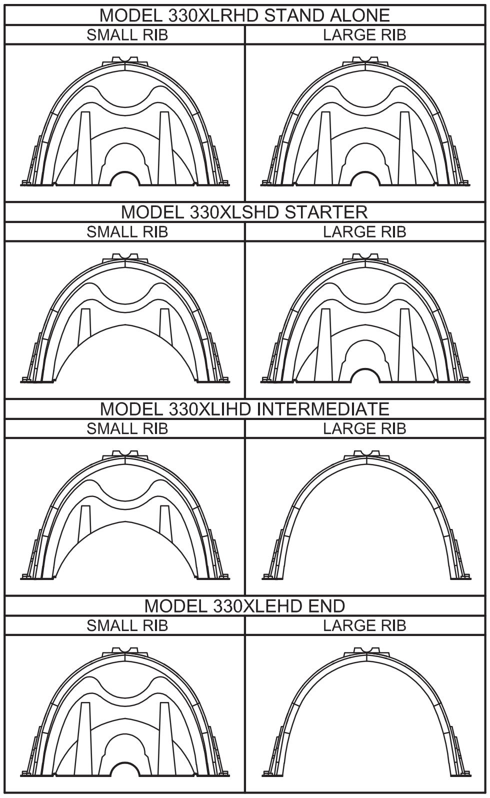
Calculations are based on installed chamber length.

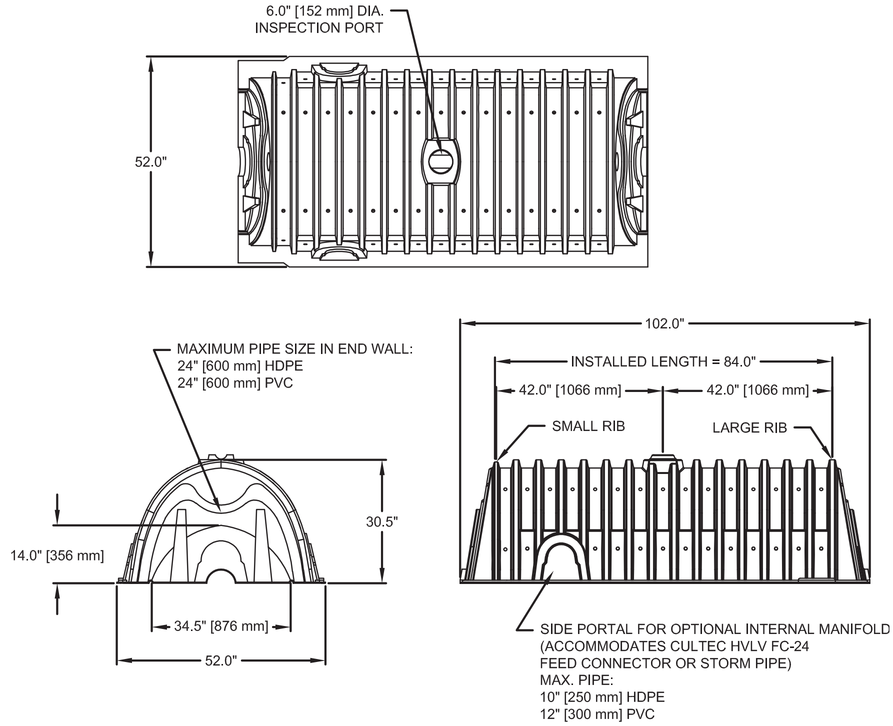
Visit http://cultec.com/downloads/ for Product Downloads and CAD details.

For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.

CULTEC Recharger® 330XLHD Stormwater Chamber

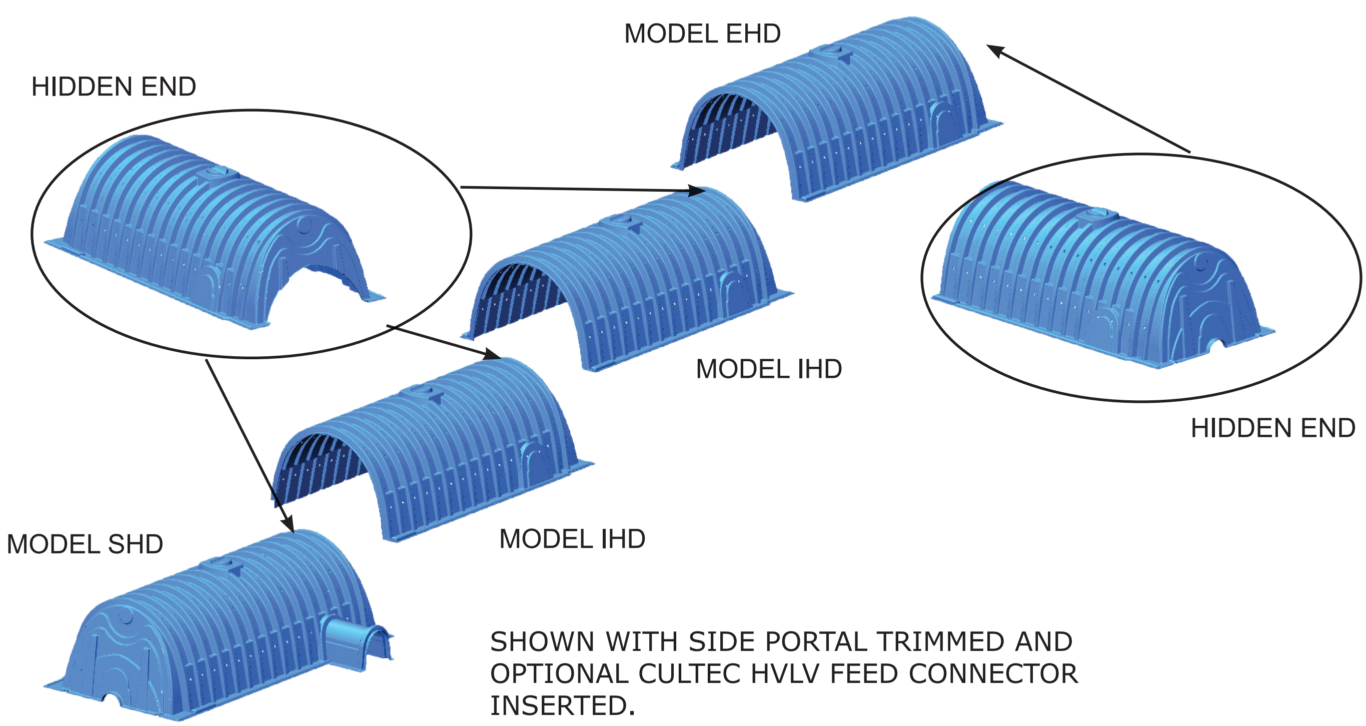
Three View Drawing





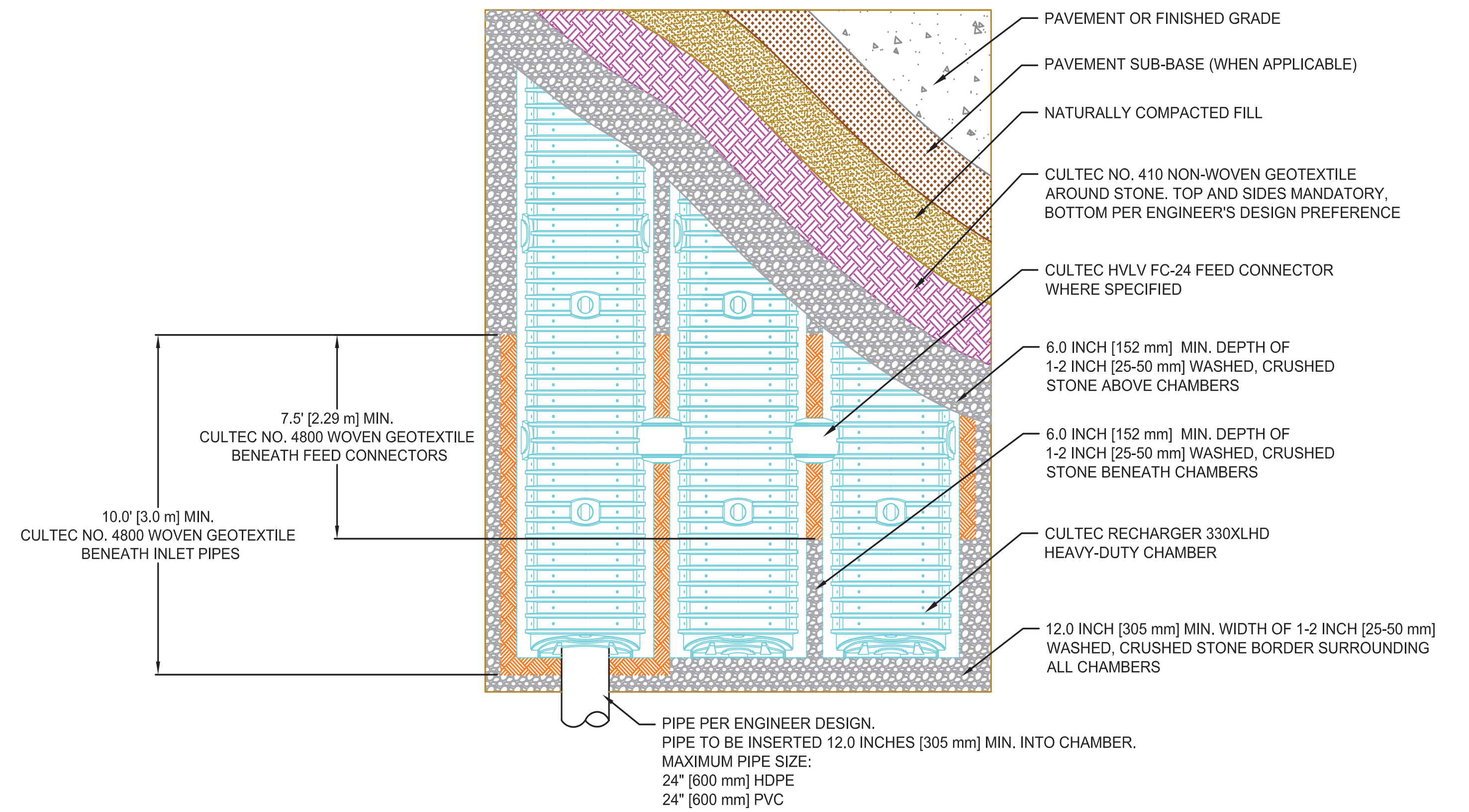
CULTEC RECHARGER 330XLHD CHAMBER STORAGE = 7.459 CF/FT [0.693 m³/m]
INSTALLED LENGTH ADJUSTMENT = 1.5' [0.46 m]
SIDE PORTAL ACCEPTS CULTEC HVLV FC-24 FEED CONNECTOR

Typical Interlock Installation

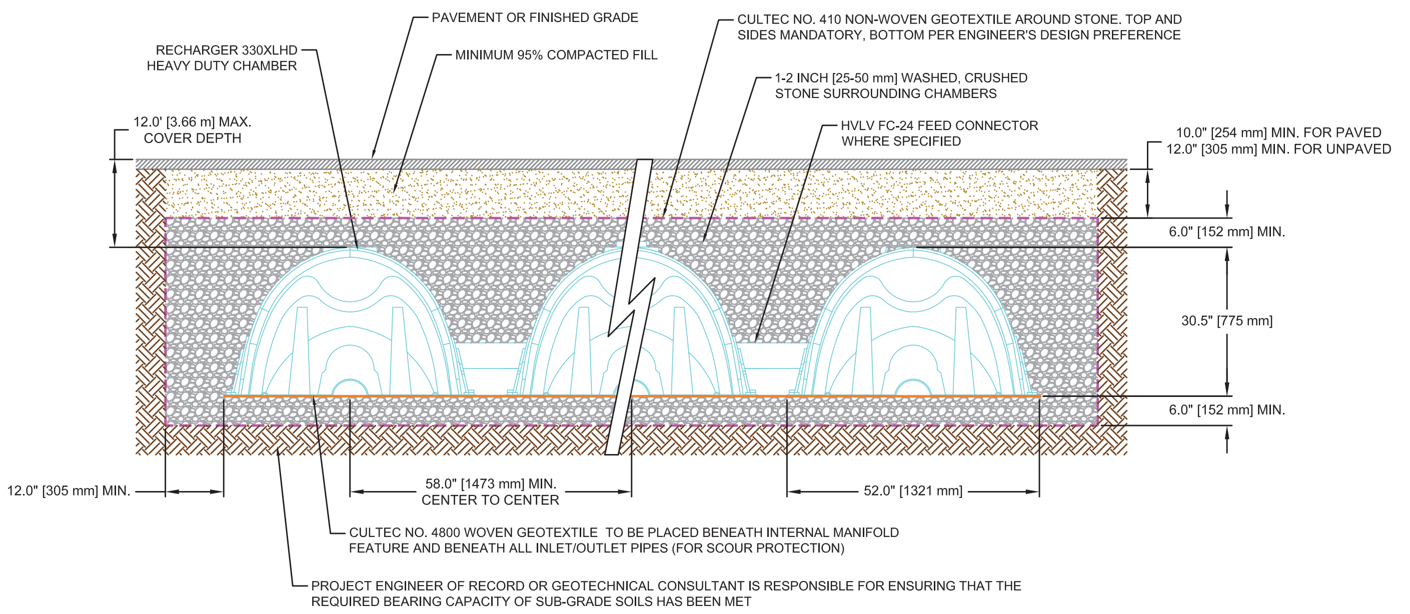


SHOWN WITH SIDE PORTAL TRIMMED AND
OPTIONAL CULTEC HVLV FEED CONNECTOR
INSERTED.

Plan View Drawing



Typical Cross Section for Traffic Application



CULTEC Recharger® 330XLHD Specifications

GENERAL

CULTEC Recharger® 330XLHD chambers are designed for underground stormwater management. The chambers may be used for retention, recharging, detention or controlling the flow of on-site stormwater runoff.

CHAMBER PARAMETERS

1. The chambers shall be manufactured in the U.S.A. by CULTEC, Inc. of Brookfield, CT (cultec.com, 203-775-4416).
2. The chamber shall be vacuum thermoformed of polyethylene with a black interior and blue exterior.
3. The chamber shall be arched in shape.
4. The chamber shall be open-bottomed.
5. The chamber shall be joined using an interlocking overlapping rib method. Connections must be fully shouldered overlapping ribs, having no separate couplings or separate end walls.
6. The nominal chamber dimensions of the CULTEC Recharger® 330XLHD shall be 30.5 inches (775 mm) tall, 52 inches (1321 mm) wide and 8.5 feet (2.59 m) long. The installed length of a joined Recharger® 330XLHD shall be 7 feet (2.13 m).
7. Maximum inlet opening on the chamber end wall is 24 inches (600 mm) HDPE, PVC.
8. The chamber shall have two side portals to accept CULTEC HVLV® FC-24 Feed Connectors to create an internal manifold. Maximum allowable O.D. in the side portal is 10 inches (250 mm) HDPE and 12 inches (300 mm) PVC.
9. The nominal chamber dimensions of the CULTEC HVLV® FC-24 Feed Connector shall be 12 inches (305 mm) tall, 16 inches (406 mm) wide and 24.2 inches (614 mm) long.
10. The nominal storage volume of the Recharger® 330XLHD chamber shall be 7.459 ft^3 / ft (0.693 m^3 / m) - without stone. The nominal storage volume of a single Recharger® 330XLRHD Stand Alone unit shall be 63.40 ft^3 (1.80 m^3) - without stone. The nominal storage volume of a joined Recharger® 330XLIHD Intermediate unit shall be 52.213 ft^3 (1.478 m^3) - without stone. The nominal storage volume of the length adjustment amount per run shall be 11.19 ft^3 (1.04 m^3) - without stone.
11. The nominal storage volume of the HVLV® FC-24 Feed Connector shall be 0.913 ft^3 / ft (0.026 m^3 / m) - without stone.
12. The Recharger® 330XLHD chamber shall have fifty-six discharge holes bored into the sidewalls of the unit's core to promote lateral conveyance of water.
13. The Recharger® 330XLHD chamber shall have 16 corrugations.
14. The end wall of the chamber, when present, shall be an integral part of the continuously formed unit. Separate end plates cannot be used with this unit.
15. The Recharger® 330XLRHD Stand Alone unit must be formed as a whole chamber having two fully formed integral end walls and having no separate end plates or separate end walls.
16. The Recharger® 330XLSHD Starter unit must be formed as a whole chamber having one fully formed integral end wall and one partially formed integral end wall with a lower transfer opening of 14 inches (356 mm) high x 34.5 inches (876 mm) wide.
17. The Recharger® 330XLIHD Intermediate unit must be formed as a whole chamber having one fully open end wall and one partially formed integral end wall with a lower transfer opening of 14 inches (356 mm) high x 34.5 inches (876 mm) wide.
18. The Recharger® 330XLEHD End unit must be formed as a whole chamber having one fully formed integral end wall and one fully open end wall and having no separate end plates or end walls.
19. The HVLV® FC-24 Feed Connector must be formed as a whole chamber having two open end walls and having no separate end plates or separate end walls. The unit shall fit into the side portals of the Recharger® 330XLHD and act as cross feed connections.
20. Chambers must have horizontal stiffening flex reduction steps between the ribs.
21. The chamber shall have a raised integral cap at the top of the arch in the center of each unit to be used as an optional inspection port or clean-out.
22. The units may be trimmed to custom lengths by cutting back to any corrugation on the large rib end.
23. The chamber shall be manufactured in an ISO 9001:2015 certified facility.
24. Maximum allowable cover over the top of the chamber shall be 12' (3.66 m).
25. The chamber shall be designed to withstand traffic loads when installed according to CULTEC's recommended installation instructions.

APPENDIX G

NOAA Atlas 14, Volume 10, Version 3
Location name: Wilton, Connecticut, USA*
Latitude: 41.1936°, Longitude: -73.4339°
Elevation: 210.34 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.364 (0.282-0.462)	0.424 (0.328-0.539)	0.522 (0.403-0.667)	0.604 (0.463-0.774)	0.716 (0.532-0.951)	0.801 (0.582-1.08)	0.889 (0.627-1.24)	0.983 (0.661-1.40)	1.11 (0.720-1.63)	1.21 (0.768-1.82)
10-min	0.515 (0.399-0.655)	0.600 (0.465-0.764)	0.739 (0.569-0.943)	0.855 (0.656-1.10)	1.01 (0.753-1.35)	1.14 (0.826-1.53)	1.26 (0.888-1.75)	1.39 (0.938-1.99)	1.58 (1.02-2.31)	1.72 (1.09-2.57)
15-min	0.606 (0.469-0.771)	0.706 (0.547-0.899)	0.870 (0.671-1.11)	1.01 (0.772-1.29)	1.19 (0.886-1.59)	1.34 (0.970-1.80)	1.48 (1.05-2.06)	1.64 (1.10-2.33)	1.85 (1.20-2.72)	2.02 (1.28-3.03)
30-min	0.848 (0.657-1.08)	0.986 (0.763-1.25)	1.21 (0.935-1.55)	1.40 (1.07-1.80)	1.66 (1.23-2.20)	1.86 (1.35-2.50)	2.06 (1.44-2.85)	2.26 (1.52-3.22)	2.54 (1.65-3.73)	2.75 (1.74-4.12)
60-min	1.09 (0.844-1.39)	1.26 (0.979-1.61)	1.55 (1.20-1.98)	1.79 (1.38-2.30)	2.12 (1.57-2.81)	2.38 (1.72-3.20)	2.63 (1.84-3.63)	2.89 (1.94-4.11)	3.22 (2.09-4.73)	3.48 (2.20-5.20)
2-hr	1.40 (1.09-1.77)	1.65 (1.28-2.08)	2.05 (1.59-2.60)	2.39 (1.84-3.04)	2.85 (2.13-3.77)	3.20 (2.34-4.31)	3.57 (2.53-4.95)	3.97 (2.68-5.62)	4.52 (2.94-6.60)	4.97 (3.16-7.39)
3-hr	1.61 (1.26-2.02)	1.90 (1.49-2.40)	2.39 (1.86-3.02)	2.80 (2.16-3.55)	3.35 (2.51-4.42)	3.77 (2.77-5.06)	4.21 (3.01-5.84)	4.71 (3.19-6.65)	5.42 (3.53-7.89)	6.01 (3.82-8.90)
6-hr	2.02 (1.59-2.53)	2.41 (1.90-3.02)	3.06 (2.40-3.84)	3.59 (2.80-4.53)	4.33 (3.27-5.68)	4.88 (3.61-6.52)	5.46 (3.93-7.55)	6.14 (4.17-8.61)	7.13 (4.66-10.3)	7.96 (5.08-11.7)
12-hr	2.50 (1.98-3.10)	3.00 (2.37-3.73)	3.81 (3.01-4.75)	4.49 (3.52-5.63)	5.43 (4.12-7.08)	6.13 (4.56-8.14)	6.87 (4.97-9.45)	7.73 (5.27-10.8)	9.00 (5.90-12.9)	10.1 (6.44-14.7)
24-hr	2.93 (2.33-3.61)	3.55 (2.83-4.39)	4.58 (3.63-5.66)	5.42 (4.27-6.75)	6.59 (5.03-8.55)	7.46 (5.58-9.87)	8.39 (6.11-11.5)	9.49 (6.49-13.1)	11.1 (7.32-15.9)	12.5 (8.04-18.2)
2-day	3.27 (2.62-4.00)	4.03 (3.23-4.94)	5.29 (4.22-6.50)	6.33 (5.02-7.82)	7.76 (5.97-10.0)	8.82 (6.65-11.6)	9.97 (7.33-13.7)	11.4 (7.80-15.6)	13.5 (8.91-19.2)	15.4 (9.89-22.1)
3-day	3.53 (2.84-4.30)	4.37 (3.51-5.34)	5.75 (4.60-7.04)	6.89 (5.48-8.48)	8.47 (6.53-10.9)	9.63 (7.29-12.7)	10.9 (8.03-14.9)	12.4 (8.55-17.1)	14.8 (9.79-20.9)	16.9 (10.9-24.2)
4-day	3.78 (3.05-4.60)	4.67 (3.76-5.69)	6.13 (4.92-7.48)	7.34 (5.85-9.00)	9.00 (6.96-11.5)	10.2 (7.75-13.4)	11.6 (8.54-15.7)	13.2 (9.09-18.0)	15.7 (10.4-22.1)	17.8 (11.5-25.5)
7-day	4.51 (3.65-5.46)	5.48 (4.44-6.64)	7.08 (5.71-8.59)	8.40 (6.73-10.2)	10.2 (7.92-13.0)	11.6 (8.78-15.0)	13.0 (9.61-17.5)	14.7 (10.2-20.0)	17.3 (11.5-24.2)	19.5 (12.6-27.8)
10-day	5.23 (4.25-6.30)	6.25 (5.08-7.55)	7.93 (6.42-9.60)	9.33 (7.50-11.3)	11.2 (8.74-14.2)	12.7 (9.64-16.3)	14.2 (10.5-18.9)	16.0 (11.1-21.6)	18.5 (12.3-25.8)	20.7 (13.4-29.3)
20-day	7.39 (6.05-8.85)	8.55 (6.98-10.2)	10.4 (8.49-12.5)	12.0 (9.71-14.5)	14.2 (11.0-17.7)	15.8 (12.0-20.1)	17.5 (12.8-22.9)	19.3 (13.4-25.9)	21.8 (14.6-30.1)	23.8 (15.5-33.5)
30-day	9.18 (7.54-11.0)	10.4 (8.55-12.4)	12.5 (10.2-14.9)	14.2 (11.5-17.0)	16.5 (12.9-20.5)	18.3 (13.9-23.0)	20.1 (14.7-26.0)	21.9 (15.3-29.2)	24.3 (16.3-33.5)	26.2 (17.1-36.8)
45-day	11.4 (9.39-13.5)	12.7 (10.5-15.1)	14.9 (12.3-17.8)	16.8 (13.7-20.1)	19.3 (15.1-23.8)	21.2 (16.2-26.6)	23.2 (17.0-29.8)	25.1 (17.6-33.3)	27.5 (18.5-37.6)	29.2 (19.1-40.8)
60-day	13.2 (10.9-15.7)	14.7 (12.1-17.4)	17.0 (14.0-20.2)	18.9 (15.5-22.6)	21.6 (17.0-26.6)	23.7 (18.1-29.6)	25.7 (18.9-32.9)	27.6 (19.4-36.6)	30.1 (20.2-41.1)	31.8 (20.8-44.3)

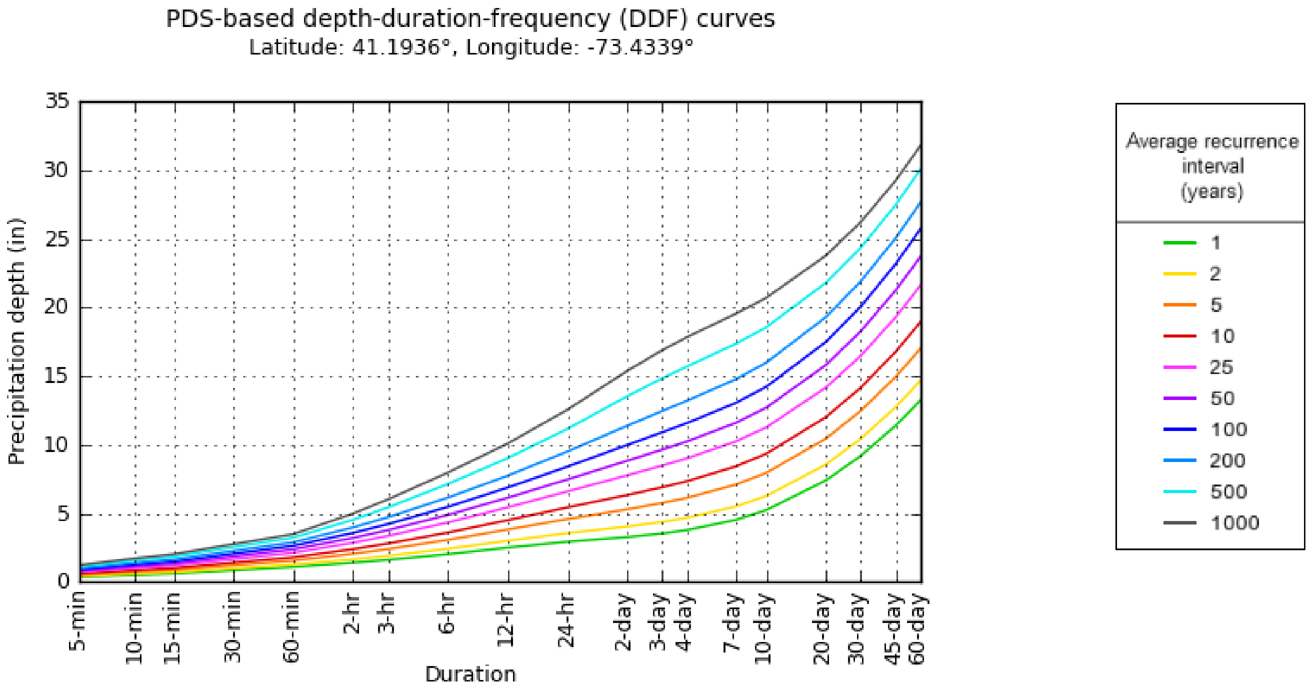
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

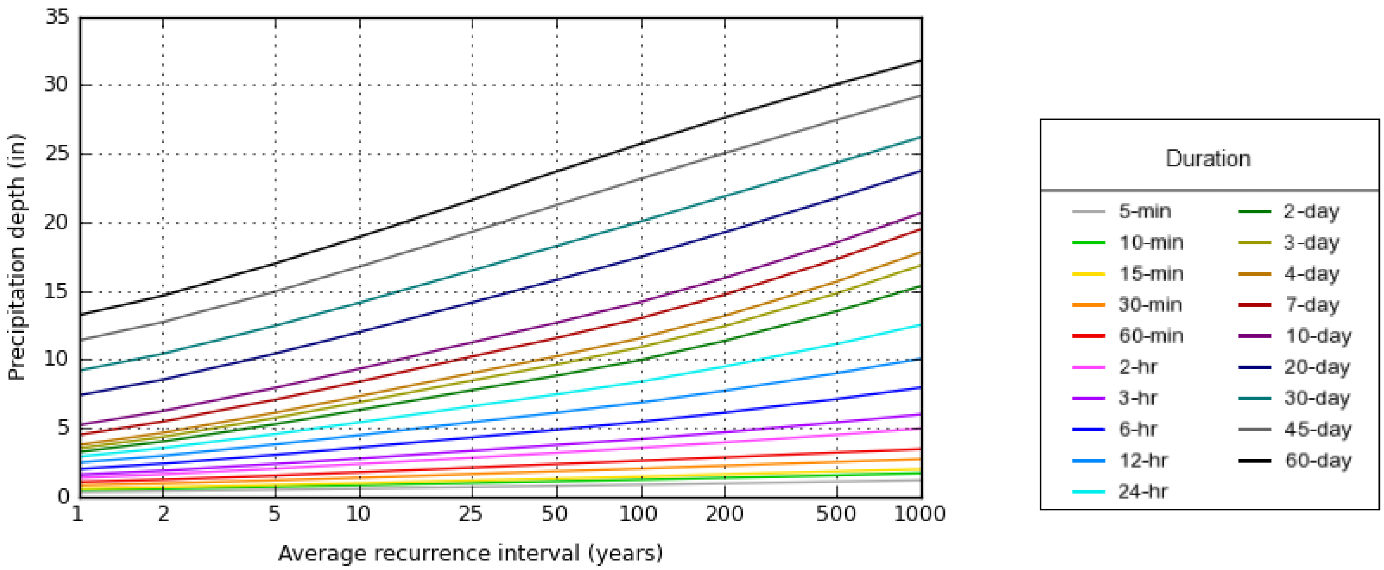
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical





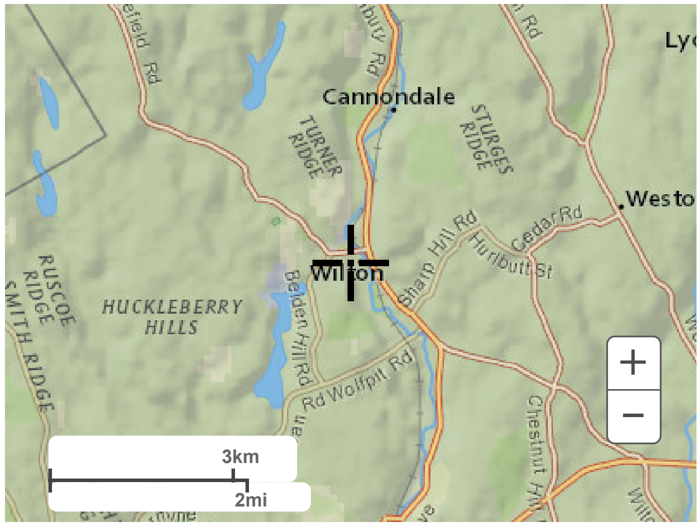
NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Sun Jan 19 03:59:33 2020

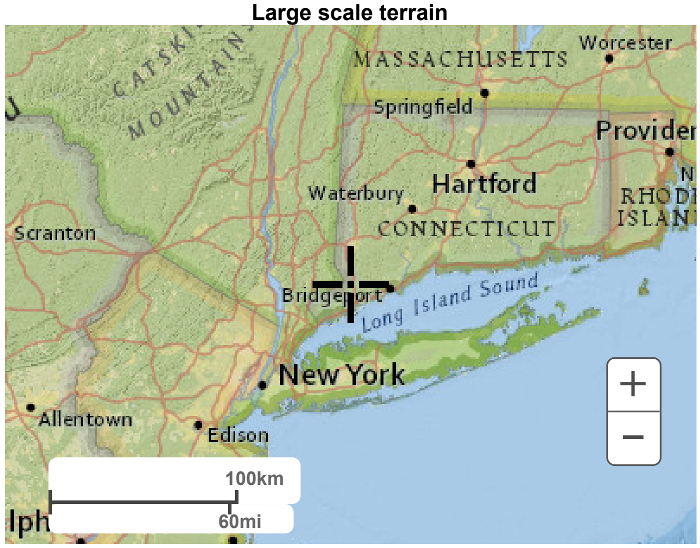
Back to Top

Maps & aerials

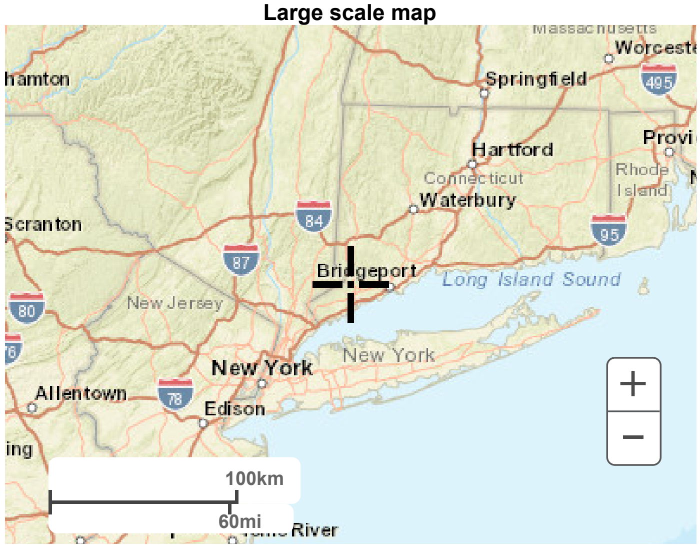
Small scale terrain



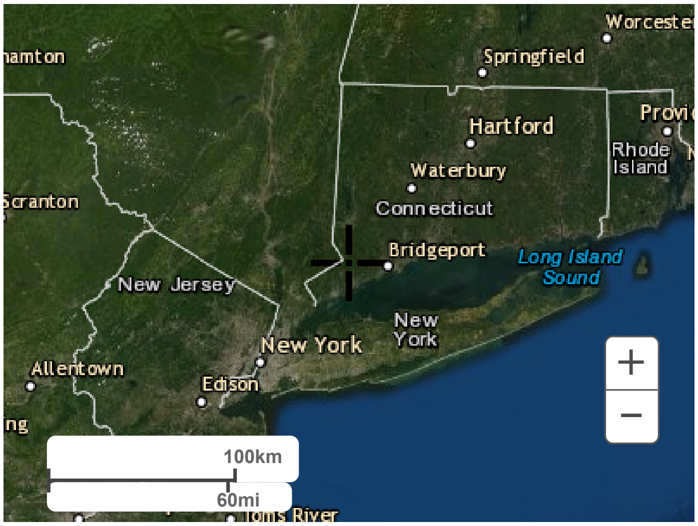
Large scale terrain



Large scale map



Large scale aerial



Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

NOAA Atlas 14, Volume 10, Version 3
Location name: Wilton, Connecticut, USA*
Latitude: 41.1936°, Longitude: -73.4339°
Elevation: 210.34 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sandra Pavlovic, Michael St. Laurent, Carl Trypaluk, Dale Unruh, Orlan Wilhite

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**4.37** (3.38-5.54)	**5.09** (3.94-6.47)	**6.26** (4.84-8.00)	**7.25** (5.56-9.29)	**8.59** (6.38-11.4)	**9.61** (6.98-13.0)	**10.7** (7.52-14.8)	**11.8** (7.93-16.8)	**13.3** (8.64-19.6)	**14.6** (9.22-21.8)
10-min	**3.09** (2.39-3.93)	**3.60** (2.79-4.58)	**4.43** (3.41-5.66)	**5.13** (3.94-6.58)	**6.08** (4.52-8.08)	**6.82** (4.96-9.20)	**7.56** (5.33-10.5)	**8.36** (5.63-11.9)	**9.46** (6.13-13.9)	**10.3** (6.53-15.4)
15-min	**2.42** (1.88-3.08)	**2.82** (2.19-3.60)	**3.48** (2.68-4.44)	**4.02** (3.09-5.16)	**4.77** (3.54-6.34)	**5.34** (3.88-7.22)	**5.93** (4.18-8.24)	**6.55** (4.41-9.34)	**7.41** (4.81-10.9)	**8.09** (5.12-12.1)
30-min	**1.70** (1.31-2.16)	**1.97** (1.53-2.51)	**2.42** (1.87-3.09)	**2.80** (2.15-3.59)	**3.32** (2.46-4.39)	**3.71** (2.69-5.00)	**4.11** (2.89-5.69)	**4.52** (3.04-6.44)	**5.08** (3.29-7.45)	**5.50** (3.48-8.23)
60-min	**1.09** (0.844-1.39)	**1.26** (0.979-1.61)	**1.55** (1.20-1.98)	**1.79** (1.38-2.30)	**2.12** (1.57-2.81)	**2.38** (1.72-3.20)	**2.63** (1.84-3.63)	**2.89** (1.94-4.11)	**3.22** (2.09-4.73)	**3.48** (2.20-5.20)
2-hr	**0.698** (0.544-0.882)	**0.822** (0.640-1.04)	**1.03** (0.796-1.30)	**1.19** (0.921-1.52)	**1.43** (1.07-1.88)	**1.60** (1.17-2.15)	**1.78** (1.27-2.47)	**1.98** (1.34-2.81)	**2.26** (1.47-3.30)	**2.49** (1.58-3.70)
3-hr	**0.535** (0.418-0.673)	**0.634** (0.495-0.799)	**0.796** (0.620-1.01)	**0.931** (0.721-1.18)	**1.12** (0.837-1.47)	**1.26** (0.923-1.69)	**1.40** (1.00-1.95)	**1.57** (1.06-2.21)	**1.81** (1.18-2.63)	**2.00** (1.27-2.96)
6-hr	**0.337** (0.265-0.422)	**0.403** (0.317-0.505)	**0.511** (0.400-0.641)	**0.600** (0.467-0.756)	**0.723** (0.545-0.948)	**0.814** (0.602-1.09)	**0.912** (0.656-1.26)	**1.02** (0.696-1.44)	**1.19** (0.778-1.72)	**1.33** (0.848-1.95)
12-hr	**0.207** (0.164-0.257)	**0.249** (0.197-0.309)	**0.317** (0.249-0.395)	**0.373** (0.292-0.467)	**0.451** (0.342-0.587)	**0.508** (0.378-0.676)	**0.570** (0.412-0.784)	**0.642** (0.437-0.894)	**0.747** (0.490-1.07)	**0.836** (0.535-1.22)
24-hr	**0.122** (0.097-0.150)	**0.148** (0.118-0.183)	**0.191** (0.151-0.236)	**0.226** (0.178-0.281)	**0.275** (0.210-0.356)	**0.311** (0.233-0.411)	**0.350** (0.255-0.479)	**0.396** (0.270-0.548)	**0.464** (0.305-0.662)	**0.522** (0.335-0.758)
2-day	**0.068** (0.054-0.083)	**0.084** (0.067-0.103)	**0.110** (0.088-0.135)	**0.132** (0.104-0.163)	**0.162** (0.124-0.209)	**0.184** (0.139-0.242)	**0.208** (0.153-0.284)	**0.237** (0.162-0.326)	**0.282** (0.186-0.399)	**0.320** (0.206-0.461)
3-day	**0.049** (0.039-0.060)	**0.061** (0.049-0.074)	**0.080** (0.064-0.098)	**0.096** (0.076-0.118)	**0.118** (0.091-0.151)	**0.134** (0.101-0.176)	**0.151** (0.112-0.207)	**0.173** (0.119-0.237)	**0.206** (0.136-0.291)	**0.234** (0.151-0.336)
4-day	**0.039** (0.032-0.048)	**0.049** (0.039-0.059)	**0.064** (0.051-0.078)	**0.076** (0.061-0.094)	**0.094** (0.072-0.120)	**0.107** (0.081-0.140)	**0.120** (0.089-0.164)	**0.137** (0.095-0.188)	**0.163** (0.108-0.230)	**0.186** (0.120-0.266)
7-day	**0.027** (0.022-0.032)	**0.033** (0.026-0.040)	**0.042** (0.034-0.051)	**0.050** (0.040-0.061)	**0.061** (0.047-0.077)	**0.069** (0.052-0.089)	**0.077** (0.057-0.104)	**0.088** (0.061-0.119)	**0.103** (0.068-0.144)	**0.116** (0.075-0.165)
10-day	**0.022** (0.018-0.026)	**0.026** (0.021-0.031)	**0.033** (0.027-0.040)	**0.039** (0.031-0.047)	**0.047** (0.036-0.059)	**0.053** (0.040-0.068)	**0.059** (0.044-0.079)	**0.066** (0.046-0.090)	**0.077** (0.051-0.108)	**0.086** (0.056-0.122)
20-day	**0.015** (0.013-0.018)	**0.018** (0.015-0.021)	**0.022** (0.018-0.026)	**0.025** (0.020-0.030)	**0.029** (0.023-0.037)	**0.033** (0.025-0.042)	**0.036** (0.027-0.048)	**0.040** (0.028-0.054)	**0.045** (0.030-0.063)	**0.050** (0.032-0.070)
30-day	**0.013** (0.010-0.015)	**0.014** (0.012-0.017)	**0.017** (0.014-0.021)	**0.020** (0.016-0.024)	**0.023** (0.018-0.028)	**0.025** (0.019-0.032)	**0.028** (0.020-0.036)	**0.030** (0.021-0.041)	**0.034** (0.023-0.047)	**0.036** (0.024-0.051)
45-day	**0.011** (0.009-0.013)	**0.012** (0.010-0.014)	**0.014** (0.011-0.016)	**0.016** (0.013-0.019)	**0.018** (0.014-0.022)	**0.020** (0.015-0.025)	**0.021** (0.016-0.028)	**0.023** (0.016-0.031)	**0.025** (0.017-0.035)	**0.027** (0.018-0.038)
60-day	**0.009** (0.008-0.011)	**0.010** (0.008-0.012)	**0.012** (0.010-0.014)	**0.013** (0.011-0.016)	**0.015** (0.012-0.018)	**0.016** (0.013-0.021)	**0.018** (0.013-0.023)	**0.019** (0.014-0.025)	**0.021** (0.014-0.029)	**0.022** (0.014-0.031)

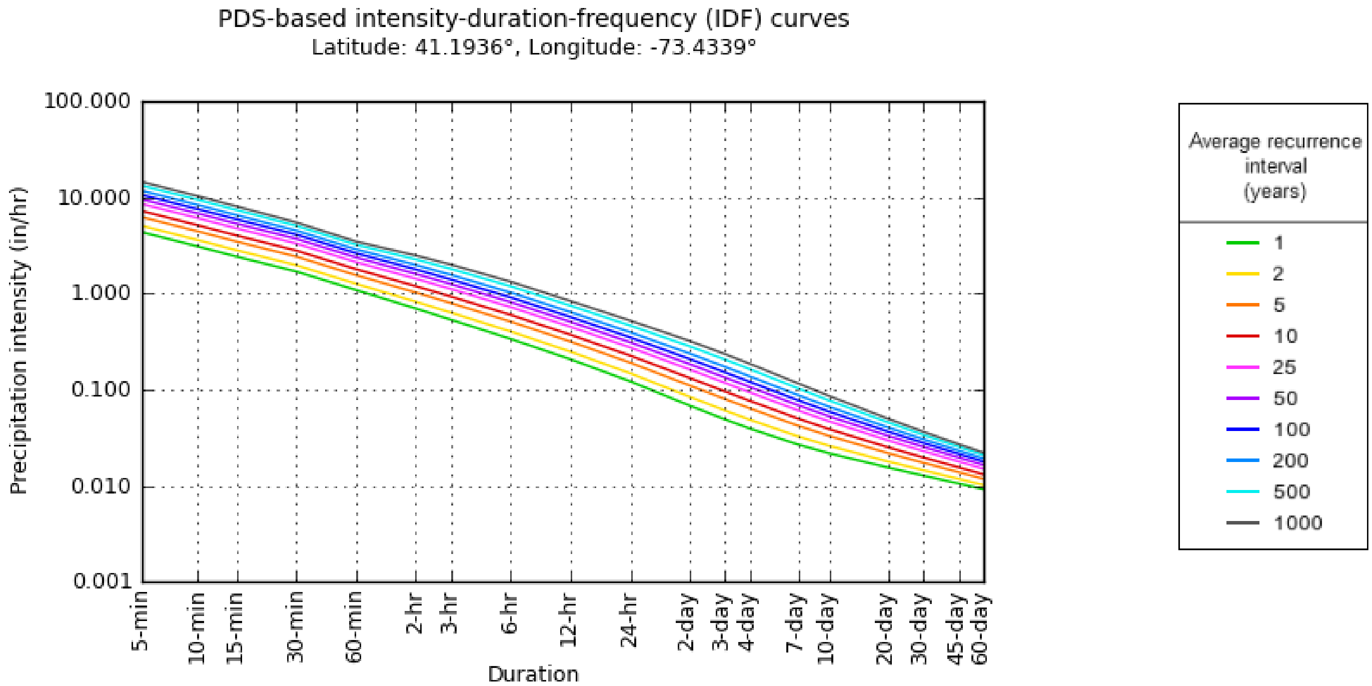
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

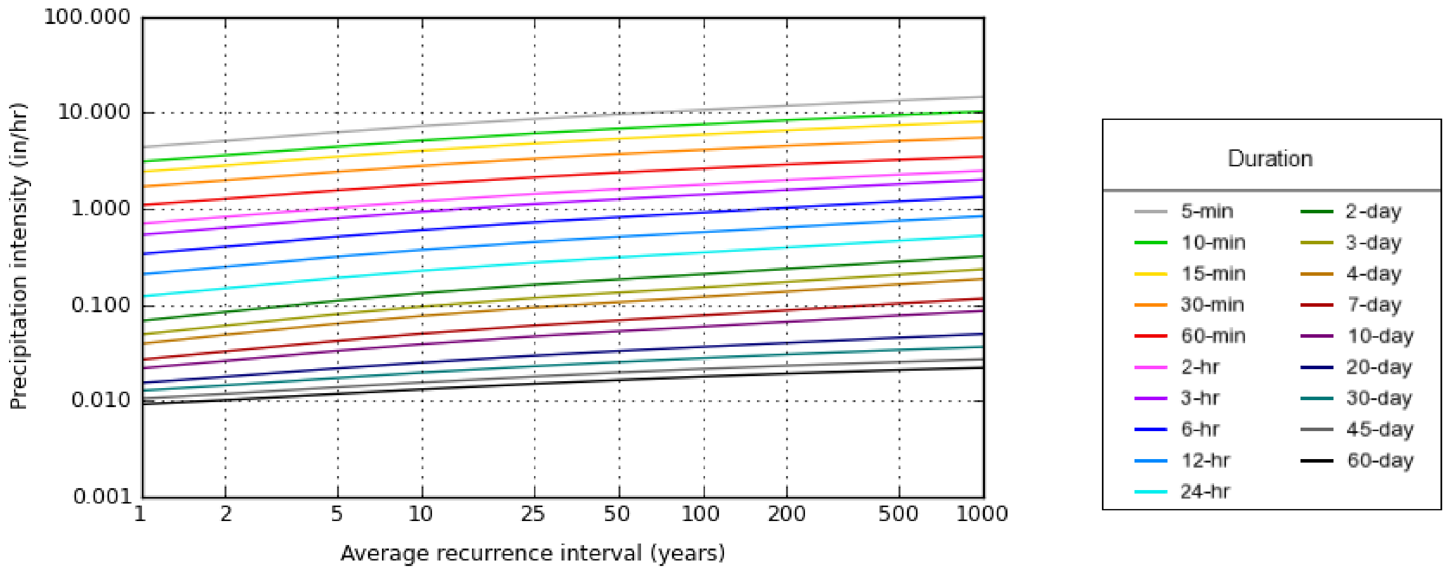
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical





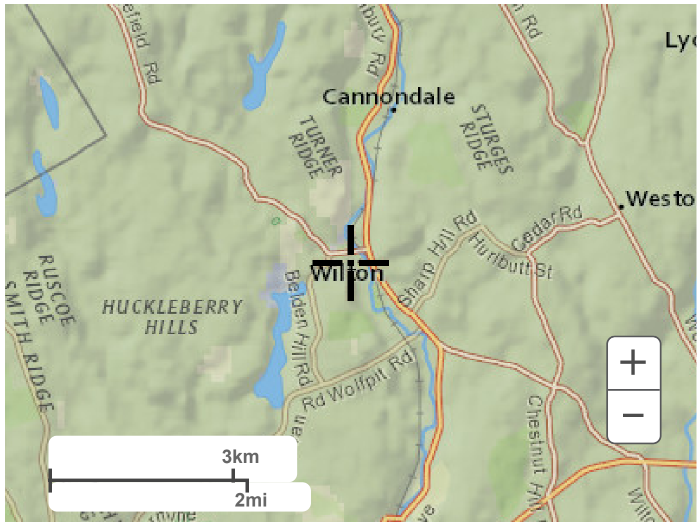
NOAA Atlas 14, Volume 10, Version 3

Created (GMT): Sun Jan 19 04:01:14 2020

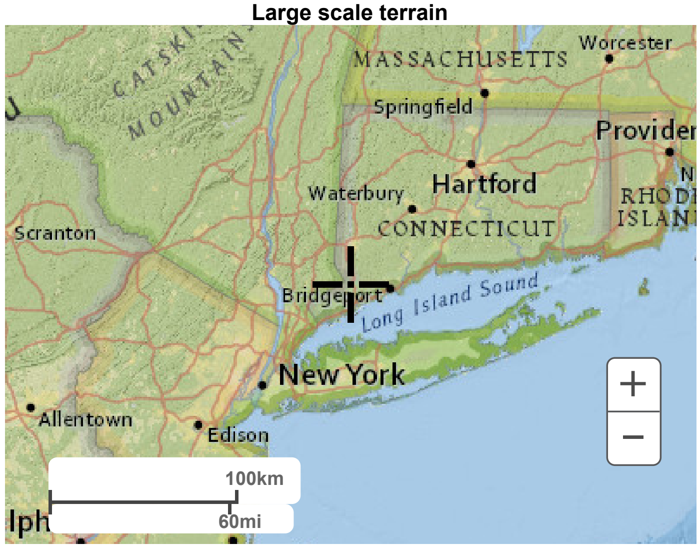
Back to Top

Maps & aerials

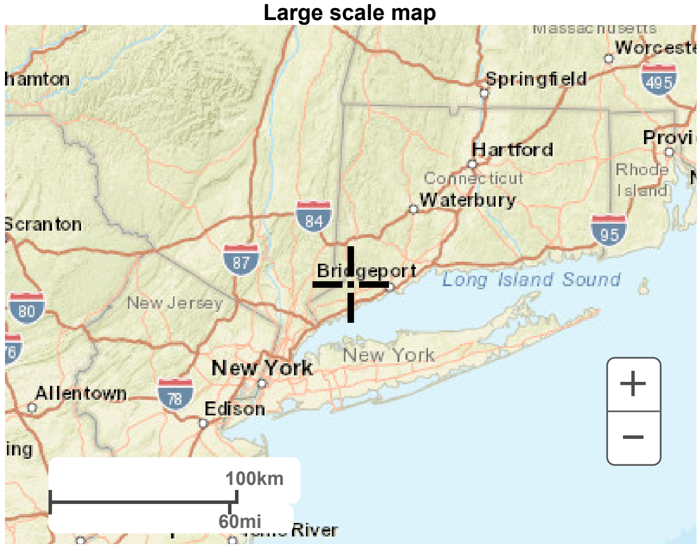
Small scale terrain



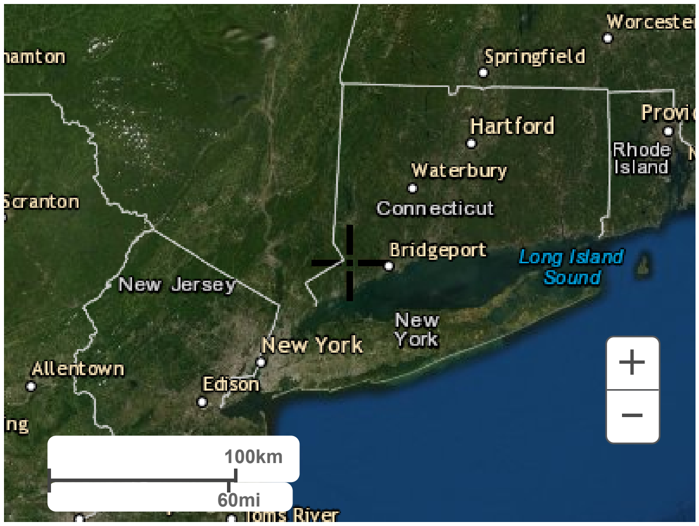
Large scale terrain



Large scale map



Large scale aerial



[Back to Top](#)

[US Department of Commerce](#)
[National Oceanic and Atmospheric Administration](#)
[National Weather Service](#)
[National Water Center](#)
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

APPENDIX H

Maintenance & Inspection Schedule

3 Hubbard Rd, Wilton CT

Regular inspection and maintenance of the stormwater management system and uphill areas is necessary to ensure proper operation. Inspections of the stormwater management system and pavement areas should be conducted monthly based on the following table:

Site Areas:

Inspection and Maintenance

Check for:	***Corrective Measure:***
Erosion	Install erosion control measures and provide stabilization measures
Spillage	Contain spill as close to source as possible with a dike of absorbent materials installed to protect drainage inlets, stormwater areas, or downstream wetlands and streams. All hazardous waste material, including absorbent materials must be disposed of by a licensed hazardous waste transporter and disposed of in an environmentally acceptable manner
Sediment Accumulation	Stabilize any disturbed areas uphill of where the sedimentation is occurring. Use temporary erosion control measures (i.e. silt fence, straw bales) to filter stormwater runoff.
Trash	Pick up and dispose of trash and litter in an environmentally acceptable manner.

At a minimum the following maintenance measures shall be provided at the frequency listed in the following table:

Routine Maintenance

Maintenance Measure:	***Frequency:***
Pavement Sweeping	Minimum two times per year: during spring cleanup (after last snow event) and during fall cleanup (to remove fallen leaves)
Pavement De-icing	Apply anti-icing treatment prior to storms Apply deicing treatments as needed during and after snow storms and mixed precipitation events to control ice and compact snow not removed during plowing

Catch Basins and Pipe:

Inspection and Maintenance

Check for:	***Corrective Measure:***
Trash, Sediment, and Debris at Grate	Remove trash, sediment, and debris and dispose of in an environmentally acceptable manner.
Sediment & Trash Accumulation in Sump	Remove sediment from sumps if depth of deposits is greater than one-half the depth from the bottom of the catch basin to the invert of the lowest pipe in the basin.
Pipe blockages	Flush pipes to remove blockages. TV inspect as required.

At a minimum the following maintenance measures shall be provided at the frequency listed in the following table:

Routine Maintenance

Maintenance Measure:	***Frequency:***
Sediment Removal	Minimum one time per year: Remove sediment and trash from catch basin sumps and grates and pipe inverts. Dispose of sediment and trash in an environmentally acceptable manner.

Maintenance & Inspection Schedule

Infiltration System
Inspection and Maintenance

Check for:	*Corrective Measure:*
Sediment Accumulation	Remove sediment when accumulation exceeds 3 inches throughout the length of the row per manufacturer's specifications.
Trash and Debris	Remove trash and debris and dispose of in an environmentally acceptable manner.

At a minimum the following maintenance measures shall be provided at the frequency listed in the following table:

Routine Maintenance

Maintenance Measure:	*Frequency:*
Sediment Removal	Inspected a minimum immediately after completion of the site's construction, every 6 months for the first year of operation and annually after the end of the first year. Remove sediment accumulation as required. Dispose of sediment in an environmentally acceptable manner.
Trash and Debris	Minimum once per year.

The infiltration system is to be inspected and maintained per manufacturer's specifications. Product information is attached.

STORMWATER MANAGEMENT SYSTEM INSPECTION AND MAINTENANCE CHECKLIST

Date: Date Since Last Precipitation Event:	Time:	Inspector: Site Conditions:
Inspection Item	**Satisfactory? Yes (Y) or No (N)**	**Comments or Corrective Measures Taken**
Site Areas		
Erosion	Y N	
Spillage	Y N	
Sediment Accumulation	Y N	
Trash	Y N	
Catch Basins and Pipe		
Trash, Sediment, and Debris at Inlet Grates	Y N	
Sediment & Trash Accumulation in Sump	Y N	
Pipe blockages	Y N	
Infiltration System		
Sediment Accumulation	Y N	
Trash and Debris	Y N	