

Stormwater Management Report

Proposed Industrial Building Gales Ferry, Connecticut

March 7, 2023
Revised: April 12, 2023
Revised: May 1, 2023
Revised: June 22, 2023

Prepared for
Gales Ferry Intermodal, LLC
549 South Street
Quincy, MA 02169



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An Employee-Owned Company

Comm. No. 045JC2.06

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Table of Contents

| | Page |
|--|------------|
| 1. INTRODUCTION | 1-1 |
| 1.1 Physical Setting | 1-1 |
| 1.2 Flood Plain and Soil Conditions | 1-1 |
| 2. EVALUATION OF EXISTING CONDITIONS | 2-2 |
| 2.1 Overview | 2-2 |
| 2.2 Existing Stormwater Management | 2-2 |
| 2.3 Existing Subcatchment Areas | 2-2 |
| 3. PROPOSED DEVELOPMENT | 3-3 |
| 3.1 Overview | 3-3 |
| 3.2 Proposed Subcatchment Areas | 3-3 |
| 3.3 Design Criteria & Proposed Stormwater Management Systems | 3-3 |
| 4. STORMWATER MANAGEMENT EVALUATION | 4-5 |
| 4.1 Stormwater Runoff Calculations | 4-5 |
| 4.1.1 Design Methodology | 4-5 |
| 4.1.2 Curve Numbers | 4-5 |
| 4.2 Existing and Proposed Peak-Flow Comparison | 4-6 |
| 4.3 Runoff Volume | 4-7 |
| 4.4 Water Quality | 4-7 |
| 4.5 Stormwater System Maintenance Program | 4-7 |
| 5. CONCLUSION | 5-1 |

DRAWINGS

Drawing 1 – Existing Drainage Areas

Drawing 2 – Proposed Drainage Areas

APPENDICIES

Appendix A – USGS Site Location Map

Appendix B – FEMA FIRMETTE Map

Appendix C – Natural Resources Conservation Service – Web Soil Survey

Appendix D – HydroCAD Reports

Appendix E – Water Quality Volume and Water Quality Flow Calculations

Appendix F – Hydrodynamic Separator Calculations

Appendix G – Stormwater Management Maintenance Program and Inspection Checklist

1. INTRODUCTION

This stormwater management report has been prepared by Loureiro Engineering Associates, Inc. (Loureiro) on behalf of Gales Ferry Intermodal LLC to provide a description and calculations for the stormwater management of the proposed 10,000 SF industrial building with a future 10,000 SF addition along with a new 6,000 SF industrial building and laydown outside storage of equipment at 1761 Route 12 in Gales Ferry, Connecticut. The property is 165 acres with the proposed work encompassing approximately 3.68 acres of the property (hereinafter referred to as the “Site”).

1.1 Physical Setting

The subject property is approximately 165 acres (ac) and is located in the Industrial zone (I). The property is the site of the former DOW Chemical manufacturing facility and been an industrial use for years. A portion of the property is currently used for the manufacturing of Styrofoam products by Americas Styrenics, a tenant of the property. The DOW Chemical facilities at the property terminated their manufacturing existence in 2011 and the former DOW Chemical manufacturing buildings have been removed from the property. The property has rail service with a rail siding and waterfront with an existing pier.

The property has inland wetlands as well as Allyn’s Pond. There is no activity with the wetland or 100 foot inland wetland upland review area with the proposed work.

The eastern boundary is bordered by Route 12 as well as some smaller industrial lots and a church that is in the R-40 zone. The western boundary is the Thames River. The northern boundary are residential lots in the R-40 zone. The southern boundary is bordered by properties zoned Commercial Marine (CM) and R-20.

1.2 Flood Plain and Soil Conditions

Federal Emergency Management Agency’s (FEMA) National Flood Insurance Program (NFIP) Flood Insurance Rate Map (FIRM) Number 09011C0354G, effective July 18, 2011, for Town of Ledyard identifies a portion of the property within the Zone AE (EL12) and Zone X. The Site is located outside of any FEMA flood zones. Appendix B includes the FEMA FIRM map for the Site.

The National Resource Conservation Service (NRCS) Soil Survey for the State of Connecticut identified soils within the Site area as Agawam (29B) and as Urban Land (307). Agawam fine

sandy loam corresponds with the Hydrologic Soil Group (HSG) rating B. Other soils just offsite correspond with the HSG rating B as well. Urban Land corresponds with the Hydrologic Soil Group (HSG) rating D. HSG D soils generally have slow or unpredictable infiltration rates correlating to high runoff potential. Appendix C includes the NRCS soil map for the site and surrounding area.

Permeability tests were run by Loureiro on representative samples taken from the Site on June 13, 2023. Permeability results were 0.314 in/min, or 37.68 ft/day. Applying a factor of safety of 1.5, a permeability of 25.12 ft/day was used in drainage calculations.

2. EVALUATION OF EXISTING CONDITIONS

2.1 Overview

The property currently has an existing manufacturing area, concrete pads left and paved areas from the removal of the DOW Chemical buildings, and woods. The area of the Site is currently wooded or densely brushed, with less than 2 percent (%) impervious coverage.

2.2 Existing Stormwater Management

The wooded area of the Site currently has no existing drainage or stormwater management features. Stormwater is conveyed 100 percent (%) through surface runoff. The wooded area of the Site currently is a plateaued mound that flows east and south then west toward the railroad tracks, which then flows downslope towards the Thames River. The section along the northern property line flows north offsite.

Through available survey information, the existing catch basin network and drainage system on the developed portion of the Site flows south before discharging into Allyn's Pond. Allyn's Pond then flows west into the Thames River.

2.3 Existing Subcatchment Areas

The total analyzed drainage area for the property is approximately 892,258 sf or 20.48 ac. The Site is divided into six (6) subcatchment areas. Subcatchment area 1 is comprised of the existing building foundations and paved area, with runoff being captured by the existing drainage system and discharging into Allyn's Pond, or running off through surface flow into Allyn's Pond. Subcatchment area 2 flows south through surface flow into Allyn's Brook, a tributary of Allyn's Pond, or is captured by the existing drainage system. Subcatchment area 3 includes areas east of the property and flows through surface flow to a large depressed area of the Site. This depressed

area captures and infiltrates all runoff from this subcatchment. Subcatchment area 4 flows north off-Site. Subcatchment area 5 flows west through surface flow west Off-Site towards the Thames River. Subcatchment area 6 is part of the existing parking area that flows to an existing catch basin that discharges to the depressed area to the north. Drawing 1, Existing Drainage Areas, depicts the existing drainage areas on the property. The three points of compliance (Allyn's Pond, North Off-Site, and West Off-Site) are utilized in HydroCAD to evaluate peak-flow leaving the property.

3. PROPOSED DEVELOPMENT

3.1 Overview

The proposed work includes a new 10,000 SF industrial building with a future 10,000 SF addition (the addition is also considered impervious for all calculations), which will be utilized by the Applicant, for the storage and repair of marine equipment and appurtenances in conjunction with marine contracting and dredging operations. A new 6,000 SF office and workshop building is also proposed. The Site will include a new parking layout, paved entrance, curbing, lighting, landscaped areas, and utilities.

3.2 Proposed Subcatchment Areas

The redeveloped Site and overall property is divided into eight (8) subcatchment areas. Subcatchment areas 1 and 2 will largely be unchanged under proposed conditions. Subcatchment area 3 will be similar to existing conditions, but will instead flow into the new drainage system instead of the depressed area on Site. Subcatchment area 4 is a large portion of the new paved area and building. Subcatchment area 5 is the southern portion of the new paved area. While the building addition is currently shown as gravel, it was modeled as a roof surface in hydrological analysis in anticipation of the future addition. Subcatchment area 6 is similar to subcatchment area 5 under existing conditions and will be relatively unchanged and flow west. Subcatchment area 7 will flow north off-site, similar to subcatchment area 4 under existing conditions. Subcatchment 8 is a portion of existing parking lot that will flow through an existing catch basin into the proposed drainage system, identical to subcatchment area 6 under existing conditions. The Site work will result in an increase in impervious area for the property, from 31% to 34%. Drawing 2, Proposed Drainage Areas, depicts the new drainage areas on the property.

3.3 Design Criteria & Proposed Stormwater Management Systems

The post-development stormwater runoff analysis was based on the 2-, 10-, 25-, 50-, and 100-year 24-hour storm events. The increase in impervious area requires on-site attenuation to meet the existing runoff rates as closely as possible.

The drainage improvements for the site will include a manhole, catch basin, and swale network to collect most of the paved area, landscaped area, and the entirety of the building roof. To attenuate and reduce peak flows, an infiltration pond will be included in the drainage system. The system is designed to fully retain and infiltrate captured runoff up to the 100-year storm event. Any runoff that outlets from the system will flow into the existing drainage system south of the Site.

To improve stormwater quality discharging from the Site, the infiltration system has been sized to hold the full water quality volume (WQV). WQV calculations are provided in Appendix E.

4. STORMWATER MANAGEMENT EVALUATION

4.1 Stormwater Runoff Calculations

The following evaluation was prepared to identify the qualitative and quantitative stormwater runoff characteristics for the existing and proposed conditions at the site. The stormwater management system was designed for the 2-year, 10-year, 25-year, 50-year, and 100-year design storms.

4.1.1 Design Methodology

Site specific point precipitation frequency estimates used to generate peak stormwater flow were obtained from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 10 Version 3: Precipitation-Frequency Atlas of the United States, Northeastern States (rev. 2015). Precipitation-frequency estimates are based upon frequency analysis of partial duration series with a 90% confidence interval of data largely from the National Centers for Environmental Information (NCEI).

The methods described in Urban Hydrology for Small Watersheds, 2nd Edition, (Technical Release Number 55 [TR-55]) from the Natural Resources Conservation Service formerly the Soil Conservation Service – [SCS], 1986) were used to calculate stormwater peak-flow generated from pre- and post-redevelopment conditions. These methods, which are incorporated into the HydroCAD computer software program, use well documented procedures to calculate stormwater runoff volume, peak-flow rate of discharge, hydrographs and storage volumes required for floodwater reservoirs in small watersheds. The method uses the SCS Runoff Curve Number method to estimate runoff volume, calculates times of concentration, produces tabular hydrographs and estimates basin storage capacity.

4.1.2 Curve Numbers

The curve numbers (CN) values utilized for the analysis of the existing and proposed conditions included:

Existing lawn/grassed area, CN = 84 (fair grass cover, HSG D)

New grassed area, CN = 61 (Good grass cover, HSG B)

New grassed area, CN = 80 (Good grass cover, HSG D)

Brush, CN = 35 (fair condition, HSG A)

Brush, CN = 56 (fair condition, HSG B)
 Brush, CN = 77 (fair condition, HSG D)
 Gravel, CN = 85 (HSG B)
 Gravel, CN = 91 (HSG D)
 Woods, CN = 30 (Good condition, HSG A)
 Woods, CN = 55 (Good condition, HSG B)
 Woods, CN = 77 (Good condition, HSG D)
 ½ acre lots, CN = 70 (HSG B)
 Impervious areas (pavement, roofs, etc), CN = 98

The weighted CN of the existing property is 73. The weighted CN of the property with the new development is 74. This is due to the increase in impervious areas.

4.2 Existing and Proposed Peak-Flow Comparison

With the use of infiltration, total peak flows are reduced during all analyzed storm events.

Table 1 – Peak-Flow Comparison, Cubic Feet per Second

| | 2-Year Event | | 10-Year Event | | 25-Year Event | | 50-year Event | | 100-year Event | |
|---------------------|--------------|----------|---------------|----------|---------------|----------|---------------|----------|----------------|----------|
| | Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed | Existing | Proposed |
| Allyn's Pond | 15.8 | 14.57 | 26.77 | 25.08 | 35.2 | 33.24 | 41.8 | 39.61 | 48.96 | 46.56 |
| North Off-Site | 0.03 | 0.01 | 0.18 | 0.13 | 0.32 | 0.26 | 0.44 | 0.36 | 0.57 | 0.48 |
| West Off-Site | 6.96 | 4.65 | 12.65 | 8.22 | 16.27 | 10.47 | 18.99 | 12.15 | 21.88 | 13.95 |
| Existing Depression | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total West Off-Site | 6.96 | 4.65 | 12.65 | 8.22 | 16.27 | 10.47 | 18.99 | 12.15 | 21.88 | 13.95 |
| Total | 22.79 | 19.23 | 39.6 | 33.43 | 51.79 | 43.97 | 61.23 | 52.12 | 71.41 | 60.99 |

The table shows decreasing total peak flow runoff during all analyzed storm events, ranging from 17.0 percent (%) to 18.5 percent (%). This is due to the robust existing improved infiltration basin capturing and fully infiltrating the Site's runoff. Off-site areas like Subcatchment 3 & 8 were graded or routed to the infiltration basin to influence total peak flows and volumes as much as possible, since the Site is only a small portion of the property relative to the total property. Overall, new drainage conditions should function similarly to those of existing conditions. Appendix D includes the HydroCAD report for the existing and new Site analysis.

4.3 Runoff Volume

Total runoff from the property was also analyzed volumetrically to ensure similar or lower runoff volumes under new conditions as volumes under existing conditions. The results for the 2-year and 100-year storm events for the total Site and for Allyn's Pond are below:

Table 2 – Total Runoff Volume Comparison, Cubic Feet

| | Existing (cf) | New (cf) | Volume Infiltrated (cf) | Surface Runoff Volume (cf) |
|----------|---------------|----------|-------------------------|----------------------------|
| 2-Year | 145,406 | 151,146 | 46,674 | 104,472 |
| 100-year | 519,067 | 523,779 | 209,705 | 314,074 |

Table 3 – Allyn's Pond Runoff Volume Comparison, Cubic Feet

| | Existing (cf) | New (cf) | Volume Infiltrated (cf) | Surface Runoff Volume (cf) |
|----------|---------------|----------|-------------------------|----------------------------|
| 2-Year | 94,162 | 133,556 | 46,674 | 86,882 |
| 100-year | 276,019 | 468,621 | 209,705 | 258,916 |

The tables show that the new infiltration pond reduces total proposed runoff volume below that of existing conditions. Therefore, receiving waters will not receive increased runoff volumes and should not be negatively impacted. Appendix D includes the HydroCAD reports showing runoff volume calculations.

4.4 Water Quality

The methods described in the 2004 Connecticut Stormwater Quality Manual were utilized to calculate the WQV of the redevelopment. The WQV for the site is equivalent to the runoff generated with the first one-inch of rainfall. The developed Site is approximately 2.35 ac and 80% impervious, resulting in a WQV of 6,535 cf. The infiltration pond provides a storage volume of approximately 72,000 cf at full capacity. The infiltration system provides adequate amount of storage to store the WQV. The drainage system also leads to two (2) hydrodynamic separators before entering the subsurface chamber systems. These separators are designed to capture oil, trash, and floatables while removing total suspended solids and other pollutants. The proposed hydrodynamic separators are also designed to treat the Water Quality Flows (WQF) of their respective subcatchments. Appendix F includes the calculations used for selecting hydrodynamic separators.

4.5 Stormwater System Maintenance Program

To help facilitate the function and longevity of the stormwater management system, a maintenance program and inspection checklist has been developed for the components and surrounding areas. The maintenance includes periodic inspections, scheduled cleanings and details on identifying

V:\CT\Gales Ferry\Route 12-1761\045JC2.06 Local Permit for Sterling Building\Working Docs\Stormwater Report

signs of failures in the system. A full checklist of system features shall be completed to provide a log of inspections, cleanings, repairs, and any important information regarding the system. The program will be implemented after installation with more frequent inspections early and fewer inspections after a year or when the system function becomes more predictable. The program, checklist, and past inspection/maintenance logs will be provided to the current or future owners and necessary facility personnel. The maintenance program and checklist is included as Appendix G.

5. CONCLUSION

The new Site work includes a new stormwater management system for the primary conveyance of the stormwater discharging from the Site. The proposed system provides attenuation and treatment of all stormwater events leaving the Site, managing post-development runoff rates and allowing for potential groundwater recharge. The existing improved infiltration basin includes sufficient storage capacity for the WQV to offer treatment of Site stormwater, along with treatment of WQF provided by hydrodynamic separators. Overall, the new drainage system will improve water quality discharging from the property while providing lower flow rates and volume to receiving waters.

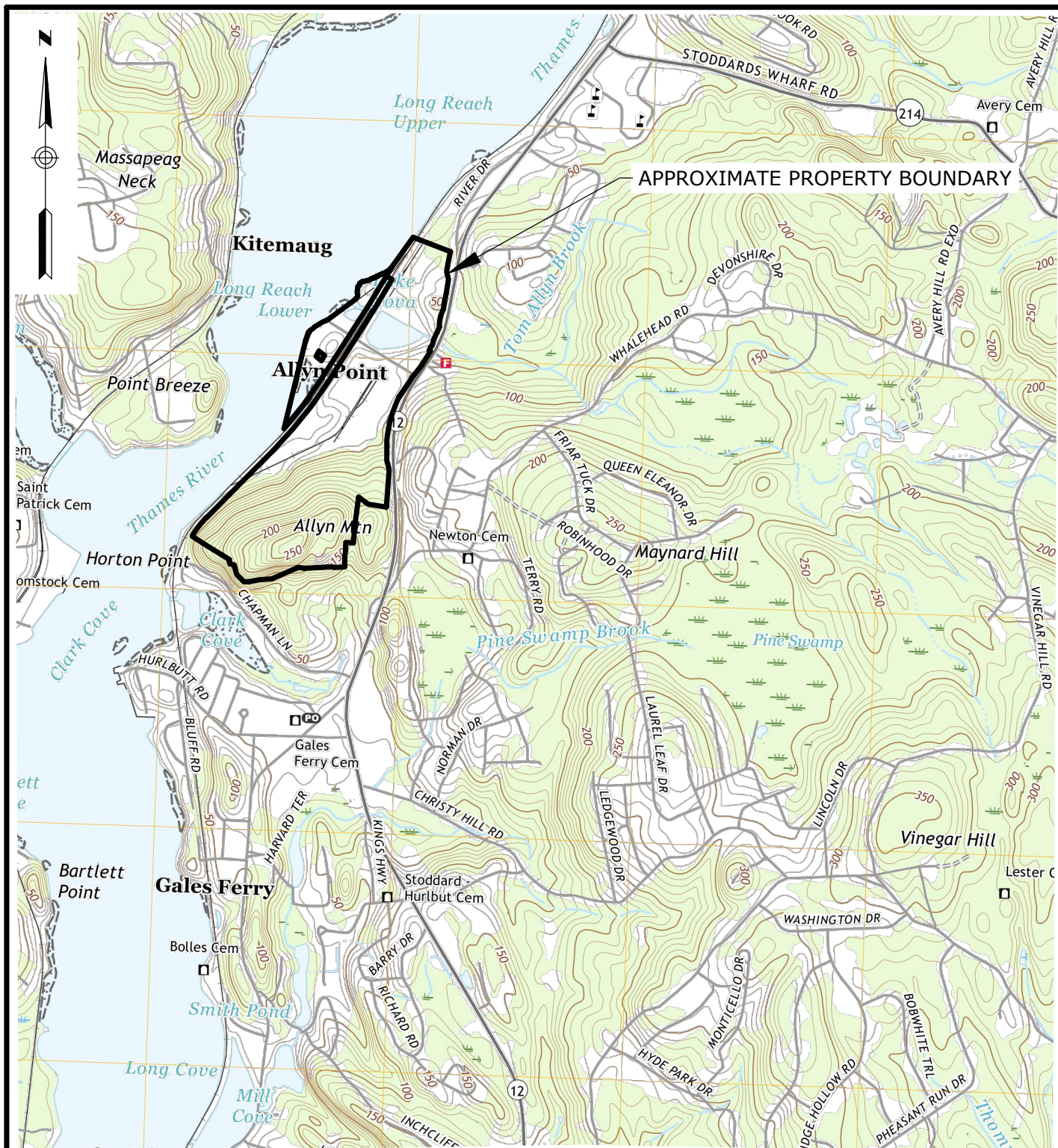
DRAWINGS

Drawing 1 –Existing Drainage Areas

Drawing 2 – Proposed Drainage Areas

APPENDIX A

USGS Site Location Map



MAP REFERENCE:

SECTION OF THE USGS 7.5 MINUTE SERIES TOPOGRAPHIC MAP
FOR UNCASVILLE, CT; MAP VERSION DATE 2021.



Engineering • Construction • EH&S • Energy
Waste • Facility Services • Laboratory

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**DRAINAGE REPORT
ATTACHMENT A
SITE LOCATION MAP**

NEW 20,000 SF INDUSTRIAL BUILDING

1761 ROUTE 12, GALES FERRY, CT

PREPARED FOR:

GALES FERRY INTERMODAL LLC

549 SOUTH STREET, QUINCY, MA

SCALE

1" = 2,000' ±

COMM. NO.

045JC2.06

DATE

03-07-2023

1

APPENDIX B

FEMA FIREMETTE Map

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study Report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Connecticut State Plane Zone (FIPS zone 0600). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from digital orthophotography provided by the Connecticut Department of Environmental Planning. This information was created from photography dated 2000, 2004 and 2005.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

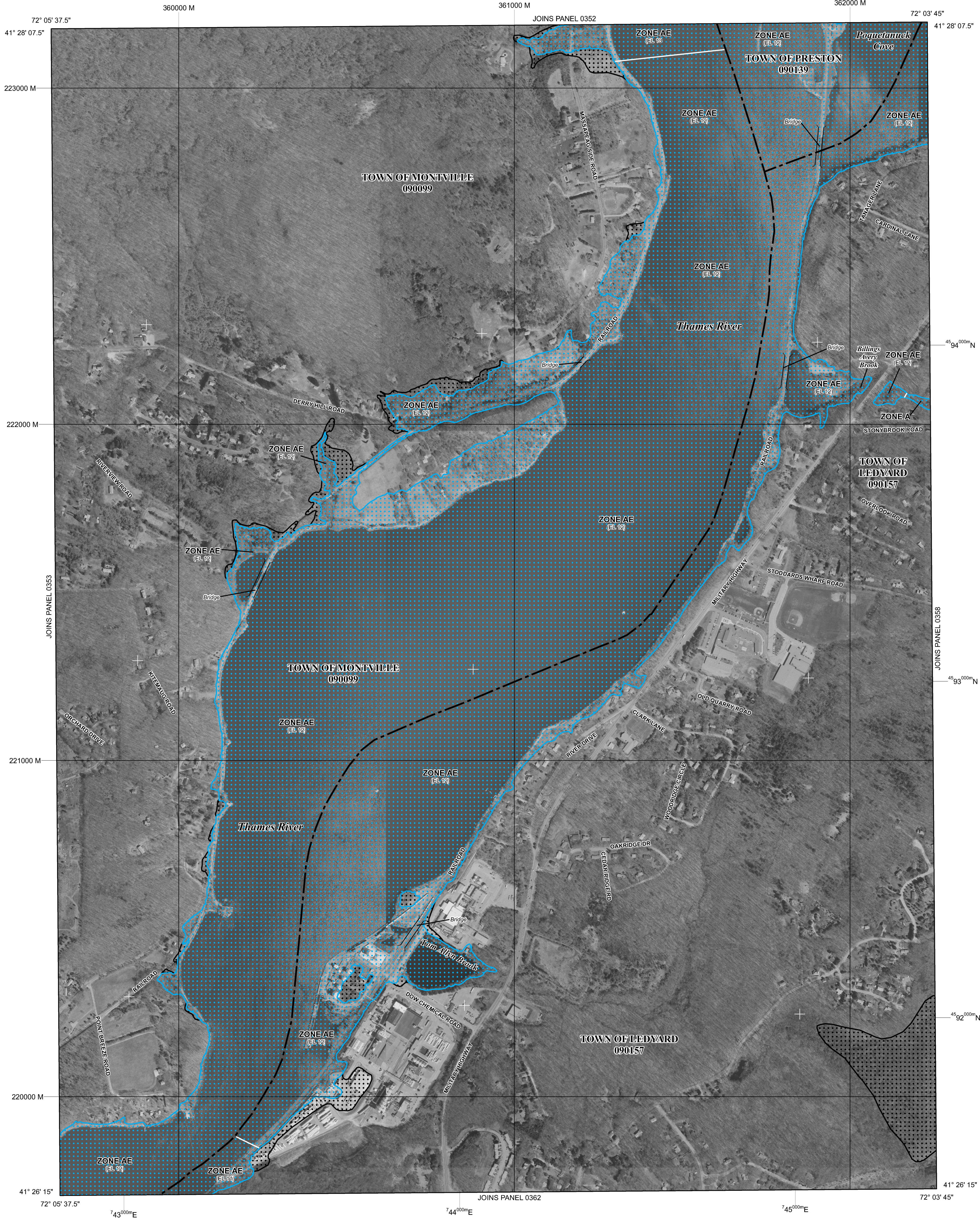
Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations** and **floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/nfp>.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAS) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD
The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A No Base Flood Elevations determined.
ZONE AE Base Flood Elevations determined.
ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99 Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
OTHER AREAS

ZONE X Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% Annual Chance Floodplain Boundary
0.2% Annual Chance Floodplain Boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.
Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet*
(EL 987)

*Referenced to the North American Vertical Datum of 1988

A Cross section line
23 Transect line
Culvert
Bridge
Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) Western Hemisphere
4989000 M
1000-meter ticks: Connecticut State Plane Zone (FIPS Zone 0600), Lambert Conformal Conic projection
1000-meter Universal Transverse Mercator grid values, zone 18N
DX5510 X
Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
July 18, 2011
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

PANEL 0354G

FIRM
FLOOD INSURANCE RATE MAP
NEW LONDON COUNTY,
CONNECTICUT
ALL JURISDICTIONS

PANEL 354 OF 554
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
LEDYARD, TOWN OF 090157 0354 G
MONTVILLE, TOWN OF 090099 0354 G
PRESTON, TOWN OF 090139 0354 G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.



MAP NUMBER
09011C0354G
EFFECTIVE DATE
JULY 18, 2011
Federal Emergency Management Agency

APPENDIX C

Natural Resources Conservation Service – Web Soil Survey



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



Preface

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

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

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

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

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

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

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Contents

| | |
|---|----|
| Preface | 2 |
| How Soil Surveys Are Made | 5 |
| Soil Map | 8 |
| Soil Map..... | 9 |
| Legend..... | 10 |
| Map Unit Legend..... | 11 |
| Map Unit Descriptions..... | 11 |
| State of Connecticut..... | 14 |
| 3—Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony..... | 14 |
| 29B—Agawam fine sandy loam, 3 to 8 percent slopes..... | 16 |
| 34B—Merrimac fine sandy loam, 3 to 8 percent slopes..... | 18 |
| 51B—Sutton fine sandy loam, 0 to 8 percent slopes, very stony..... | 20 |
| 60C—Canton and Charlton fine sandy loams, 8 to 15 percent slopes..... | 22 |
| 61B—Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony..... | 24 |
| 62C—Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony..... | 26 |
| 73C—Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky..... | 29 |
| 73E—Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky..... | 31 |
| 86D—Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony..... | 33 |
| 306—Udorthents-Urban land complex..... | 36 |
| 307—Urban land..... | 37 |
| W—Water..... | 38 |
| References | 39 |

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

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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.


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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 22, Sep 12, 2022

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

Date(s) aerial images were photographed: Jun 14, 2022—Oct 6, 2022

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 |
|------------------------------------|---|--------------|----------------|
| 3 | Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony | 8.1 | 8.3% |
| 29B | Agawam fine sandy loam, 3 to 8 percent slopes | 11.2 | 11.5% |
| 34B | Merrimac fine sandy loam, 3 to 8 percent slopes | 0.2 | 0.3% |
| 51B | Sutton fine sandy loam, 0 to 8 percent slopes, very stony | 4.9 | 5.0% |
| 60C | Canton and Charlton fine sandy loams, 8 to 15 percent slopes | 4.9 | 5.0% |
| 61B | Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony | 19.2 | 19.7% |
| 62C | Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony | 5.5 | 5.6% |
| 73C | Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky | 18.3 | 18.8% |
| 73E | Charlton-Chatfield complex, 15 to 45 percent slopes, very rocky | 7.8 | 8.0% |
| 86D | Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony | 0.2 | 0.2% |
| 306 | Udorthents-Urban land complex | 0.1 | 0.1% |
| 307 | Urban land | 12.5 | 12.8% |
| W | Water | 4.6 | 4.7% |
| Totals for Area of Interest | | 97.6 | 100.0% |

Map Unit Descriptions

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

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class.

Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

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

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

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

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

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

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

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

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The

Custom Soil Resource Report

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

3—Ridgebury, Leicester, and Whitman soils, 0 to 8 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2t2qt
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Ridgebury, extremely stony, and similar soils: 40 percent
Leicester, extremely stony, and similar soils: 35 percent
Whitman, extremely stony, and similar soils: 17 percent
Minor components: 8 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Ridgebury, Extremely Stony

Setting

Landform: Drumlins, ground moraines, hills, drainageways, depressions
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Head slope, base slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material
A - 1 to 6 inches: fine sandy loam
Bw - 6 to 10 inches: sandy loam
Bg - 10 to 19 inches: gravelly sandy loam
Cd - 19 to 66 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 15 to 35 inches to densic material
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s

Custom Soil Resource Report

Hydrologic Soil Group: D

Ecological site: F144AY009CT - Wet Till Depressions

Hydric soil rating: Yes

Description of Leicester, Extremely Stony

Setting

Landform: Ground moraines, hills, drainageways, depressions

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave, linear

Across-slope shape: Concave

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

Typical profile

Oe - 0 to 1 inches: moderately decomposed plant material

A - 1 to 7 inches: fine sandy loam

Bg - 7 to 18 inches: fine sandy loam

BC - 18 to 24 inches: fine sandy loam

C1 - 24 to 39 inches: gravelly fine sandy loam

C2 - 39 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 0 to 8 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high
(0.14 to 14.17 in/hr)

Depth to water table: About 0 to 6 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: High (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: B/D

Ecological site: F144AY009CT - Wet Till Depressions

Hydric soil rating: Yes

Description of Whitman, Extremely Stony

Setting

Landform: Drumlins, ground moraines, hills, drainageways, depressions

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 1 inches: peat

Custom Soil Resource Report

A - 1 to 10 inches: fine sandy loam
Bg - 10 to 17 inches: gravelly fine sandy loam
Cdg - 17 to 61 inches: fine sandy loam

Properties and qualities

Slope: 0 to 3 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: 7 to 38 inches to densic material
Drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: F144AY009CT - Wet Till Depressions
Hydric soil rating: Yes

Minor Components

Woodbridge, extremely stony

Percent of map unit: 6 percent
Landform: Hills, drumlins, ground moraines
Landform position (two-dimensional): Summit, backslope, footslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Swansea

Percent of map unit: 2 percent
Landform: Bogs, swamps
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

29B—Agawam fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2tyqx
Elevation: 0 to 820 feet

Custom Soil Resource Report

Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 250 days
Farmland classification: All areas are prime farmland

Map Unit Composition

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

Description of Agawam

Setting

Landform: Outwash plains, kames, kame terraces, outwash terraces, moraines
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Crest, side slope, riser, tread, rise, dip
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Coarse-loamy eolian deposits over sandy and gravelly glaciofluvial deposits derived from gneiss, granite, schist, and/or phyllite

Typical profile

Ap - 0 to 11 inches: fine sandy loam
Bw1 - 11 to 16 inches: fine sandy loam
Bw2 - 16 to 26 inches: fine sandy loam
2C1 - 26 to 45 inches: loamy fine sand
2C2 - 45 to 55 inches: loamy fine sand
2C3 - 55 to 65 inches: loamy sand

Properties and qualities

Slope: 3 to 8 percent
Depth to restrictive feature: 15 to 35 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: B
Ecological site: F145XY008MA - Dry Outwash
Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent
Landform: Deltas, terraces, outwash plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip

Custom Soil Resource Report

Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hinckley

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

Merrimac

Percent of map unit: 3 percent
Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope
Landform position (three-dimensional): Crest, side slope, riser, tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

Windsor

Percent of map unit: 2 percent
Landform: Dunes, outwash plains, deltas, outwash terraces
Landform position (three-dimensional): Tread, riser
Down-slope shape: Convex, linear
Across-slope shape: Convex, linear
Hydric soil rating: No

34B—Merrimac fine sandy loam, 3 to 8 percent slopes

Map Unit Setting

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

Map Unit Composition

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

Description of Merrimac

Setting

Landform: Outwash plains, outwash terraces, moraines, eskers, kames
Landform position (two-dimensional): Summit, shoulder, backslope, footslope

Custom Soil Resource Report

Landform position (three-dimensional): Crest, side slope, riser, tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loamy glaciofluvial deposits derived from granite, schist, and gneiss over sandy and gravelly glaciofluvial deposits derived from granite, schist, and gneiss

Typical profile

Ap - 0 to 10 inches: fine sandy loam

Bw1 - 10 to 22 inches: fine sandy loam

Bw2 - 22 to 26 inches: stratified gravel to gravelly loamy sand

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

Properties and qualities

Slope: 3 to 8 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to very high (1.42 to 99.90 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 2 percent

Maximum salinity: Nonsaline (0.0 to 1.4 mmhos/cm)

Sodium adsorption ratio, maximum: 1.0

Available water supply, 0 to 60 inches: Low (about 4.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2s

Hydrologic Soil Group: A

Ecological site: F145XY008MA - Dry Outwash

Hydric soil rating: No

Minor Components

Sudbury

Percent of map unit: 5 percent

Landform: Deltas, terraces, outwash plains

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread, dip

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

Hinckley

Percent of map unit: 5 percent

Landform: Deltas, kames, eskers, outwash plains

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Head slope, nose slope, crest, side slope, rise

Down-slope shape: Convex

Across-slope shape: Convex, linear

Hydric soil rating: No

Windsor

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

Agawam

Percent of map unit: 2 percent
Landform: Outwash plains, outwash terraces, moraines, stream terraces, eskers, kames
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

51B—Sutton fine sandy loam, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2xfff
Elevation: 0 to 1,410 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Sutton, Very Stony

Setting

Landform: Ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Coarse-loamy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material
A - 2 to 7 inches: fine sandy loam
Bw1 - 7 to 19 inches: fine sandy loam
Bw2 - 19 to 27 inches: sandy loam
C1 - 27 to 41 inches: gravelly sandy loam

Custom Soil Resource Report

C2 - 41 to 62 inches: gravelly sandy loam

Properties and qualities

Slope: 0 to 8 percent

Surface area covered with cobbles, stones or boulders: 1.6 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high
(0.14 to 14.17 in/hr)

Depth to water table: About 12 to 27 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 8.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: B/D

Ecological site: F144AY008CT - Moist Till Uplands

Hydric soil rating: No

Minor Components

Charlton, very stony

Percent of map unit: 7 percent

Landform: Ridges, ground moraines, hills

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Convex

Hydric soil rating: No

Canton, very stony

Percent of map unit: 4 percent

Landform: Moraines, hills, ridges

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Convex

Hydric soil rating: No

Leicester, very stony

Percent of map unit: 3 percent

Landform: Depressions, ground moraines, drainageways, hills

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Linear, concave

Across-slope shape: Concave

Hydric soil rating: Yes

Whitman, very stony

Percent of map unit: 1 percent

Landform: Drumlins, ground moraines, hills, drainageways, depressions

Landform position (two-dimensional): Toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

60C—Canton and Charlton fine sandy loams, 8 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2w81z
Elevation: 0 to 1,620 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Canton and similar soils: 50 percent
Charlton and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton

Setting

Landform: Hills, moraines, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw1 - 7 to 15 inches: fine sandy loam
Bw2 - 15 to 26 inches: gravelly fine sandy loam
2C - 26 to 65 inches: gravelly loamy sand

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.7 inches)

Interpretive groups

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

Description of Charlton

Setting

Landform: Ridges, ground moraines, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

Ap - 0 to 7 inches: fine sandy loam
Bw - 7 to 22 inches: gravelly fine sandy loam
C - 22 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.9 inches)

Interpretive groups

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

Minor Components

Leicester

Percent of map unit: 5 percent
Landform: Ground moraines, drainageways, depressions, hills
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Chatfield

Percent of map unit: 5 percent
Landform: Ridges, hills

Custom Soil Resource Report

Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Sutton

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

61B—Canton and Charlton fine sandy loams, 0 to 8 percent slopes, very stony

Map Unit Setting

National map unit symbol: 2w81v
Elevation: 0 to 1,480 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 140 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Canton, very stony, and similar soils: 50 percent
Charlton, very stony, and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Very Stony

Setting

Landform: Moraines, hills, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy over sandy melt-out till derived from gneiss, granite, and/or schist

Typical profile

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

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

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

Description of Charlton, Very Stony

Setting

Landform: Ridges, ground moraines, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Side slope, crest
Down-slope shape: Convex, linear
Across-slope shape: Convex
Parent material: Coarse-loamy melt-out till derived from granite, gneiss, and/or schist

Typical profile

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

Properties and qualities

Slope: 0 to 8 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

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

Custom Soil Resource Report

Hydrologic Soil Group: B

Ecological site: F144AY034CT - Well Drained Till Uplands

Hydric soil rating: No

Minor Components

Chatfield, very stony

Percent of map unit: 5 percent

Landform: Ridges, hills

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Nose slope, side slope, crest

Down-slope shape: Convex

Across-slope shape: Linear, convex

Hydric soil rating: No

Sutton, very stony

Percent of map unit: 5 percent

Landform: Ground moraines, hills

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

Leicester, very stony

Percent of map unit: 5 percent

Landform: Hills, drainageways, depressions, ground moraines

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Base slope

Down-slope shape: Concave, linear

Across-slope shape: Concave

Hydric soil rating: Yes

62C—Canton and Charlton fine sandy loams, 3 to 15 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2wks7

Elevation: 0 to 1,310 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Canton, extremely stony, and similar soils: 50 percent

Charlton, extremely stony, and similar soils: 35 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Canton, Extremely Stony

Setting

Landform: Moraines, hills, ridges

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Nose slope, side slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Convex

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

Typical profile

Oi - 0 to 2 inches: slightly decomposed plant material

A - 2 to 5 inches: fine sandy loam

Bw1 - 5 to 16 inches: fine sandy loam

Bw2 - 16 to 22 inches: gravelly fine sandy loam

2C - 22 to 67 inches: gravelly loamy sand

Properties and qualities

Slope: 3 to 15 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: 19 to 39 inches to strongly contrasting textural stratification

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.14 to 14.17 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: B

Ecological site: F144AY034CT - Well Drained Till Uplands

Hydric soil rating: No

Description of Charlton, Extremely Stony

Setting

Landform: Ridges, ground moraines, hills

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Convex, linear

Across-slope shape: Convex

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

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

A - 2 to 4 inches: fine sandy loam

Bw - 4 to 27 inches: gravelly fine sandy loam

C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 9.0 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high
(0.14 to 14.17 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Chatfield, extremely stony

Percent of map unit: 5 percent
Landform: Ridges, hills
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Leicester, extremely stony

Percent of map unit: 5 percent
Landform: Hills, drainageways, depressions, ground moraines
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave, linear
Across-slope shape: Concave
Hydric soil rating: Yes

Sutton, extremely stony

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

73C—Charlton-Chatfield complex, 0 to 15 percent slopes, very rocky

Map Unit Setting

National map unit symbol: 2w698

Elevation: 0 to 1,550 feet

Mean annual precipitation: 36 to 71 inches

Mean annual air temperature: 39 to 55 degrees F

Frost-free period: 140 to 240 days

Farmland classification: Not prime farmland

Map Unit Composition

Charlton, very stony, and similar soils: 50 percent

Chatfield, very stony, and similar soils: 30 percent

Minor components: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Charlton, Very Stony

Setting

Landform: Ridges, hills

Landform position (two-dimensional): Summit, shoulder, backslope

Landform position (three-dimensional): Side slope, crest, nose slope

Down-slope shape: Convex, linear

Across-slope shape: Convex

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

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

A - 2 to 4 inches: fine sandy loam

Bw - 4 to 27 inches: gravelly fine sandy loam

C - 27 to 65 inches: gravelly fine sandy loam

Properties and qualities

Slope: 3 to 15 percent

Surface area covered with cobbles, stones or boulders: 1.6 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high
(0.14 to 14.17 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Moderate (about 8.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Custom Soil Resource Report

Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Description of Chatfield, Very Stony

Setting

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

Typical profile

Oi - 0 to 1 inches: slightly decomposed plant material
A - 1 to 2 inches: fine sandy loam
Bw - 2 to 30 inches: gravelly fine sandy loam
2R - 30 to 40 inches: bedrock

Properties and qualities

Slope: 3 to 15 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 41 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

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

Minor Components

Rock outcrop

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

Hollis, very stony

Percent of map unit: 5 percent
Landform: Hills, ridges
Landform position (two-dimensional): Summit, shoulder, backslope
Landform position (three-dimensional): Nose slope, side slope, crest
Down-slope shape: Convex
Across-slope shape: Linear, convex
Hydric soil rating: No

Leicester, very stony

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

Sutton, very stony

Percent of map unit: 5 percent
Landform: Ground moraines, hills
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
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

Custom Soil Resource Report

Properties and qualities

Slope: 15 to 45 percent
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: 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 supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
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
Surface area covered with cobbles, stones or boulders: 1.6 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
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 supply, 0 to 60 inches: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: B
Ecological site: F144AY034CT - Well Drained Till Uplands
Hydric soil rating: No

Minor Components

Rock outcrop

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

Sutton

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

Hollis

Percent of map unit: 3 percent
Landform: Ridges, hills
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

86D—Paxton and Montauk fine sandy loams, 15 to 35 percent slopes, extremely stony

Map Unit Setting

National map unit symbol: 2w67c
Elevation: 0 to 1,400 feet
Mean annual precipitation: 36 to 71 inches
Mean annual air temperature: 39 to 55 degrees F
Frost-free period: 145 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Paxton, extremely stony, and similar soils: 55 percent
Montauk, extremely stony, and similar soils: 30 percent

Custom Soil Resource Report

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Paxton, Extremely Stony

Setting

Landform: Ground moraines, hills, drumlins

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex, linear

Across-slope shape: Convex

Parent material: Coarse-loamy lodgment till derived from gneiss, granite, and/or schist

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

A - 2 to 10 inches: fine sandy loam

Bw1 - 10 to 17 inches: fine sandy loam

Bw2 - 17 to 28 inches: fine sandy loam

Cd - 28 to 67 inches: gravelly fine sandy loam

Properties and qualities

Slope: 15 to 35 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: 20 to 43 inches to densic material

Drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 18 to 37 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: C

Ecological site: F144AY007CT - Well Drained Dense Till Uplands

Hydric soil rating: No

Description of Montauk, Extremely Stony

Setting

Landform: Hills, recessional moraines, ground moraines, drumlins

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex, linear

Across-slope shape: Convex

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

Typical profile

Oe - 0 to 2 inches: moderately decomposed plant material

A - 2 to 6 inches: fine sandy loam

Bw1 - 6 to 28 inches: fine sandy loam

Custom Soil Resource Report

Bw2 - 28 to 36 inches: sandy loam

2Cd - 36 to 74 inches: gravelly loamy sand

Properties and qualities

Slope: 15 to 35 percent

Surface area covered with cobbles, stones or boulders: 9.0 percent

Depth to restrictive feature: 20 to 43 inches to densic material

Drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 1.42 in/hr)

Depth to water table: About 18 to 37 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline (0.0 to 1.9 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: C

Ecological site: F144AY007CT - Well Drained Dense Till Uplands

Hydric soil rating: No

Minor Components

Charlton, extremely stony

Percent of map unit: 6 percent

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Convex

Hydric soil rating: No

Woodbridge, extremely stony

Percent of map unit: 5 percent

Landform: Ground moraines, hills, drumlins

Landform position (two-dimensional): Summit, backslope, footslope

Landform position (three-dimensional): Side slope, crest

Down-slope shape: Concave

Across-slope shape: Linear

Hydric soil rating: No

Ridgebury, extremely stony

Percent of map unit: 3 percent

Landform: Drumlins, depressions, ground moraines, hills, drainageways

Landform position (two-dimensional): Footslope, toeslope

Landform position (three-dimensional): Head slope, base slope

Down-slope shape: Concave

Across-slope shape: Concave

Hydric soil rating: Yes

Stockbridge, extremely stony

Percent of map unit: 1 percent

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: No

306—Udorthents-Urban land complex

Map Unit Setting

National map unit symbol: 9lmg
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

Udorthents and similar soils: 50 percent
Urban land: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Setting

Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Drift

Typical profile

A - 0 to 5 inches: loam
C1 - 5 to 21 inches: gravelly loam
C2 - 21 to 80 inches: very gravelly sandy loam

Properties and qualities

Slope: 0 to 25 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: About 54 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Hydric soil rating: No

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: 8 percent

Hydric soil rating: No

Udorthents, wet substratum

Percent of map unit: 5 percent

Down-slope shape: Convex

Across-slope shape: Linear

Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 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

Custom Soil Resource Report

Hydrologic Soil Group: D
Hydric soil rating: Unranked

Minor Components

Udorthents, wet substratum

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

Unnamed, undisturbed soils

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

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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Custom Soil Resource Report

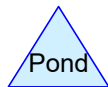
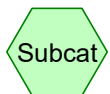
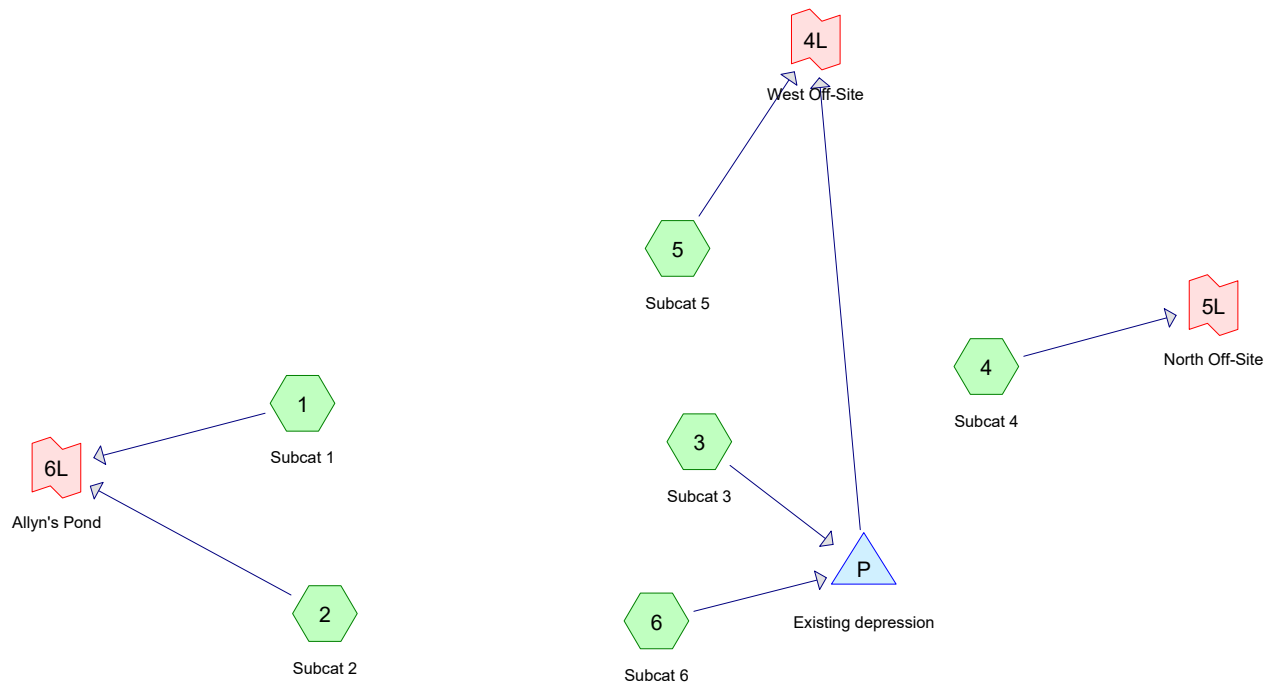
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APPENDIX D

HydroCAD Reports



Existing Conditions

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Page 2

Rainfall Events Listing (selected events)

| Event# | Event Name | Storm Type | Curve | Mode | Duration (hours) | B/B | Depth (inches) | AMC |
|--------|------------|----------------|-------|---------|------------------|-----|----------------|-----|
| 1 | 2-yr | Type III 24-hr | | Default | 24.00 | 1 | 3.46 | 2 |
| 2 | 10-yr | Type III 24-hr | | Default | 24.00 | 1 | 5.12 | 2 |
| 3 | 25-yr | Type III 24-hr | | Default | 24.00 | 1 | 6.15 | 2 |
| 4 | 50-yr | Type III 24-hr | | Default | 24.00 | 1 | 6.92 | 2 |
| 5 | 100-yr | Type III 24-hr | | Default | 24.00 | 1 | 7.74 | 2 |

Existing Conditions

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Page 3

Area Listing (all nodes)

| Area (sq-ft) | CN | Description (subcatchment-numbers) |
|------------------|-----------|--|
| 105,404 | 70 | 1/2 acre lots, 25% imp, HSG B (3) |
| 1,614 | 85 | 1/2 acre lots, 25% imp, HSG D (3) |
| 5,428 | 84 | 50-75% Grass cover, Fair, HSG D (1, 2) |
| 6,884 | 35 | Brush, Fair, HSG A (3, 4) |
| 117,547 | 56 | Brush, Fair, HSG B (2, 3, 5, 6) |
| 87,881 | 77 | Brush, Fair, HSG D (1, 2, 3, 4, 5) |
| 36,252 | 85 | Gravel roads, HSG B (1, 2) |
| 74,515 | 91 | Gravel roads, HSG D (1, 2, 5) |
| 110,834 | 98 | Unconnected pavement, HSG B (1, 2, 3, 6) |
| 295,870 | 98 | Unconnected pavement, HSG D (1, 2, 3, 5) |
| 456 | 30 | Woods, Good, HSG A (3) |
| 521,262 | 55 | Woods, Good, HSG B (2, 3, 5, 6) |
| 33,365 | 77 | Woods, Good, HSG D (1, 2, 3, 5) |
| 1,397,310 | 73 | TOTAL AREA |

Existing Conditions

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Page 4

Soil Listing (all nodes)

| Area (sq-ft) | Soil Group | Subcatchment Numbers |
|------------------|---------------|-------------------------|
| 7,340 | HSG A | 3, 4 |
| 891,298 | HSG B | 1, 2, 3, 5, 6 |
| 0 | HSG C | |
| 498,673 | HSG D | 1, 2, 3, 4, 5 |
| 0 | Other | |
| 1,397,310 | | TOTAL AREA |

Existing Conditions

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Page 5

Ground Covers (all nodes)

| HSG-A (sq-ft) | HSG-B (sq-ft) | HSG-C (sq-ft) | HSG-D (sq-ft) | Other (sq-ft) | Total (sq-ft) | Ground Cover |
|------------------|------------------|------------------|------------------|------------------|------------------|-----------------------------|
| 0 | 105,404 | 0 | 1,614 | 0 | 107,017 | 1/2 acre lots, 25% imp |
| 0 | 0 | 0 | 5,428 | 0 | 5,428 | 50-75% Grass cover, Fair |
| 6,884 | 117,547 | 0 | 87,881 | 0 | 212,311 | Brush, Fair |
| 0 | 36,252 | 0 | 74,515 | 0 | 110,767 | Gravel roads |
| 0 | 110,834 | 0 | 295,870 | 0 | 406,703 | Unconnected pavement |
| 456 | 521,262 | 0 | 33,365 | 0 | 555,083 | Woods, Good |
| 7,340 | 891,298 | 0 | 498,673 | 0 | 1,397,310 | TOTAL AREA |

Existing Conditions

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Type III 24-hr 2-yr Rainfall=3.46"

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Page 6

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=270,407 sf 91.02% Impervious Runoff Depth=3.11"
Flow Length=254' Tc=28.5 min CN=97 Runoff=12.10 cfs 70,186 cf

Subcatchment2: Subcat 2 Runoff Area=327,638 sf 29.04% Impervious Runoff Depth=0.88"
Flow Length=349' Tc=9.0 min UI Adjusted CN=68 Runoff=6.17 cfs 23,977 cf

Subcatchment3: Subcat 3 Runoff Area=622,716 sf 11.51% Impervious Runoff Depth=0.51"
Tc=57.1 min UI Adjusted CN=60 Runoff=2.47 cfs 26,690 cf

Subcatchment4: Subcat 4 Runoff Area=8,555 sf 0.00% Impervious Runoff Depth=0.30"
Tc=5.0 min CN=54 Runoff=0.03 cfs 214 cf

Subcatchment5: Subcat 5 Runoff Area=142,734 sf 3.81% Impervious Runoff Depth=1.75"
Tc=5.0 min CN=82 Runoff=6.96 cfs 20,811 cf

Subcatchment6: Subcat 6 Runoff Area=25,260 sf 59.71% Impervious Runoff Depth=1.68"
Tc=5.0 min CN=81 Runoff=1.18 cfs 3,528 cf

Pond P: Existing depression Peak Elev=22.05' Storage=269 cf Inflow=2.60 cfs 30,219 cf
Discarded=2.59 cfs 30,219 cf Primary=0.00 cfs 0 cf Outflow=2.59 cfs 30,219 cf

Link 4L: West Off-Site Inflow=6.96 cfs 20,811 cf
Primary=6.96 cfs 20,811 cf

Link 5L: North Off-Site Inflow=0.03 cfs 214 cf
Primary=0.03 cfs 214 cf

Link 6L: Allyn's Pond Inflow=15.80 cfs 94,162 cf
Primary=15.80 cfs 94,162 cf

Total Runoff Area = 1,397,310 sf Runoff Volume = 145,406 cf Average Runoff Depth = 1.25"
68.98% Pervious = 963,852 sf 31.02% Impervious = 433,458 sf

Existing Conditions

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Type III 24-hr 10-yr Rainfall=5.12"

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Page 7

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1

Runoff Area=270,407 sf 91.02% Impervious Runoff Depth=4.77"
Flow Length=254' Tc=28.5 min CN=97 Runoff=18.16 cfs 107,412 cf

Subcatchment2: Subcat 2

Runoff Area=327,638 sf 29.04% Impervious Runoff Depth=1.97"
Flow Length=349' Tc=9.0 min UI Adjusted CN=68 Runoff=15.21 cfs 53,663 cf

Subcatchment3: Subcat 3

Runoff Area=622,716 sf 11.51% Impervious Runoff Depth=1.37"
Tc=57.1 min UI Adjusted CN=60 Runoff=8.36 cfs 71,182 cf

Subcatchment4: Subcat 4

Runoff Area=8,555 sf 0.00% Impervious Runoff Depth=0.98"
Tc=5.0 min CN=54 Runoff=0.18 cfs 697 cf

Subcatchment5: Subcat 5

Runoff Area=142,734 sf 3.81% Impervious Runoff Depth=3.19"
Tc=5.0 min CN=82 Runoff=12.65 cfs 37,903 cf

Subcatchment6: Subcat 6

Runoff Area=25,260 sf 59.71% Impervious Runoff Depth=3.09"
Tc=5.0 min CN=81 Runoff=2.18 cfs 6,508 cf

Pond P: Existing depression

Peak Elev=22.92' Storage=8,515 cf Inflow=8.58 cfs 77,689 cf
Discarded=6.04 cfs 77,689 cf Primary=0.00 cfs 0 cf Outflow=6.04 cfs 77,689 cf

Link 4L: West Off-Site

Inflow=12.65 cfs 37,903 cf
Primary=12.65 cfs 37,903 cf

Link 5L: North Off-Site

Inflow=0.18 cfs 697 cf
Primary=0.18 cfs 697 cf

Link 6L: Allyn's Pond

Inflow=26.77 cfs 161,076 cf
Primary=26.77 cfs 161,076 cf

Total Runoff Area = 1,397,310 sf Runoff Volume = 277,366 cf Average Runoff Depth = 2.38"
68.98% Pervious = 963,852 sf 31.02% Impervious = 433,458 sf

Existing Conditions

Prepared by Loureiro Engineering Assoc, Inc

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Type III 24-hr 25-yr Rainfall=6.15"

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Page 8

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1

Runoff Area=270,407 sf 91.02% Impervious Runoff Depth=5.79"
Flow Length=254' Tc=28.5 min CN=97 Runoff=21.89 cfs 130,558 cf

Subcatchment2: Subcat 2

Runoff Area=327,638 sf 29.04% Impervious Runoff Depth=2.74"
Flow Length=349' Tc=9.0 min UI Adjusted CN=68 Runoff=21.55 cfs 74,716 cf

Subcatchment3: Subcat 3

Runoff Area=622,716 sf 11.51% Impervious Runoff Depth=2.02"
Tc=57.1 min UI Adjusted CN=60 Runoff=12.91 cfs 104,842 cf

Subcatchment4: Subcat 4

Runoff Area=8,555 sf 0.00% Impervious Runoff Depth=1.52"
Tc=5.0 min CN=54 Runoff=0.32 cfs 1,087 cf

Subcatchment5: Subcat 5

Runoff Area=142,734 sf 3.81% Impervious Runoff Depth=4.13"
Tc=5.0 min CN=82 Runoff=16.27 cfs 49,069 cf

Subcatchment6: Subcat 6

Runoff Area=25,260 sf 59.71% Impervious Runoff Depth=4.02"
Tc=5.0 min CN=81 Runoff=2.81 cfs 8,463 cf

Pond P: Existing depression

Peak Elev=23.51' Storage=17,647 cf Inflow=13.21 cfs 113,305 cf
Discarded=8.31 cfs 113,305 cf Primary=0.00 cfs 0 cf Outflow=8.31 cfs 113,305 cf

Link 4L: West Off-Site

Inflow=16.27 cfs 49,069 cf
Primary=16.27 cfs 49,069 cf

Link 5L: North Off-Site

Inflow=0.32 cfs 1,087 cf
Primary=0.32 cfs 1,087 cf

Link 6L: Allyn's Pond

Inflow=35.20 cfs 205,273 cf
Primary=35.20 cfs 205,273 cf

Total Runoff Area = 1,397,310 sf Runoff Volume = 368,734 cf Average Runoff Depth = 3.17"
68.98% Pervious = 963,852 sf 31.02% Impervious = 433,458 sf

Existing Conditions

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Type III 24-hr 50-yr Rainfall=6.92"

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Page 9

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1

Runoff Area=270,407 sf 91.02% Impervious Runoff Depth=6.56"
Flow Length=254' Tc=28.5 min CN=97 Runoff=24.68 cfs 147,873 cf

Subcatchment2: Subcat 2

Runoff Area=327,638 sf 29.04% Impervious Runoff Depth=3.35"
Flow Length=349' Tc=9.0 min UI Adjusted CN=68 Runoff=26.52 cfs 91,344 cf

Subcatchment3: Subcat 3

Runoff Area=622,716 sf 11.51% Impervious Runoff Depth=2.55"
Tc=57.1 min UI Adjusted CN=60 Runoff=16.62 cfs 132,178 cf

Subcatchment4: Subcat 4

Runoff Area=8,555 sf 0.00% Impervious Runoff Depth=1.98"
Tc=5.0 min CN=54 Runoff=0.44 cfs 1,412 cf

Subcatchment5: Subcat 5

Runoff Area=142,734 sf 3.81% Impervious Runoff Depth=4.84"
Tc=5.0 min CN=82 Runoff=18.99 cfs 57,584 cf

Subcatchment6: Subcat 6

Runoff Area=25,260 sf 59.71% Impervious Runoff Depth=4.73"
Tc=5.0 min CN=81 Runoff=3.29 cfs 9,958 cf

Pond P: Existing depression

Peak Elev=23.93' Storage=25,955 cf Inflow=16.97 cfs 142,136 cf
Discarded=9.93 cfs 142,136 cf Primary=0.00 cfs 0 cf Outflow=9.93 cfs 142,136 cf

Link 4L: West Off-Site

Inflow=18.99 cfs 57,584 cf
Primary=18.99 cfs 57,584 cf

Link 5L: North Off-Site

Inflow=0.44 cfs 1,412 cf
Primary=0.44 cfs 1,412 cf

Link 6L: Allyn's Pond

Inflow=41.80 cfs 239,217 cf
Primary=41.80 cfs 239,217 cf

Total Runoff Area = 1,397,310 sf Runoff Volume = 440,350 cf Average Runoff Depth = 3.78"
68.98% Pervious = 963,852 sf 31.02% Impervious = 433,458 sf

Existing Conditions

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Type III 24-hr 100-yr Rainfall=7.74"

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Page 10

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1

Runoff Area=270,407 sf 91.02% Impervious Runoff Depth=7.38"
Flow Length=254' Tc=28.5 min CN=97 Runoff=27.65 cfs 166,319 cf

Subcatchment2: Subcat 2

Runoff Area=327,638 sf 29.04% Impervious Runoff Depth=4.02"
Flow Length=349' Tc=9.0 min UI Adjusted CN=68 Runoff=31.95 cfs 109,700 cf

Subcatchment3: Subcat 3

Runoff Area=622,716 sf 11.51% Impervious Runoff Depth=3.14"
Tc=57.1 min UI Adjusted CN=60 Runoff=20.78 cfs 162,925 cf

Subcatchment4: Subcat 4

Runoff Area=8,555 sf 0.00% Impervious Runoff Depth=2.50"
Tc=5.0 min CN=54 Runoff=0.57 cfs 1,785 cf

Subcatchment5: Subcat 5

Runoff Area=142,734 sf 3.81% Impervious Runoff Depth=5.61"
Tc=5.0 min CN=82 Runoff=21.88 cfs 66,767 cf

Subcatchment6: Subcat 6

Runoff Area=25,260 sf 59.71% Impervious Runoff Depth=5.50"
Tc=5.0 min CN=81 Runoff=3.81 cfs 11,572 cf

Pond P: Existing depression

Peak Elev=24.44' Storage=37,229 cf Inflow=21.88 cfs 174,496 cf
Discarded=10.71 cfs 174,496 cf Primary=0.00 cfs 0 cf Outflow=10.71 cfs 174,496 cf

Link 4L: West Off-Site

Inflow=21.88 cfs 66,767 cf
Primary=21.88 cfs 66,767 cf

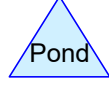
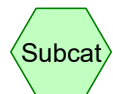
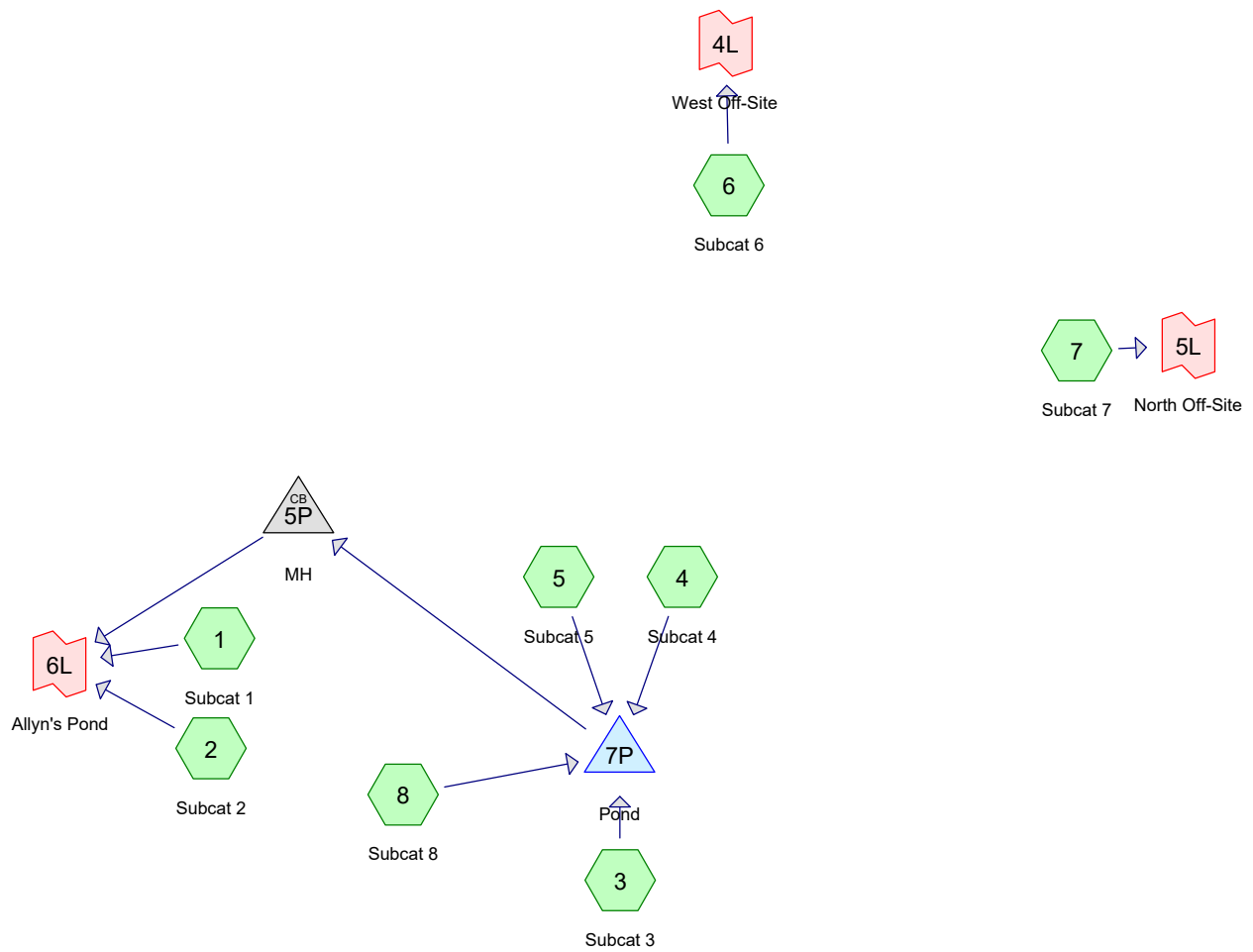
Link 5L: North Off-Site

Inflow=0.57 cfs 1,785 cf
Primary=0.57 cfs 1,785 cf

Link 6L: Allyn's Pond

Inflow=48.96 cfs 276,019 cf
Primary=48.96 cfs 276,019 cf

Total Runoff Area = 1,397,310 sf Runoff Volume = 519,067 cf Average Runoff Depth = 4.46"
68.98% Pervious = 963,852 sf 31.02% Impervious = 433,458 sf



New Conditions

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Page 2

Rainfall Events Listing (selected events)

| Event# | Event Name | Storm Type | Curve | Mode | Duration (hours) | B/B | Depth (inches) | AMC |
|--------|------------|----------------|-------|---------|------------------|-----|----------------|-----|
| 1 | 2-yr | Type III 24-hr | | Default | 24.00 | 1 | 3.46 | 2 |
| 2 | 10-yr | Type III 24-hr | | Default | 24.00 | 1 | 5.12 | 2 |
| 3 | 25-yr | Type III 24-hr | | Default | 24.00 | 1 | 6.15 | 2 |
| 4 | 50-yr | Type III 24-hr | | Default | 24.00 | 1 | 6.92 | 2 |
| 5 | 100-yr | Type III 24-hr | | Default | 24.00 | 1 | 7.74 | 2 |

New Conditions

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Page 3

Area Listing (all nodes)

| Area (sq-ft) | CN | Description (subcatchment-numbers) |
|------------------|-----------|--|
| 105,488 | 70 | 1/2 acre lots, 25% imp, HSG B (3) |
| 1,625 | 85 | 1/2 acre lots, 25% imp, HSG D (3) |
| 5,660 | 80 | >75% Grass cover, Good, HSG D (1, 2, 5) |
| 67 | 35 | Brush, Fair, HSG A (3) |
| 133,125 | 56 | Brush, Fair, HSG B (2, 3, 8) |
| 51,485 | 77 | Brush, Fair, HSG D (1, 2, 6) |
| 25,975 | 85 | Gravel roads, HSG B (1, 2) |
| 76,948 | 91 | Gravel roads, HSG D (1, 2, 4, 5, 6) |
| 417 | 98 | Paved parking, HSG B (2) |
| 806 | 98 | Roofs, HSG B (1, 2) |
| 25,198 | 98 | Roofs, HSG D (1, 2, 4, 5) |
| 0 | 98 | Unconnected pavement, HSG A (7) |
| 117,351 | 98 | Unconnected pavement, HSG B (1, 2, 3, 4, 5, 8) |
| 305,363 | 98 | Unconnected pavement, HSG D (1, 2, 3, 4, 5, 6) |
| 7,276 | 30 | Woods, Good, HSG A (3, 7) |
| 503,819 | 55 | Woods, Good, HSG B (2, 3, 8) |
| 34,438 | 77 | Woods, Good, HSG D (1, 2, 3, 4, 6, 7) |
| 1,395,041 | 74 | TOTAL AREA |

New Conditions

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Page 4

Soil Listing (all nodes)

| Area (sq-ft) | Soil Group | Subcatchment Numbers |
|------------------|---------------|-------------------------|
| 7,343 | HSG A | 3, 7 |
| 886,981 | HSG B | 1, 2, 3, 4, 5, 8 |
| 0 | HSG C | |
| 500,717 | HSG D | 1, 2, 3, 4, 5, 6, 7 |
| 0 | Other | |
| 1,395,041 | | TOTAL AREA |

New Conditions

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Page 5

Ground Covers (all nodes)

| HSG-A (sq-ft) | HSG-B (sq-ft) | HSG-C (sq-ft) | HSG-D (sq-ft) | Other (sq-ft) | Total (sq-ft) | Ground Cover |
|------------------|------------------|------------------|------------------|------------------|------------------|---------------------------|
| 0 | 105,488 | 0 | 1,625 | 0 | 107,114 | 1/2 acre lots, 25% imp |
| 0 | 0 | 0 | 5,660 | 0 | 5,660 | >75% Grass cover, Good |
| 67 | 133,125 | 0 | 51,485 | 0 | 184,677 | Brush, Fair |
| 0 | 25,975 | 0 | 76,948 | 0 | 102,923 | Gravel roads |
| 0 | 417 | 0 | 0 | 0 | 417 | Paved parking |
| 0 | 806 | 0 | 25,198 | 0 | 26,004 | Roofs |
| 0 | 117,351 | 0 | 305,363 | 0 | 422,713 | Unconnected pavement |
| 7,276 | 503,819 | 0 | 34,438 | 0 | 545,534 | Woods, Good |
| 7,343 | 886,981 | 0 | 500,717 | 0 | 1,395,041 | TOTAL AREA |

New Conditions

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Page 6

Pipe Listing (all nodes)

| Line# | Node Number | In-Invert (feet) | Out-Invert (feet) | Length (feet) | Slope (ft/ft) | n | Width (inches) | Diam/Height (inches) | Inside-Fill (inches) |
|-------|----------------|---------------------|----------------------|------------------|------------------|-------|-------------------|-------------------------|-------------------------|
| 1 | 3 | 0.00 | 0.00 | 96.0 | 0.0100 | 0.012 | 0.0 | 24.0 | 0.0 |
| 2 | 5P | 23.78 | 22.12 | 105.7 | 0.0157 | 0.011 | 0.0 | 15.0 | 0.0 |
| 3 | 7P | 24.90 | 23.83 | 171.0 | 0.0063 | 0.013 | 0.0 | 15.0 | 0.0 |

New Conditions

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Type III 24-hr 2-yr Rainfall=3.46"

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Page 7

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=247,789 sf 91.57% Impervious Runoff Depth=3.11"
Tc=28.5 min CN=97 Runoff=11.09 cfs 64,315 cf

Subcatchment2: Subcat 2 Runoff Area=327,174 sf 27.28% Impervious Runoff Depth=0.83"
Tc=9.0 min UI Adjusted CN=67 Runoff=5.69 cfs 22,567 cf

Subcatchment3: Subcat 3 Runoff Area=598,927 sf 11.81% Impervious Runoff Depth=0.48"
Flow Length=1,055' Tc=57.1 min UI Adjusted CN=59 Runoff=2.11 cfs 23,715 cf

Subcatchment4: Subcat 4 Runoff Area=30,771 sf 72.78% Impervious Runoff Depth=2.70"
Tc=5.0 min CN=93 Runoff=2.23 cfs 6,914 cf

Subcatchment5: Subcat 5 Runoff Area=46,548 sf 94.88% Impervious Runoff Depth=3.23"
Tc=5.0 min CN=98 Runoff=3.72 cfs 12,516 cf

Subcatchment6: Subcat 6 Runoff Area=110,009 sf 6.70% Impervious Runoff Depth=1.90"
Tc=11.8 min CN=84 Runoff=4.65 cfs 17,439 cf

Subcatchment7: Subcat 7 Runoff Area=8,563 sf 0.00% Impervious Runoff Depth=0.21"
Tc=5.0 min CN=51 Runoff=0.01 cfs 152 cf

Subcatchment8: Subcat 8 Runoff Area=25,260 sf 59.64% Impervious Runoff Depth=1.68"
Tc=5.0 min CN=81 Runoff=1.18 cfs 3,528 cf

Pond 5P: MH Peak Elev=23.78' Inflow=0.00 cfs 0 cf
15.0" Round Culvert n=0.011 L=105.7' S=0.0157 '/' Outflow=0.00 cfs 0 cf

Pond 7P: Pond Peak Elev=22.82' Storage=4,072 cf Inflow=7.14 cfs 46,674 cf
Discarded=2.77 cfs 46,674 cf Primary=0.00 cfs 0 cf Outflow=2.77 cfs 46,674 cf

Link 4L: West Off-Site Inflow=4.65 cfs 17,439 cf
Primary=4.65 cfs 17,439 cf

Link 5L: North Off-Site Inflow=0.01 cfs 152 cf
Primary=0.01 cfs 152 cf

Link 6L: Allyn's Pond Inflow=14.57 cfs 86,882 cf
Primary=14.57 cfs 86,882 cf

Total Runoff Area = 1,395,041 sf Runoff Volume = 151,146 cf Average Runoff Depth = 1.30"
65.89% Pervious = 919,129 sf 34.11% Impervious = 475,912 sf

New Conditions

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Type III 24-hr 2-yr Rainfall=3.46"

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Page 3

Summary for Pond 7P: Pond

Inflow Area = 701,507 sf, 21.72% Impervious, Inflow Depth = 0.80" for 2-yr event
 Inflow = 7.14 cfs @ 12.07 hrs, Volume= 46,674 cf
 Outflow = 2.77 cfs @ 12.34 hrs, Volume= 46,674 cf, Atten= 61%, Lag= 15.9 min
 Discarded = 2.77 cfs @ 12.34 hrs, Volume= 46,674 cf
 Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
 Routed to Pond 5P : MH

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
 Peak Elev= 22.82' @ 12.34 hrs Surf.Area= 6,270 sf Storage= 4,072 cf
 Flood Elev= 28.00' Surf.Area= 18,164 sf Storage= 72,263 cf

Plug-Flow detention time= 12.5 min calculated for 46,674 cf (100% of inflow)
 Center-of-Mass det. time= 12.5 min (883.8 - 871.4)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|--|
| #1 | 22.00' | 91,334 cf | Custom Stage Data (Irregular) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---------------------|----------------------|------------------|---------------------------|---------------------------|---------------------|
| 22.00 | 3,818 | 277.4 | 0 | 0 | 3,818 |
| 24.00 | 10,911 | 519.5 | 14,122 | 14,122 | 19,192 |
| 26.00 | 14,610 | 578.4 | 25,431 | 39,553 | 24,453 |
| 28.00 | 18,164 | 637.0 | 32,710 | 72,263 | 30,250 |
| 29.00 | 19,992 | 657.3 | 19,071 | 91,334 | 32,439 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|---|
| #1 | Discarded | 22.00' | 12.560 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 13.25' |
| #2 | Primary | 24.90' | 15.0" Round Culvert L= 171.0' Ke= 0.500 Inlet / Outlet Invert= 24.90' / 23.83' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf |
| #3 | Device 2 | 28.00' | 48.0" x 36.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads |

Discarded OutFlow Max=2.77 cfs @ 12.34 hrs HW=22.82' (Free Discharge)

↑ **1=Exfiltration** (Controls 2.77 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=22.00' (Free Discharge)

↑ **2=Culvert** (Controls 0.00 cfs)

↑ **3=Orifice/Grate** (Controls 0.00 cfs)

New Conditions

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Type III 24-hr 10-yr Rainfall=5.12"

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Page 8

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=247,789 sf 91.57% Impervious Runoff Depth=4.77"
Tc=28.5 min CN=97 Runoff=16.64 cfs 98,428 cf

Subcatchment2: Subcat 2 Runoff Area=327,174 sf 27.28% Impervious Runoff Depth=1.89"
Tc=9.0 min UI Adjusted CN=67 Runoff=14.50 cfs 51,451 cf

Subcatchment3: Subcat 3 Runoff Area=598,927 sf 11.81% Impervious Runoff Depth=1.30"
Flow Length=1,055' Tc=57.1 min UI Adjusted CN=59 Runoff=7.53 cfs 65,029 cf

Subcatchment4: Subcat 4 Runoff Area=30,771 sf 72.78% Impervious Runoff Depth=4.32"
Tc=5.0 min CN=93 Runoff=3.48 cfs 11,067 cf

Subcatchment5: Subcat 5 Runoff Area=46,548 sf 94.88% Impervious Runoff Depth=4.88"
Tc=5.0 min CN=98 Runoff=5.55 cfs 18,941 cf

Subcatchment6: Subcat 6 Runoff Area=110,009 sf 6.70% Impervious Runoff Depth=3.38"
Tc=11.8 min CN=84 Runoff=8.22 cfs 30,989 cf

Subcatchment7: Subcat 7 Runoff Area=8,563 sf 0.00% Impervious Runoff Depth=0.80"
Tc=5.0 min CN=51 Runoff=0.13 cfs 570 cf

Subcatchment8: Subcat 8 Runoff Area=25,260 sf 59.64% Impervious Runoff Depth=3.09"
Tc=5.0 min CN=81 Runoff=2.18 cfs 6,508 cf

Pond 5P: MH Peak Elev=23.78' Inflow=0.00 cfs 0 cf
15.0" Round Culvert n=0.011 L=105.7' S=0.0157 '/' Outflow=0.00 cfs 0 cf

Pond 7P: Pond Peak Elev=24.08' Storage=15,049 cf Inflow=11.62 cfs 101,545 cf
Discarded=6.35 cfs 101,545 cf Primary=0.00 cfs 0 cf Outflow=6.35 cfs 101,545 cf

Link 4L: West Off-Site Inflow=8.22 cfs 30,989 cf
Primary=8.22 cfs 30,989 cf

Link 5L: North Off-Site Inflow=0.13 cfs 570 cf
Primary=0.13 cfs 570 cf

Link 6L: Allyn's Pond Inflow=25.08 cfs 149,878 cf
Primary=25.08 cfs 149,878 cf

Total Runoff Area = 1,395,041 sf Runoff Volume = 282,982 cf Average Runoff Depth = 2.43"
65.89% Pervious = 919,129 sf 34.11% Impervious = 475,912 sf

New Conditions

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Type III 24-hr 10-yr Rainfall=5.12"

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Page 4

Summary for Pond 7P: Pond

Inflow Area = 701,507 sf, 21.72% Impervious, Inflow Depth = 1.74" for 10-yr event
Inflow = 11.62 cfs @ 12.07 hrs, Volume= 101,545 cf
Outflow = 6.35 cfs @ 13.26 hrs, Volume= 101,545 cf, Atten= 45%, Lag= 71.2 min
Discarded = 6.35 cfs @ 13.26 hrs, Volume= 101,545 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond 5P : MH

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 24.08' @ 13.26 hrs Surf.Area= 11,056 sf Storage= 15,049 cf
Flood Elev= 28.00' Surf.Area= 18,164 sf Storage= 72,263 cf

Plug-Flow detention time= 23.5 min calculated for 101,545 cf (100% of inflow)
Center-of-Mass det. time= 23.5 min (891.6 - 868.1)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|--|
| #1 | 22.00' | 91,334 cf | Custom Stage Data (Irregular) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---------------------|----------------------|------------------|---------------------------|---------------------------|---------------------|
| 22.00 | 3,818 | 277.4 | 0 | 0 | 3,818 |
| 24.00 | 10,911 | 519.5 | 14,122 | 14,122 | 19,192 |
| 26.00 | 14,610 | 578.4 | 25,431 | 39,553 | 24,453 |
| 28.00 | 18,164 | 637.0 | 32,710 | 72,263 | 30,250 |
| 29.00 | 19,992 | 657.3 | 19,071 | 91,334 | 32,439 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|---|
| #1 | Discarded | 22.00' | 12.560 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 13.25' |
| #2 | Primary | 24.90' | 15.0" Round Culvert L= 171.0' Ke= 0.500 Inlet / Outlet Invert= 24.90' / 23.83' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf |
| #3 | Device 2 | 28.00' | 48.0" x 36.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads |

Discarded OutFlow Max=6.35 cfs @ 13.26 hrs HW=24.08' (Free Discharge)

↑ **1=Exfiltration** (Controls 6.35 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=22.00' (Free Discharge)

↑ **2=Culvert** (Controls 0.00 cfs)

↑ **3=Orifice/Grate** (Controls 0.00 cfs)

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Type III 24-hr 25-yr Rainfall=6.15"

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Page 9

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=247,789 sf 91.57% Impervious Runoff Depth=5.79"
Tc=28.5 min CN=97 Runoff=20.06 cfs 119,637 cf

Subcatchment2: Subcat 2 Runoff Area=327,174 sf 27.28% Impervious Runoff Depth=2.64"
Tc=9.0 min UI Adjusted CN=67 Runoff=20.72 cfs 72,081 cf

Subcatchment3: Subcat 3 Runoff Area=598,927 sf 11.81% Impervious Runoff Depth=1.94"
Flow Length=1,055' Tc=57.1 min UI Adjusted CN=59 Runoff=11.78 cfs 96,584 cf

Subcatchment4: Subcat 4 Runoff Area=30,771 sf 72.78% Impervious Runoff Depth=5.33"
Tc=5.0 min CN=93 Runoff=4.24 cfs 13,669 cf

Subcatchment5: Subcat 5 Runoff Area=46,548 sf 94.88% Impervious Runoff Depth=5.91"
Tc=5.0 min CN=98 Runoff=6.67 cfs 22,932 cf

Subcatchment6: Subcat 6 Runoff Area=110,009 sf 6.70% Impervious Runoff Depth=4.34"
Tc=11.8 min CN=84 Runoff=10.47 cfs 39,760 cf

Subcatchment7: Subcat 7 Runoff Area=8,563 sf 0.00% Impervious Runoff Depth=1.29"
Tc=5.0 min CN=51 Runoff=0.26 cfs 922 cf

Subcatchment8: Subcat 8 Runoff Area=25,260 sf 59.64% Impervious Runoff Depth=4.02"
Tc=5.0 min CN=81 Runoff=2.81 cfs 8,463 cf

Pond 5P: MH Peak Elev=23.78' Inflow=0.00 cfs 0 cf
15.0" Round Culvert n=0.011 L=105.7' S=0.0157 'l' Outflow=0.00 cfs 0 cf

Pond 7P: Pond Peak Elev=25.15' Storage=27,842 cf Inflow=14.96 cfs 141,649 cf
Discarded=7.81 cfs 141,649 cf Primary=0.00 cfs 0 cf Outflow=7.81 cfs 141,649 cf

Link 4L: West Off-Site Inflow=10.47 cfs 39,760 cf
Primary=10.47 cfs 39,760 cf

Link 5L: North Off-Site Inflow=0.26 cfs 922 cf
Primary=0.26 cfs 922 cf

Link 6L: Allyn's Pond Inflow=33.24 cfs 191,718 cf
Primary=33.24 cfs 191,718 cf

Total Runoff Area = 1,395,041 sf Runoff Volume = 374,048 cf Average Runoff Depth = 3.22"
65.89% Pervious = 919,129 sf 34.11% Impervious = 475,912 sf

New Conditions

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Type III 24-hr 25-yr Rainfall=6.15"

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Page 5

Summary for Pond 7P: Pond

Inflow Area = 701,507 sf, 21.72% Impervious, Inflow Depth = 2.42" for 25-yr event
Inflow = 14.96 cfs @ 12.07 hrs, Volume= 141,649 cf
Outflow = 7.81 cfs @ 13.42 hrs, Volume= 141,649 cf, Atten= 48%, Lag= 80.6 min
Discarded = 7.81 cfs @ 13.42 hrs, Volume= 141,649 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond 5P : MH

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 25.15' @ 13.42 hrs Surf.Area= 12,973 sf Storage= 27,842 cf
Flood Elev= 28.00' Surf.Area= 18,164 sf Storage= 72,263 cf

Plug-Flow detention time= 33.3 min calculated for 141,634 cf (100% of inflow)
Center-of-Mass det. time= 33.3 min (898.0 - 864.6)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|--|
| #1 | 22.00' | 91,334 cf | Custom Stage Data (Irregular) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---------------------|----------------------|------------------|---------------------------|---------------------------|---------------------|
| 22.00 | 3,818 | 277.4 | 0 | 0 | 3,818 |
| 24.00 | 10,911 | 519.5 | 14,122 | 14,122 | 19,192 |
| 26.00 | 14,610 | 578.4 | 25,431 | 39,553 | 24,453 |
| 28.00 | 18,164 | 637.0 | 32,710 | 72,263 | 30,250 |
| 29.00 | 19,992 | 657.3 | 19,071 | 91,334 | 32,439 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|---|
| #1 | Discarded | 22.00' | 12.560 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 13.25' |
| #2 | Primary | 24.90' | 15.0" Round Culvert L= 171.0' Ke= 0.500 Inlet / Outlet Invert= 24.90' / 23.83' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf |
| #3 | Device 2 | 28.00' | 48.0" x 36.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads |

Discarded OutFlow Max=7.81 cfs @ 13.42 hrs HW=25.15' (Free Discharge)

↑ **1=Exfiltration** (Controls 7.81 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=22.00' (Free Discharge)

↑ **2=Culvert** (Controls 0.00 cfs)

↑ **3=Orifice/Grate** (Controls 0.00 cfs)

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Type III 24-hr 50-yr Rainfall=6.92"

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Page 10

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=247,789 sf 91.57% Impervious Runoff Depth=6.56"
Tc=28.5 min CN=97 Runoff=22.62 cfs 135,503 cf

Subcatchment2: Subcat 2 Runoff Area=327,174 sf 27.28% Impervious Runoff Depth=3.24"
Tc=9.0 min UI Adjusted CN=67 Runoff=25.62 cfs 88,427 cf

Subcatchment3: Subcat 3 Runoff Area=598,927 sf 11.81% Impervious Runoff Depth=2.45"
Flow Length=1,055' Tc=57.1 min UI Adjusted CN=59 Runoff=15.28 cfs 122,315 cf

Subcatchment4: Subcat 4 Runoff Area=30,771 sf 72.78% Impervious Runoff Depth=6.09"
Tc=5.0 min CN=93 Runoff=4.81 cfs 15,622 cf

Subcatchment5: Subcat 5 Runoff Area=46,548 sf 94.88% Impervious Runoff Depth=6.68"
Tc=5.0 min CN=98 Runoff=7.51 cfs 25,916 cf

Subcatchment6: Subcat 6 Runoff Area=110,009 sf 6.70% Impervious Runoff Depth=5.06"
Tc=11.8 min CN=84 Runoff=12.15 cfs 46,423 cf

Subcatchment7: Subcat 7 Runoff Area=8,563 sf 0.00% Impervious Runoff Depth=1.71"
Tc=5.0 min CN=51 Runoff=0.36 cfs 1,221 cf

Subcatchment8: Subcat 8 Runoff Area=25,260 sf 59.64% Impervious Runoff Depth=4.73"
Tc=5.0 min CN=81 Runoff=3.29 cfs 9,958 cf

Pond 5P: MH Peak Elev=23.78' Inflow=0.00 cfs 0 cf
15.0" Round Culvert n=0.011 L=105.7' S=0.0157 'l' Outflow=0.00 cfs 0 cf

Pond 7P: Pond Peak Elev=26.00' Storage=39,489 cf Inflow=17.61 cfs 173,810 cf
Discarded=9.05 cfs 173,810 cf Primary=0.00 cfs 0 cf Outflow=9.05 cfs 173,810 cf

Link 4L: West Off-Site Inflow=12.15 cfs 46,423 cf
Primary=12.15 cfs 46,423 cf

Link 5L: North Off-Site Inflow=0.36 cfs 1,221 cf
Primary=0.36 cfs 1,221 cf

Link 6L: Allyn's Pond Inflow=39.61 cfs 223,931 cf
Primary=39.61 cfs 223,931 cf

Total Runoff Area = 1,395,041 sf Runoff Volume = 445,385 cf Average Runoff Depth = 3.83"
65.89% Pervious = 919,129 sf 34.11% Impervious = 475,912 sf

New Conditions

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Type III 24-hr 50-yr Rainfall=6.92"

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Page 6

Summary for Pond 7P: Pond

Inflow Area = 701,507 sf, 21.72% Impervious, Inflow Depth = 2.97" for 50-yr event
Inflow = 17.61 cfs @ 12.07 hrs, Volume= 173,810 cf
Outflow = 9.05 cfs @ 13.48 hrs, Volume= 173,810 cf, Atten= 49%, Lag= 84.5 min
Discarded = 9.05 cfs @ 13.48 hrs, Volume= 173,810 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond 5P : MH

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 26.00' @ 13.48 hrs Surf.Area= 14,601 sf Storage= 39,489 cf
Flood Elev= 28.00' Surf.Area= 18,164 sf Storage= 72,263 cf

Plug-Flow detention time= 41.6 min calculated for 173,810 cf (100% of inflow)
Center-of-Mass det. time= 41.6 min (903.6 - 862.0)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|--|
| #1 | 22.00' | 91,334 cf | Custom Stage Data (Irregular) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---------------------|----------------------|------------------|---------------------------|---------------------------|---------------------|
| 22.00 | 3,818 | 277.4 | 0 | 0 | 3,818 |
| 24.00 | 10,911 | 519.5 | 14,122 | 14,122 | 19,192 |
| 26.00 | 14,610 | 578.4 | 25,431 | 39,553 | 24,453 |
| 28.00 | 18,164 | 637.0 | 32,710 | 72,263 | 30,250 |
| 29.00 | 19,992 | 657.3 | 19,071 | 91,334 | 32,439 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|---|
| #1 | Discarded | 22.00' | 12.560 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 13.25' |
| #2 | Primary | 24.90' | 15.0" Round Culvert L= 171.0' Ke= 0.500 Inlet / Outlet Invert= 24.90' / 23.83' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf |
| #3 | Device 2 | 28.00' | 48.0" x 36.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads |

Discarded OutFlow Max=9.05 cfs @ 13.48 hrs HW=26.00' (Free Discharge)

↑ **1=Exfiltration** (Controls 9.05 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=22.00' (Free Discharge)

↑ **2=Culvert** (Controls 0.00 cfs)

↑ **3=Orifice/Grate** (Controls 0.00 cfs)

New Conditions

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Type III 24-hr 100-yr Rainfall=7.74"

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Page 11

Time span=0.00-96.00 hrs, dt=0.01 hrs, 9601 points

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN

Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: Subcat 1 Runoff Area=247,789 sf 91.57% Impervious Runoff Depth=7.38"
Tc=28.5 min CN=97 Runoff=25.33 cfs 152,407 cf

Subcatchment2: Subcat 2 Runoff Area=327,174 sf 27.28% Impervious Runoff Depth=3.91"
Tc=9.0 min UI Adjusted CN=67 Runoff=30.99 cfs 106,508 cf

Subcatchment3: Subcat 3 Runoff Area=598,927 sf 11.81% Impervious Runoff Depth=3.03"
Flow Length=1,055' Tc=57.1 min UI Adjusted CN=59 Runoff=19.21 cfs 151,333 cf

Subcatchment4: Subcat 4 Runoff Area=30,771 sf 72.78% Impervious Runoff Depth=6.90"
Tc=5.0 min CN=93 Runoff=5.41 cfs 17,706 cf

Subcatchment5: Subcat 5 Runoff Area=46,548 sf 94.88% Impervious Runoff Depth=7.50"
Tc=5.0 min CN=98 Runoff=8.41 cfs 29,094 cf

Subcatchment6: Subcat 6 Runoff Area=110,009 sf 6.70% Impervious Runoff Depth=5.85"
Tc=11.8 min CN=84 Runoff=13.95 cfs 53,592 cf

Subcatchment7: Subcat 7 Runoff Area=8,563 sf 0.00% Impervious Runoff Depth=2.19"
Tc=5.0 min CN=51 Runoff=0.48 cfs 1,566 cf

Subcatchment8: Subcat 8 Runoff Area=25,260 sf 59.64% Impervious Runoff Depth=5.50"
Tc=5.0 min CN=81 Runoff=3.81 cfs 11,572 cf

Pond 5P: MH Peak Elev=23.78' Inflow=0.00 cfs 0 cf
15.0" Round Culvert n=0.011 L=105.7' S=0.0157 'l' Outflow=0.00 cfs 0 cf

Pond 7P: Pond Peak Elev=26.88' Storage=53,137 cf Inflow=20.96 cfs 209,705 cf
Discarded=10.43 cfs 209,705 cf Primary=0.00 cfs 0 cf Outflow=10.43 cfs 209,705 cf

Link 4L: West Off-Site Inflow=13.95 cfs 53,592 cf
Primary=13.95 cfs 53,592 cf

Link 5L: North Off-Site Inflow=0.48 cfs 1,566 cf
Primary=0.48 cfs 1,566 cf

Link 6L: Allyn's Pond Inflow=46.56 cfs 258,916 cf
Primary=46.56 cfs 258,916 cf

Total Runoff Area = 1,395,041 sf Runoff Volume = 523,779 cf Average Runoff Depth = 4.51"
65.89% Pervious = 919,129 sf 34.11% Impervious = 475,912 sf

New Conditions

Prepared by Loureiro Engineering Assoc, Inc

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Type III 24-hr 100-yr Rainfall=7.74"

Printed 6/21/2023

Page 7

Summary for Pond 7P: Pond

Inflow Area = 701,507 sf, 21.72% Impervious, Inflow Depth = 3.59" for 100-yr event
Inflow = 20.96 cfs @ 12.76 hrs, Volume= 209,705 cf
Outflow = 10.43 cfs @ 13.53 hrs, Volume= 209,705 cf, Atten= 50%, Lag= 46.2 min
Discarded = 10.43 cfs @ 13.53 hrs, Volume= 209,705 cf
Primary = 0.00 cfs @ 0.00 hrs, Volume= 0 cf
Routed to Pond 5P : MH

Routing by Stor-Ind method, Time Span= 0.00-96.00 hrs, dt= 0.01 hrs
Peak Elev= 26.88' @ 13.53 hrs Surf.Area= 16,133 sf Storage= 53,137 cf
Flood Elev= 28.00' Surf.Area= 18,164 sf Storage= 72,263 cf

Plug-Flow detention time= 50.2 min calculated for 209,705 cf (100% of inflow)
Center-of-Mass det. time= 50.2 min (909.5 - 859.3)

| Volume | Invert | Avail.Storage | Storage Description |
|--------|--------|---------------|--|
| #1 | 22.00' | 91,334 cf | Custom Stage Data (Irregular) Listed below (Recalc) |

| Elevation (feet) | Surf.Area (sq-ft) | Perim. (feet) | Inc.Store (cubic-feet) | Cum.Store (cubic-feet) | Wet.Area (sq-ft) |
|---------------------|----------------------|------------------|---------------------------|---------------------------|---------------------|
| 22.00 | 3,818 | 277.4 | 0 | 0 | 3,818 |
| 24.00 | 10,911 | 519.5 | 14,122 | 14,122 | 19,192 |
| 26.00 | 14,610 | 578.4 | 25,431 | 39,553 | 24,453 |
| 28.00 | 18,164 | 637.0 | 32,710 | 72,263 | 30,250 |
| 29.00 | 19,992 | 657.3 | 19,071 | 91,334 | 32,439 |

| Device | Routing | Invert | Outlet Devices |
|--------|-----------|--------|---|
| #1 | Discarded | 22.00' | 12.560 in/hr Exfiltration over Wetted area Conductivity to Groundwater Elevation = 13.25' |
| #2 | Primary | 24.90' | 15.0" Round Culvert L= 171.0' Ke= 0.500 Inlet / Outlet Invert= 24.90' / 23.83' S= 0.0063 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 1.23 sf |
| #3 | Device 2 | 28.00' | 48.0" x 36.0" Horiz. Orifice/Grate X 2.00 C= 0.600 Limited to weir flow at low heads |

Discarded OutFlow Max=10.43 cfs @ 13.53 hrs HW=26.88' (Free Discharge)

↑ **1=Exfiltration** (Controls 10.43 cfs)

Primary OutFlow Max=0.00 cfs @ 0.00 hrs HW=22.00' (Free Discharge)

↑ **2=Culvert** (Controls 0.00 cfs)

↑ **3=Orifice/Grate** (Controls 0.00 cfs)

APPENDIX E

Water Quality Volume and Water Quality Flow Calculations

Water Quality Volume and Water Quality Flow Worksheet

Watershed: Developed Site (DA-4, DA-5, DA-8)

Condition: Proposed

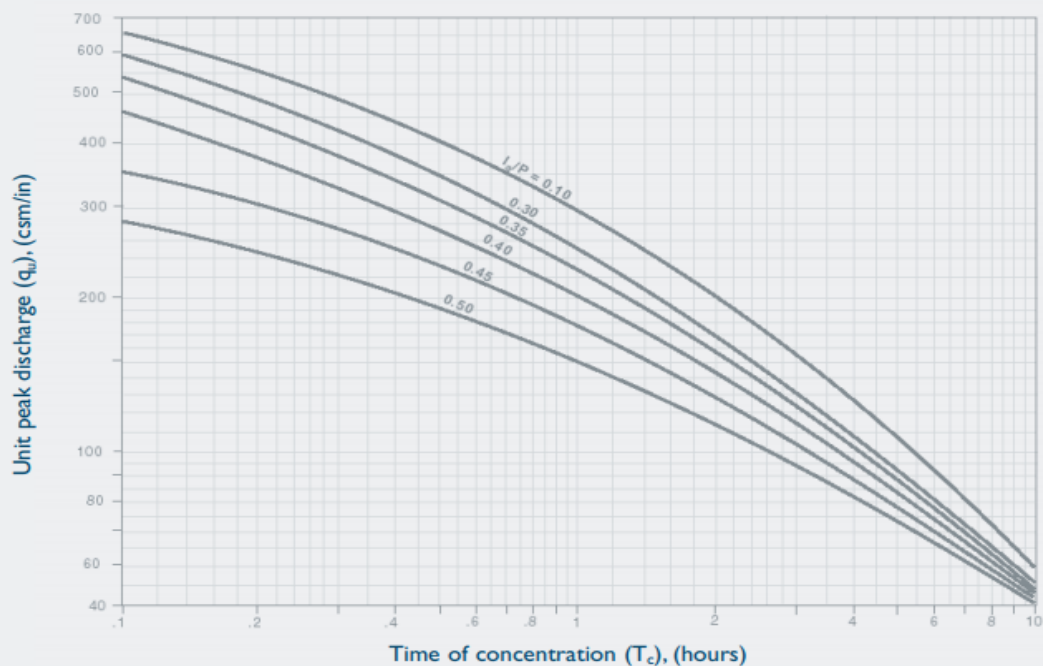
Water Quality Volume

| | | |
|-----------------------------------|-------|-------|
| Design Precipitation, P: | 1 | in |
| Percent Impervious Cover, I: | 80% | |
| Volumetric Runoff Coefficient, R: | 0.766 | |
| Area, A: | 2.35 | acres |
| Water Quality Volume, WQV: | 6,535 | C.F. |

Water Quality Flow

| | | |
|--|---------|-----------------------------------|
| Runoff Depth, Q: | 0.766 | in |
| Runoff Curve Number, CN: | 98 | |
| Time of Concentration, T _c : (>=10 min) | 10.0 | min |
| Time of Concentration, T _c : | 0.167 | hr |
| Initial Abstraction, I _a : | 0.041 | in |
| I _a /P: | 0.041 | |
| Unit Peak Discharge, q _u : | 600 | csn/in (from Exhibit 4-111 below) |
| Area, A: | 0.00367 | mi ² |
| Water Quality Flow, WQF: | 1.69 | cfs |

Exhibit 4-111 Unit peak discharge (q_u) for NRCS (SCS) type III rainfall distribution



Water Quality Volume and Water Quality Flow Worksheet

Watershed: Hydrodynamic Separator #1 (DA-4)

Condition: Proposed

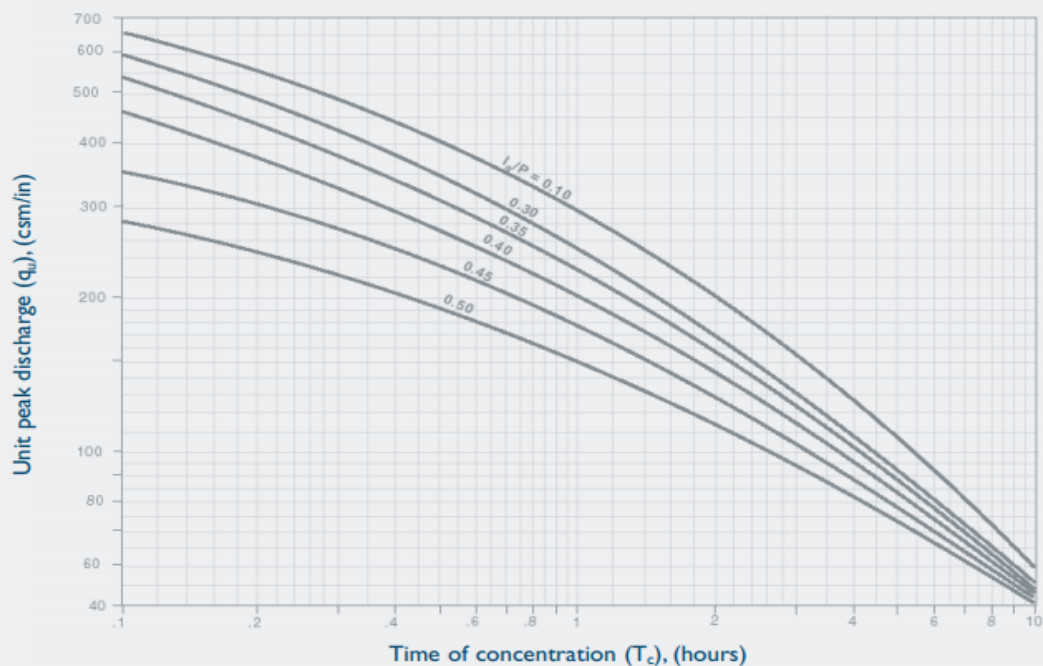
Water Quality Volume

| | | |
|-----------------------------------|-------|-------|
| Design Precipitation, P: | 1 | in |
| Percent Impervious Cover, I: | 73% | |
| Volumetric Runoff Coefficient, R: | 0.705 | |
| Area, A: | 0.70 | acres |
| Water Quality Volume, WQV: | 1,791 | C.F. |

Water Quality Flow

| | | |
|--|---------|-----------------------------------|
| Runoff Depth, Q: | 0.705 | in |
| Runoff Curve Number, CN: | 97 | |
| Time of Concentration, T _c : (>=10 min) | 10.0 | min |
| Time of Concentration, T _c : | 0.167 | hr |
| Initial Abstraction, I _a : | 0.062 | in |
| I _a /P: | 0.062 | |
| Unit Peak Discharge, q _u : | 600 | csn/in (from Exhibit 4-111 below) |
| Area, A: | 0.00109 | mi ² |
| Water Quality Flow, WQF: | 0.46 | cfs |

Exhibit 4-111 Unit peak discharge (q_u) for NRCS (SCS) type III rainfall distribution



Water Quality Volume and Water Quality Flow Worksheet

Watershed: Hydrodynamic Separator #2 (DA-5)

Condition: Proposed

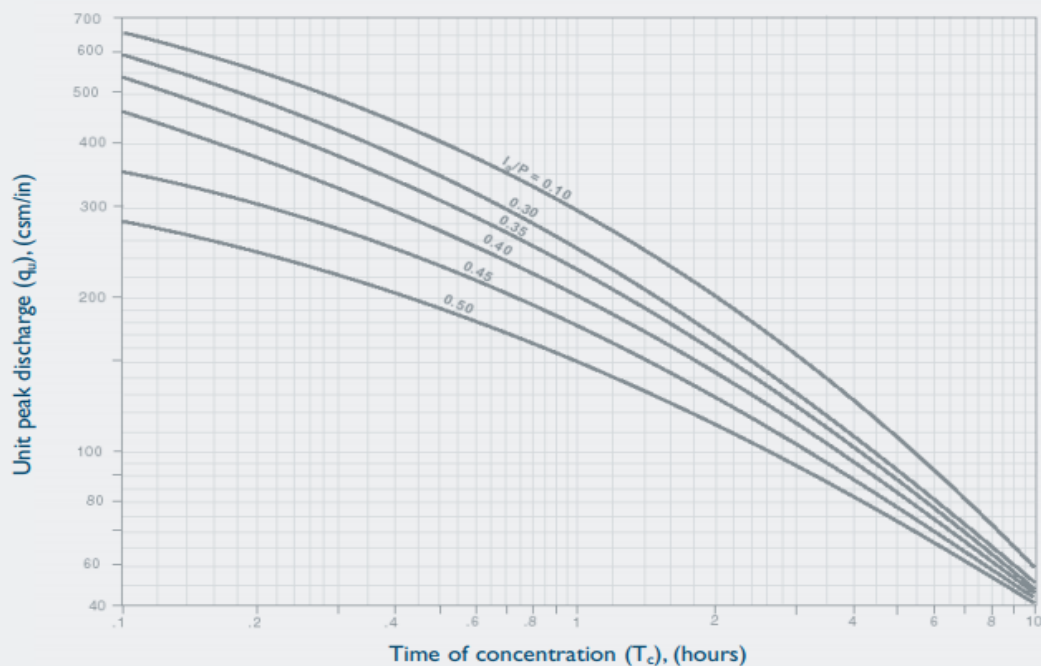
Water Quality Volume

| | | |
|-----------------------------------|-------|-------|
| Design Precipitation, P: | 1 | in |
| Percent Impervious Cover, I: | 95% | |
| Volumetric Runoff Coefficient, R: | 0.904 | |
| Area, A: | 1.07 | acres |
| Water Quality Volume, WQV: | 3,511 | C.F. |

Water Quality Flow

| | | |
|--|---------|-----------------------------------|
| Runoff Depth, Q: | 0.904 | in |
| Runoff Curve Number, CN: | 99 | |
| Time of Concentration, T _c : (>=10 min) | 10.0 | min |
| Time of Concentration, T _c : | 0.167 | hr |
| Initial Abstraction, I _a : | 0.041 | in |
| I _a /P: | 0.041 | |
| Unit Peak Discharge, q _u : | 600 | csn/in (from Exhibit 4-111 below) |
| Area, A: | 0.00167 | mi ² |
| Water Quality Flow, WQF: | 0.91 | cfs |

Exhibit 4-111 Unit peak discharge (q_u) for NRCS (SCS) type III rainfall distribution



APPENDIX F

Hydrodynamic Separator calculations

Hydrodynamic Separation Product Calculator

Gales Ferry Intermodal LLC

HDS #1

CASCADE SEPARATOR CS-3

Project Information

| | | | | | |
|--------------|----------------------------|-------|-------------|----------|-------------|
| Project Name | Gales Ferry Intermodal LLC | | | Option # | A |
| Country | UNITED_STATES | State | Connecticut | City | Gales Ferry |

Contact Information

| | | | |
|------------|---------------------------------------|-----------|--------------|
| First Name | Susan | Last Name | Marquardt |
| Company | Loureiro Engineering Associates, Inc. | Phone # | 860-448-0400 |
| Email | srmarquardt@loureiro.com | | |

Design Criteria

| | | | | | |
|--------------------------------------|---------|-------------------------|-------|--------------------|---------------------|
| Site Designation | HDS #1 | | | Sizing Method | Treatment Flow Rate |
| Screening Required? | No | Treatment Flow Rate | 0.46 | Peak Flow (cfs) | 5.41 |
| Groundwater Depth (ft) | 10 - 15 | Pipe Invert Depth (ft) | 0 - 5 | Bedrock Depth (ft) | 10 - 15 |
| Multiple Inlets? | No | Grate Inlet Required? | Yes | Pipe Size (in) | 12.00 |
| Required Particle Size Distribution? | No | 90° between two inlets? | N/A | | |

Treatment Selection

| | | | | | |
|----------------|-------------------|----------------------------------|------|--|--|
| Treatment Unit | CASCADE SEPARATOR | System Model | CS-3 | | |
| Target Removal | 80% | Particle Size Distribution (PSD) | 250 | | |

Hydrodynamic Separation Product Calculator

Gales Ferry Intermodal LLC

HDS #2

CASCADE SEPARATOR CS-4

Project Information

| | | | | | |
|--------------|----------------------------|-------|-------------|----------|-------------|
| Project Name | Gales Ferry Intermodal LLC | | | Option # | A |
| Country | UNITED_STATES | State | Connecticut | City | Gales Ferry |

Contact Information

| | | | |
|------------|---------------------------------------|-----------|--------------|
| First Name | Susan | Last Name | Marquardt |
| Company | Loureiro Engineering Associates, Inc. | Phone # | 860-448-0400 |
| Email | srmarquardt@loureiro.com | | |

Design Criteria

| | | | | | |
|--------------------------------------|---------|-------------------------|-------|--------------------|---------------------|
| Site Designation | HDS #2 | | | Sizing Method | Treatment Flow Rate |
| Screening Required? | No | Treatment Flow Rate | 0.91 | Peak Flow (cfs) | 8.41 |
| Groundwater Depth (ft) | 10 - 15 | Pipe Invert Depth (ft) | 0 - 5 | Bedrock Depth (ft) | 10 - 15 |
| Multiple Inlets? | No | Grate Inlet Required? | Yes | Pipe Size (in) | 12.00 |
| Required Particle Size Distribution? | No | 90° between two inlets? | N/A | | |

Treatment Selection

| | | | | | |
|----------------|-------------------|----------------------------------|------|--|--|
| Treatment Unit | CASCADE SEPARATOR | System Model | CS-4 | | |
| Target Removal | 80% | Particle Size Distribution (PSD) | 250 | | |

APPENDIX G

Stormwater Management Maintenance Program and Inspection Checklist

Stormwater Management System Maintenance Program

There shall be periodic maintenance of the stormwater systems on the property after installation. In order to ensure effective performance of the system, the following stormwater maintenance program has been established. The property owner will be responsible for implementation of this program. A log and schedule of all inspections, cleanings, and repairs shall be maintained by the property owner. All maintenance documents shall be transferred to any future owners upon sale or transfer of the property.

A. Catch basins/Manholes

Catch basins are designed with sumps for the purpose of collecting coarse sediment. All catch basins should be inspected two times per year, specifically during times for high levels of maintenance around the site. Sediment should be removed when it extends to within 6 inches of the outlet pipe invert or not less than once per year. Cleanout should be facilitated via vacuum truck or other means that accomplish sediment removal. The sediment shall be disposed of in an approved off-site location in accordance with town and state requirements.

B. Asphalt

Asphalt areas should be swept annually. Ideal sweeping timeframe is in the spring after winter sanding or salting for deicing. Deicing chemicals should be kept to a minimum during the winter months.

C. Infiltration basin

The infiltration basin be inspected twice per year. Inspections shall include the following:

- Check for sediment accumulation, trash, and debris.
- Check for blockages, structural integrity, and evidence of erosion at inlets, outlets, and overflow spillways;
- Check that the trash rack at the low-level outlet is clear and the outlet is functioning properly;

Regular maintenance includes the following:

- Prune trees and shrubs as needed.
- Inspect soil and repair eroded areas seasonally or as necessary.
- Remove any invasive species (including roots) that have become established within the basin and embankments.
- Sediment removal should occur at a minimum of every five years or before the sediment storage capacity has been filled.

D. Lawn and vegetated areas

Vegetated cover shall be maintained on all earth surfaces to minimize soil erosion. Fertilizer use should be minimized and applied using careful application processes.

E. Hydrodynamic Separator (Stormceptor)

Stormwater Management System Maintenance Checklist

The hydrodynamic separator shall be inspected and maintained during catch basin inspections and cleaning. An inspection is made by checking the depth of sediment in each manhole with a grade stick or similar device. Maintenance is required when the sediment depth exceeds 20 inches.

Minimum inspection is recommended twice a year to maintain operation and function of the unit.

Maintenance Instructions:

1. Remove the manhole cover to provide access to the pollutant storage. Pollutants are stored in the sump, below the bowl assembly visible from the surface. Access this area through the 10" diameter access cylinder.
2. Use a vacuum truck or other similar equipment to remove all water, debris, oils and sediment.
3. Use a high-pressure hose to clean the manhole of all the remaining sediment and debris. Then, use the vacuum truck to remove the water.
4. Fill the cleaned manhole with water until the level reaches the invert of the outlet pipe.
5. Replace the manhole cover.
6. Dispose of the polluted water, oils, sediment and trash at an approved facility.
 - Check with the local sewer authority for authority to discharge the liquid.

1761 Route 12, Gales Ferry,CT

Stormwater Management System Maintenance Checklist

Inspection Date: _____

Inspector: _____

| Maintenance Item | Satisfactory | Unsatisfactory | Comments |
|---|--------------|----------------|----------|
| Drainage Structures | | | |
| Sedimentation Accumulation | | | |
| Large Floating Debris | | | |
| Inlet/Outlet | | | |
| Structure walls | | | |
| Riser | | | |
| Frame and Cover | | | |
| Infiltration System | | | |
| Settling Over System | | | |
| Sedimentation Accumulation | | | |
| Large Floating Debris | | | |
| Inspection Structure Integrity | | | |
| Inspection Inlets/Outlets | | | |
| Surrounding Lawn and Vegetated Areas | | | |
| Signs of Erosion | | | |
| Ponding/Settling | | | |
| Overgrowth | | | |

Additional Comments: _____
