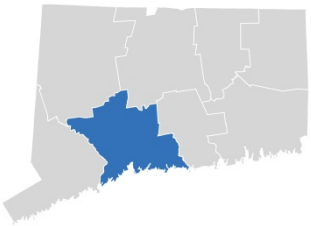
FLOOD INSURANCE STUDY

FEDERAL EMERGENCY MANAGEMENT AGENCY

VOLUME 1 OF 9



NEW HAVEN COUNTY, CONNECTICUT

(ALL JURISDICTIONS)

COMMUNITY NAME	NUMBER
CITY OF ANSONIA	090071
TOWN OF BEACON FALLS	090072
TOWN OF BETHANY	090144
TOWN OF BRANFORD	090073
TOWN OF CHESHIRE	090074
CITY OF DERBY	090075
TOWN OF EAST HAVEN	090076
TOWN OF GUILFORD	090077
TOWN OF HAMDEN	090078
TOWN OF MADISON	090079
CITY OF MERIDEN	090081
TOWN OF MIDDLEBURY	090080
CITY OF MILFORD	090082
BOROUGH OF NAUGATUCK	090137
CITY OF NEW HAVEN	090084
TOWN OF NORTH BRANFORD	090085
TOWN OF NORTH HAVEN	090086
TOWN OF ORANGE	090087
TOWN OF OXFORD	090150

COMMUNITY NAME	NUMBER
TOWN OF PROSPECT	090151
TOWN OF SEYMOUR	090088
TOWN OF SOUTHBURY	090089
TOWN OF WALLINGFORD	090090
CITY OF WATERBURY	090091
CITY OF WEST HAVEN	090092
TOWN OF WOLCOTT	090093
TOWN OF WOODBRIDGE	090153
BOROUGH OF WOODMONT	090168

PRELIMINARY:

AUGUST 10, 2015

FLOOD INSURANCE STUDY NUMBER
09009CV001D

Version Number 2.3.3.2

FEMA

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Published Separately

Flood Insurance Rate Map (FIRM)

FLOOD INSURANCE STUDY REPORT
NEW HAVEN COUNTY, CONNECTICUT

SECTION 1.0 – INTRODUCTION

1.1 The National Flood Insurance Program

The National Flood Insurance Program (NFIP) is a voluntary Federal program that enables property owners in participating communities to purchase insurance protection against losses from flooding. This insurance is designed to provide an insurance alternative to disaster assistance to meet the escalating costs of repairing damage to buildings and their contents caused by floods.

For decades, the national response to flood disasters was generally limited to constructing flood-control works such as dams, levees, sea-walls, and the like, and providing disaster relief to flood victims. This approach did not reduce losses nor did it discourage unwise development. In some instances, it may have actually encouraged additional development. To compound the problem, the public generally could not buy flood coverage from insurance companies, and building techniques to reduce flood damage were often overlooked.

In the face of mounting flood losses and escalating costs of disaster relief to the general taxpayers, the U.S. Congress created the NFIP. The intent was to reduce future flood damage through community floodplain management ordinances, and provide protection for property owners against potential losses through an insurance mechanism that requires a premium to be paid for the protection.

The U.S. Congress established the NFIP on August 1, 1968, with the passage of the National Flood Insurance Act of 1968. The NFIP was broadened and modified with the passage of the Flood Disaster Protection Act of 1973 and other legislative measures. It was further modified by the National Flood Insurance Reform Act of 1994 and the Flood Insurance Reform Act of 2004. The NFIP is administered by the Federal Emergency Management Agency (FEMA), which is a component of the Department of Homeland Security (DHS).

Participation in the NFIP is based on an agreement between local communities and the Federal Government. If a community adopts and enforces floodplain management regulations to reduce future flood risks to new construction and substantially improved structures in Special Flood Hazard Areas (SFHAs), the Federal Government will make flood insurance available within the community as a financial protection against flood losses. The community's floodplain management regulations must meet or exceed criteria established in accordance with Title 44 Code of Federal Regulations (CFR) Part 60.3, *Criteria for land Management and Use*.

SFHAs are delineated on the community's Flood Insurance Rate Maps (FIRMs). Under the NFIP, buildings that were built before the flood hazard was identified on the community's FIRMs are generally referred to as "Pre-FIRM" buildings. When the NFIP was created, the U.S. Congress recognized that insurance for Pre-FIRM buildings would be prohibitively expensive if the premiums were not subsidized by the Federal Government. Congress also recognized that most of these floodprone buildings were built by individuals who did not have sufficient knowledge of the flood hazard to make informed decisions. The NFIP requires that full actuarial rates reflecting the complete flood risk be charged on all buildings constructed or substantially improved on or after

the effective date of the initial FIRM for the community or after December 31, 1974, whichever is later. These buildings are generally referred to as "Post-FIRM" buildings.

1.2 Purpose of this Flood Insurance Study Report

This Flood Insurance Study (FIS) report revises and updates information on the existence and severity of flood hazards for the study area. The studies described in this report developed flood hazard data that will be used to establish actuarial flood insurance rates and to assist communities in efforts to implement sound floodplain management.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive than the minimum Federal requirements. Contact your State NFIP Coordinator to ensure that any higher State standards are included in the community's regulations.

1.3 Jurisdictions Included in the Flood Insurance Study Project

This FIS Report covers the entire geographic area of New Haven County, Connecticut.

The jurisdictions that are included in this project area, along with the Community Identification Number (CID) for each community and the 8-digit Hydrologic Unit Codes (HUC-8) sub-basins affecting each, are shown in Table 1. The Flood Insurance Rate Map (FIRM) panel numbers that affect each community are listed. If the flood hazard data for the community is not included in this FIS Report, the location of that data is identified.

The location of flood hazard data for participating communities in multiple jurisdictions is also indicated in the table.

Jurisdictions that have no identified SFHAs as of the effective date of this study are indicated in the table. Changed conditions in these communities (such as urbanization or annexation) or the availability of new scientific or technical data about flood hazards could make it necessary to determine SFHAs in these jurisdictions in the future.

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s) *(all prefixed by 09009C)*	If Not Included, Location of Flood Hazard Data
City of Ansonia	090071	01100004, 01100005	0401, 0402, 0403, 0404, 0406, 0408	
Town of Beacon Falls	090072	01100005	0254, 0256, 0258, 0259, 0262, 0264, 0266, 0267	
Town of Bethany	090144	01100004, 01100005	0257, 0259, 0266, 0267, 0268, 0269, 0276, 0280, 0290	
Town of Branford	090073	01100004	0454, 0458, 0459, 0461, 0462, 0463, 0464, 0466, 0467, 0468, 0469, 0486, 0488, 0576, 0577, 0581, 0582, 0601	

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s) *(all prefixed by 09009C)*	If Not Included, Location of Flood Hazard Data
Town of Cheshire	090074	01100004, 01100005	0134, 0136, 0137, 0138, 0139, 0141, 0142, 0143, 0144, 0161, 0163, 0280, 0281, 0282, 0283, 0284, 0301, 0303	
City of Derby	090075	01100004, 01100005	0401, 0403, 0404, 0408, 0412, 0416	
Town of East Haven	090076	01100004	0442, 0444, 0452, 0453, 0454, 0461, 0462, 0463, 0557, 0576	
Town of Guilford	090077	01080205, 01100004	0336, 0337, 0338, 0339, 0345, 0476, 0477, 0478, 0479, 0481, 0483, 0484, 0486, 0487, 0488, 0489, 0491, 0492, 0493, 0494, 0601, 0602, 0606	
Town of Hamden	090078	01100004	0280, 0283, 0284, 0290, 0291, 0292, 0293, 0294, 0303, 0311, 0426, 0427, 0429, 0431, 0432, 0433, 0434, 0451	
Town of Madison	090079	01080205, 01100004	0334, 0335, 0342, 0344, 0345, 0363, 0481, 0482, 0483, 0484, 0492, 0494, 0501, 0503, 0504, 0511, 0512, 0513, 0514, 0516, 0518, 0631	
City of Meriden	090081	01080205, 01100004	0155[1], 0160, 0161, 0162, 0163, 0164, 0166, 0167, 0168, 0169, 0190, 0306, 0307, 0330	
Town of Middlebury	090080	01100005	0095, 0103, 0104, 0111, 0112, 0113, 0114, 0231, 0232, 0251	
City of Milford	090082	01100004, 01100005	0414, 0418, 0419, 0526, 0527, 0528, 0529, 0531, 0532, 0533, 0534, 0536, 0537, 0551	
Borough of Naugatuck	090137	01100005	0113, 0114, 0118, 0119, 0251, 0252, 0254, 0256, 0257, 0258, 0259	
City of New Haven	090084	01100004	0426, 0427, 0428, 0429, 0433, 0434, 0436, 0437, 0439, 0441, 0442, 0443, 0444, 0453, 0461, 0557	
Town of North Branford	090085	01080205, 01100004	0314, 0316, 0317, 0318, 0319, 0336, 0338, 0452, 0454, 0456, 0457, 0458, 0459, 0467, 0476, 0478, 0486	
Town of North Haven	090086	01100004	0292, 0294, 0311, 0312, 0313, 0314, 0431, 0432, 0434, 0451, 0452, 0453, 0454	

[1] Panel not printed

Table 1: Listing of NFIP Jurisdictions

Community	CID	HUC-8 Sub-Basin(s)	Located on FIRM Panel(s) *(all prefixed by 09009C)*	If Not Included, Location of Flood Hazard Data
Town of Orange	090087	01100004, 01100005	0408, 0409, 0412, 0414, 0416, 0417, 0418, 0419, 0428, 0436, 0438, 0532, 0551	
Town of Oxford	090150	01100005	0231, 0232, 0233, 0234, 0237, 0239, 0241, 0242, 0243, 0244, 0251, 0252, 0253, 0254, 0261, 0262, 0263, 0264, 0382	
Town of Prospect	090151	01100004, 01100005	0119, 0136, 0138, 0139, 0143, 0257, 0276, 0280, 0281	
Town of Seymour	090088	01100005	0244, 0262, 0263, 0264, 0266, 0268, 0382, 0401, 0402, 0406	
Town of Southbury	090089	01100005	0065, 0070, 0088, 0089, 0095, 0205, 0206, 0207, 0208, 0209, 0217, 0226, 0227, 0228, 0229[1], 0231, 0232, 0233, 0236, 0237, 0241	
Town of Wallingford	090090	01080205, 01100004	0163, 0164, 0168, 0284, 0301, 0302, 0303, 0304, 0306, 0307, 0308, 0309, 0311, 0312, 0314, 0316, 0317, 0318, 0330, 0336	
City of Waterbury	090091	01100004, 01100005	0104, 0106, 0107, 0108, 0109, 0112, 0114, 0116, 0117, 0118, 0119, 0128, 0136, 0137, 0138	
City of West Haven	090092	01100004	0428, 0436, 0437, 0438, 0439, 0443, 0551, 0552	
Town of Wolcott	090093	01080207, 01100004, 01100005	0020[1], 0040, 0045[1], 0107, 0109, 0126, 0127, 0128, 0129, 0135, 0136, 0137	
Town of Woodbridge	090153	01100004, 01100005	0268, 0269, 0290, 0406, 0407, 0408, 0409, 0417, 0426, 0428	
Borough of Woodmont	090168	01100004	0532, 0551	

[1] Panel not printed

1.4 Considerations for using this Flood Insurance Study Report

The NFIP encourages State and local governments to implement sound floodplain management programs. To assist in this endeavor, each FIS Report provides floodplain data, which may include a combination of the following: 10-, 4-, 2-, 1-, and 0.2-percent annual chance flood elevations (the 1% annual chance flood elevation is also referred to as the Base Flood Elevation

(BFE)); delineations of the 1% annual chance and 0.2% annual chance floodplains; and 1% annual chance floodway. This information is presented on the FIRM and/or in many components of the FIS Report, including Flood Profiles, Floodway Data tables, Summary of Non-Coastal Stillwater Elevations tables, and Coastal Transect Parameters tables (not all components may be provided for a specific FIS).

This section presents important considerations for using the information contained in this FIS Report and the FIRM, including changes in format and content. Figures 1, 2, and 3 present information that applies to using the FIRM with the FIS Report.

- Part or all of this FIS Report may be revised and republished at any time. In addition, part of this FIS Report may be revised by a Letter of Map Revision (LOMR), which does not involve republication or redistribution of the FIS Report. Refer to Section 6.5 of this FIS Report for information about the process to revise the FIS Report and/or FIRM.

  It is, therefore, the responsibility of the user to consult with community officials by contacting the community repository to obtain the most current FIS Report components. Communities participating in the NFIP have established repositories of flood hazard data for floodplain management and flood insurance purposes. Community map repository addresses are provided in Table 31, "Map Repositories," within this FIS Report.

- New FIS Reports are frequently developed for multiple communities, such as entire counties. A countywide FIS Report incorporates previous FIS Reports for individual communities and the unincorporated area of the county (if not jurisdictional) into a single document and supersedes those documents for the purposes of the NFIP.

  The initial Countywide FIS Report for New Haven County became effective on December 17, 2010. Refer to Table 28 for information about subsequent revisions to the FIRMs.

- Selected FIRM panels for the community may contain information (such as floodways and cross sections) that was previously shown separately on the corresponding Flood Boundary and Floodway Map panels. In addition, former flood hazard zone designations have been changed as follows:

Old Zone	New Zone
A1 through A30	AE
V1 through V30	VE
B	X (shaded)
C	X (unshaded)

- FEMA does not impose floodplain management requirements or special insurance ratings based on Limit of Moderate Wave Action (LiMWA) delineations at this time. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. If the LiMWA is shown on the FIRM, it is being provided by FEMA as information only. For communities that do adopt Zone VE building standards in the area defined by the LiMWA, additional Community Rating System (CRS) credits are available. Refer to Section 2.5.4 for additional information about the LiMWA.

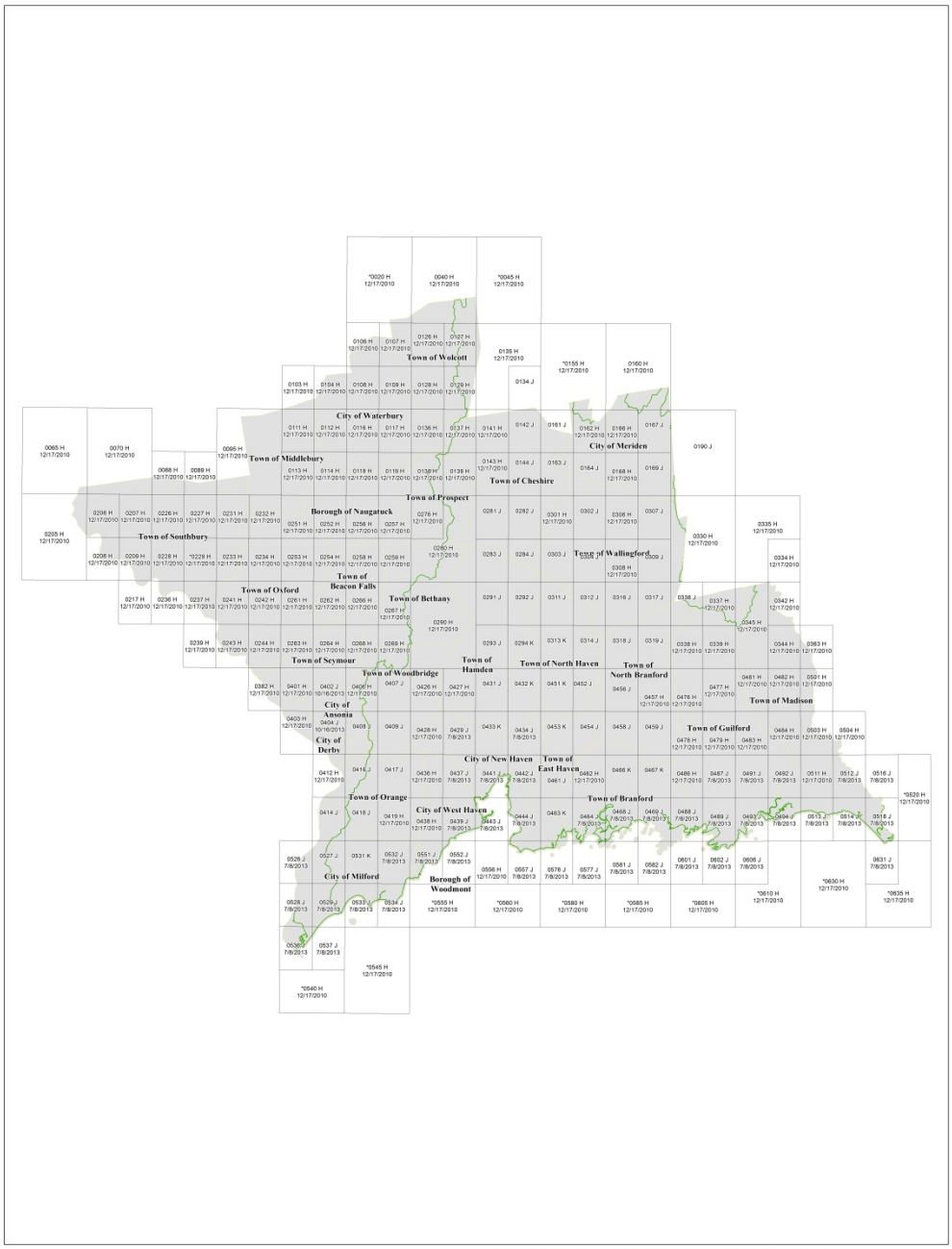
The CRS is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Visit the FEMA Web site at http://www.fema.gov or contact your appropriate FEMA Regional Office for more information about this program.

- Previous FIS Reports and FIRMs may have included levees that were accredited as reducing the risk associated with the 1% annual chance flood based on the information available and the mapping standards of the NFIP at that time. For FEMA to continue to accredit the identified levees, the levees must meet the criteria of the Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10), titled "Mapping of Areas Protected by Levee Systems."

  Since the status of levees is subject to change at any time, the user should contact the appropriate agency for the latest information regarding levees presented in Table 9 of this FIS Report. For levees owned or operated by the U.S. Army Corps of Engineers (USACE), information may be obtained from the USACE national levee database. For all other levees, the user is encouraged to contact the appropriate local community.

- FEMA has developed a *Guide to Flood Maps* (FEMA 258) and online tutorials to assist users in accessing the information contained on the FIRM. These include how to read panels and step-by-step instructions to obtain specific information. To obtain this guide and other assistance in using the FIRM, visit the FEMA Web site at http://www.fema.gov.

Figure 1: FIRM Panel Index



1 inch = 10,833 feet 1:130,000

N

0 11,000 22,000 44,000 Feet

0 2,800 5,600 11,200 Meters

Map Projection:

Western Hemisphere; Vertical Datum: NAVD 88

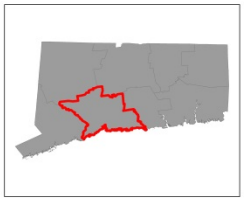
THE INFORMATION DEPICTED ON THIS MAP AND SUPPORTING DOCUMENTATION ARE ALSO AVAILABLE IN DIGITAL FORMAT AT

HTTP://MSC.FEMA.GOV

SEE FIS REPORT FOR MORE INFORMATION

* PANEL NOT PRINTED - AREA ALL IN ZONE D

** PANEL NOT PRINTED - AREA ALL IN ZONE X AND ZONE D



NATIONAL FLOOD INSURANCE PROGRAM

FLOOD INSURANCE RATE MAP INDEX

NEW HAVEN COUNTY, CT and Incorporated Areas

PANELS PRINTED:

0134, 0142, 0144, 0161, 0163, 0164, 0167, 0169, 0281, 0282, 0283, 0284, 0292, 0293, 0294, 0302, 0303, 0304, 0307, 0309, 0311, 0312, 0313, 0314, 0316, 0317, 0318, 0319, 0336, 0407, 0408, 0409, 0418, 0417, 0418, 0431, 0432, 0433, 0451, 0452, 0453, 0454, 0458, 0458, 0459, 0461, 0463, 0466, 0467, 0527, 0531, 0414, 0291, 0180, 0040, 0050, 0070, 0088, 0089, 0095, 0103, 0104, 0108, 0107, 0108, 0109, 0111, 0112, 0113, 0114, 0116, 0117, 0118, 0119, 0126, 0127, 0128, 0129, 0135, 0136, 0137, 0138, 0139, 0141, 0143, 0160, 0162, 0166, 0168, 0169, 0205, 0206, 0207, 0226, 0227, 0231, 0232, 0233, 0234, 0236, 0237, 0241, 0242, 0251, 0252, 0253, 0254, 0256, 0257, 0258, 0259, 0261, 0262, 0263, 0264, 0266, 0267, 0268, 0269, 0276, 0280, 0283, 0284, 0287, 0288, 0290, 0291, 0292, 0293, 0294, 0296, 0297, 0298, 0299, 0301, 0302, 0303, 0304, 0307, 0308, 0309, 0311, 0312, 0313, 0314, 0316, 0317, 0318, 0319, 0334, 0337, 0338, 0339, 0342, 0344, 0345, 0363, 0382, 0401, 0402, 0403, 0404, 0406, 0412, 0419, 0426, 0427, 0428, 0429, 0434, 0436, 0437, 0438, 0439, 0441, 0442, 0443, 0444, 0457, 0462, 0464, 0469, 0470, 0477, 0479, 0481, 0482, 0483, 0484, 0486, 0487, 0488, 0489, 0491, 0492, 0493, 0494, 0501, 0503, 0504, 0511, 0512, 0513, 0514, 0516, 0518, 0526, 0528, 0529, 0532, 0533, 0534, 0536, 0537, 0551, 0552, 0556, 0557, 0576, 0577, 0581, 0582, 0601, 0602, 0606, 0631.

FEMA

MAP INDEX

09009CIND0D

MAP REVISED

Figure 2: FIRM Notes to Users

NOTES TO USERS

For information and questions about this map, available products associated with this FIRM including historic versions of this FIRM, how to order products, or the National Flood Insurance Program in general, please call the FEMA Map Information eXchange at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA Map Service Center 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 website. Users may determine the current map date for each FIRM panel by visiting the FEMA Map Service Center website or by calling the FEMA Map Information eXchange.

Communities annexing land on adjacent FIRM panels must obtain a current copy of the adjacent panel as well as the current FIRM Index. These may be ordered directly from the Map Service Center at the number listed above.

For community and countywide map dates, refer to Table 28 in this FIS Report.

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

PRELIMINARY FIS REPORT: FEMA maintains information about map features, such as street locations and names, in or near designated flood hazard areas. Requests to revise information in or near designated flood hazard areas may be provided to FEMA during the community review period, at the final Consultation Coordination Officer's meeting, or during the statutory 90-day appeal period. Approved requests for changes will be shown on the final printed FIRM.

The map is for use in administering the NFIP. It may not identify all areas subject to flooding, particularly from local drainage sources of small size. Consult the community map repository to find updated or additional flood hazard information.

BASE FLOOD ELEVATIONS: For more detailed information in areas where Base Flood Elevations (BFEs) and/or floodways have been determined, consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables within this FIS Report. Use the flood elevation data within the FIS Report in conjunction with the FIRM for construction and/or floodplain management.

Coastal Base Flood Elevations shown on the map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the FIS 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 the FIRM.

FLOODWAY INFORMATION: 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 FIS Report for this jurisdiction.

Figure 2. FIRM Notes to Users

FLOOD CONTROL STRUCTURE INFORMATION: Certain areas not in Special Flood Hazard Areas may be protected by flood control structures. Refer to Section 4.3 "Non-Levee Flood Protection Measures" of this FIS Report for information on flood control structures for this jurisdiction.

PROJECTION INFORMATION: The projection used in the preparation of the map was Connecticut State Plane Zone 0600**.** The horizontal datum was NAD83, GRS1980 spheroid**.** Differences in datum, spheroid, projection or State Plane 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 the FIRM.

ELEVATION DATUM: Flood elevations on the FIRM 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

Local vertical monuments may have been used to create the map. To obtain current monument information, please contact the appropriate local community listed in Table 31 of this FIS Report.

BASE MAP INFORMATION: Base map information shown on the FIRM was provided by the State of Connecticut Department of Environmental Protection at a scale of 1:12,000 in 2004. The following panels used base map information provided by the U.S. Geological Survey at a GSD of 0.30 meter in 2012: 0134, 0142, 0144, 0161, 0163, 0164, 0167, 0169, 0190, 0281, 0282, 0283, 0284, 0291, 0292, 0293, 0294, 0302, 0303, 0304, 0307, 0309, 0311, 0312, 0313, 0314, 0316, 0317, 0318, 0319, 0336, 0407, 0408, 0409, 0414, 0416, 0417, 0418, 0431, 0432, 0433, 0451, 0452, 0453, 0454, 0456, 0458, 0459, 0461, 0463, 0466, 0467, 0527, and 0531. For information about base maps, refer to Section 6.2 “Base Map” in this FIS Report.

The map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map.

Corporate limits shown on the 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 the map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Figure 2. FIRM Notes to Users

NOTES FOR FIRM INDEX

REVISIONS TO INDEX: As new studies are performed and FIRM panels are updated within New Haven County, Connecticut, corresponding revisions to the FIRM Index will be incorporated within the FIS Report to reflect the effective dates of those panels. Please refer to Table 28 of this FIS Report to determine the most recent FIRM revision date for each community. The most recent FIRM panel effective date will correspond to the most recent index date.

SPECIAL NOTES FOR SPECIFIC FIRM PANELS

This Notes to Users section was created specifically for New Haven County, Connecticut**,** effective **December 31, 9999.**

COASTAL BARRIER RESOURCES (CBRS) NOTE: This map includes approximate boundaries of the CBRS for informational purposes only. Flood insurance is not available within CBRS areas for structures that are newly built or substantially improved on or after the date(s) indicated on the map. For more information see http://www.fws.gov/habitatconservation/coastal_barrier.html, the FIS Report, or call the U.S. Fish and Wildlife Service Customer Service Center at 1-800-344-WILD.

LIMIT OF MODERATE WAVE ACTION: Zone AE has been divided by a Limit of Moderate Wave Action (LiMWA). The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between Zone VE and the LiMWA (or between the shoreline and the LiMWA for areas where Zone VE is not identified) will be similar to, but less severe than, those in Zone VE.

ACCREDITED LEVEE NOTES TO USERS: Check with your local community to obtain more information, such as the estimated level of protection provided (which may exceed the 1-percent-annual-chance level) and Emergency Action Plan, on the levee system(s) shown as providing protection for areas on this panel. To mitigate flood risk in residual risk areas, property owners and residents are encouraged to consider flood insurance and floodproofing or other protective measures. For more information on flood insurance, interested parties should visit the FEMA Website at http://www.fema.gov/business/nfip/index.shtm.

FLOOD RISK REPORT: A Flood Risk Report (FRR) may be available for many of the flooding sources and communities referenced in this FIS Report. The FRR is provided to increase public awareness of flood risk by helping communities identify the areas within their jurisdictions that have the greatest risks. Although non-regulatory, the information provided within the FRR can assist communities in assessing and evaluating mitigation opportunities to reduce these risks. It can also be used by communities developing or updating flood risk mitigation plans. These plans allow communities to identify and evaluate opportunities to reduce potential loss of life and property. However, the FRR is not intended to be the final authoritative source of all flood risk data for a project area; rather, it should be used with other data sources to paint a comprehensive picture of flood risk.

Figure 3: Map Legend for FIRM

SPECIAL FLOOD HAZARD AREAS: *The 1% annual chance flood, also known as the base flood or 100-year flood, has a 1% chance of happening or being exceeded each year. Special Flood Hazard Areas are subject to flooding by the 1% annual chance flood. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood. 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. See note for specific types. If the floodway is too narrow to be shown, a note is shown.*

	Special Flood Hazard Areas subject to inundation by the 1% annual chance flood (Zones A, AE, AH, AO, AR, A99, V and VE)
Zone A	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. No base (1% annual chance) flood elevations (BFEs) or depths are shown within this zone.
Zone AE	The flood insurance rate zone that corresponds to the 1% annual chance floodplains. Base flood elevations derived from the hydraulic analyses are shown within this zone, either at cross section locations or as static whole-foot elevations that apply throughout the zone.
Zone AH	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot BFEs derived from the hydraulic analyses are shown at selected intervals within this zone.
Zone AO	The flood insurance rate zone that corresponds to the areas of 1% annual chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. Average whole-foot depths derived from the hydraulic analyses are shown within this zone.
Zone AR	The flood insurance rate zone that corresponds to areas that were 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	The flood insurance rate zone that corresponds to areas of the 1% annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or flood depths are shown within this zone.
Zone V	The flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations are not shown within this zone.
Zone VE	Zone VE is the flood insurance rate zone that corresponds to the 1% annual chance coastal floodplains that have additional hazards associated with storm waves. Base flood elevations derived from the coastal analyses are shown within this zone as static whole-foot elevations that apply throughout the zone.
	Regulatory Floodway determined in Zone AE.

Figure 3: Map Legend for FIRM

OTHER AREAS OF FLOOD HAZARD	
	Shaded Zone X: Areas of 0.2% annual chance flood hazards and areas of 1% annual chance flood hazards with average depths of less than 1 foot or with drainage areas less than 1 square mile.
	Future Conditions 1% Annual Chance Flood Hazard – Zone X: The flood insurance rate zone that corresponds to the 1% annual chance floodplains that are determined based on future-conditions hydrology. No base flood elevations or flood depths are shown within this zone.
	Area with Reduced Flood Risk due to Levee: Areas where an accredited levee, dike, or other flood control structure has reduced the flood risk from the 1% annual chance flood. See Notes to Users for important information.
OTHER AREAS	
	Zone D (Areas of Undetermined Flood Hazard): The flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.
NO SCREEN	Unshaded Zone X: Areas of minimal flood hazard.
FLOOD HAZARD AND OTHER BOUNDARY LINES	
(ortho) (vector)	Flood Zone Boundary (white line on ortho-photography-based mapping; gray line on vector-based mapping)
	Limit of Study
	Jurisdiction Boundary
	Limit of Moderate Wave Action (LiMWA): Indicates the inland limit of the area affected by waves greater than 1.5 feet
GENERAL STRUCTURES	
Aqueduct *Channel* *Culvert* *Storm Sewer*	Channel, Culvert, Aqueduct, or Storm Sewer
Dam *Jetty* *Weir*	Dam, Jetty, Weir
	Levee, Dike, or Floodwall accredited or provisionally accredited to reduce the flood risk from the 1% annual chance flood.
	Levee, Dike or Floodwall not accredited to reduce the flood risk from the 1% annual chance flood.
Bridge	Bridge

Figure 3: Map Legend for FIRM

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AND OTHERWISE PROTECTED AREAS (OPA): *CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas. See Notes to Users for important information.*	
CBRS AREA 09/30/2009	Coastal Barrier Resources System Area: Labels are shown to clarify where this area shares a boundary with an incorporated area or overlaps with the floodway.
OTHERWISE PROTECTED AREA 09/30/2009	Otherwise Protected Area
REFERENCE MARKERS	
22.0	River mile Markers
CROSS SECTION & TRANSECT INFORMATION	
B 20.2	Lettered Cross Section with Regulatory Water Surface Elevation (BFE)
5280 21.1	Numbered Cross Section with Regulatory Water Surface Elevation (BFE)
17.5	Unlettered Cross Section with Regulatory Water Surface Elevation (BFE)
8	Coastal Transect
	Profile Baseline: Indicates the modeled flow path of a stream and is shown on FIRM panels for all valid studies with profiles or otherwise established base flood elevation.
	Coastal Transect Baseline: Used in the coastal flood hazard model to represent the 0.0-foot elevation contour and the starting point for the transect and the measuring point for the coastal mapping.
513	Base Flood Elevation Line (shown for flooding sources for which no cross sections or profile are available)
ZONE AE (EL 16)	Static Base Flood Elevation value (shown under zone label)
ZONE AO (DEPTH 2)	Zone designation with Depth
ZONE AO (DEPTH 2) (VEL 15 FPS)	Zone designation with Depth and Velocity

Figure 3: Map Legend for FIRM

BASE MAP FEATURES	
Missouri Creek	River, Stream or Other Hydrographic Feature
234	Interstate Highway
234	U.S. Highway
234	State Highway
234	County Highway
MAPLE LANE	Street, Road, Avenue Name, or Private Drive if shown on Flood Profile
RAILROAD	Railroad
	Horizontal Reference Grid Line
	Horizontal Reference Grid Ticks
+	Secondary Grid Crosshairs
Land Grant	Name of Land Grant
7	Section Number
R. 43 W. T. 22 N.	Range, Township Number
$^{42}76^{000m}$E	Horizontal Reference Grid Coordinates (UTM)
365000 FT	Horizontal Reference Grid Coordinates (State Plane)
80° 16’ 52.5”	Corner Coordinates (Latitude, Longitude)

SECTION 2.0 – FLOODPLAIN MANAGEMENT APPLICATIONS

2.1 Floodplain Boundaries

To provide a national standard without regional discrimination, the 1% annual chance (100-year) flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2% annual chance (500-year) flood is employed to indicate additional areas of flood hazard in the community.

Each flooding source included in the project scope has been studied and mapped using professional engineering and mapping methodologies that were agreed upon by FEMA and New Haven County as appropriate to the risk level. Flood risk is evaluated based on factors such as known flood hazards and projected impact on the built environment. Engineering analyses were performed for each studied flooding source to calculate its 1% annual chance flood elevations; elevations corresponding to other floods (e.g. 10-, 4-, 2-, 0.2-percent annual chance, etc.) may have also been computed for certain flooding sources. Engineering models and methods are described in detail in Section 5.0 of this FIS Report. The modeled elevations at cross sections were used to delineate the floodplain boundaries on the FIRM; between cross sections, the boundaries were interpolated using elevation data from various sources. More information on specific mapping methods is provided in Section 6.0 of this FIS Report.

Depending on the accuracy of available topographic data (Table 23), study methodologies employed (Section 5.0), and flood risk, certain flooding sources may be mapped to show both the 1% and 0.2% annual chance floodplain boundaries, regulatory water surface elevations (BFEs), and/or a regulatory floodway. Similarly, other flooding sources may be mapped to show only the 1% annual chance floodplain boundary on the FIRM, without published water surface elevations. In cases where the 1% and 0.2% annual chance floodplain boundaries are close together, only the 1% annual chance floodplain boundary is shown on the FIRM. Figure 3, "Map Legend for FIRM", describes the flood zones that are used on the FIRMs to account for the varying levels of flood risk that exist along flooding sources within the project area. Table 2 and Table 3 indicate the flood zone designations for each flooding source and each community within New Haven County, respectively.

Table 2, "Flooding Sources Included in this FIS Report," lists each flooding source, including its study limits, affected communities, mapped zone on the FIRM, and the completion date of its engineering analysis from which the flood elevations on the FIRM and in the FIS Report were derived. Descriptions and dates for the latest hydrologic and hydraulic analyses of the flooding sources are shown in Table 13. Floodplain boundaries for these flooding sources are shown on the FIRM (published separately) using the symbology described in Figure 3. On the map, the 1% annual chance floodplain corresponds to the SFHAs. The 0.2% annual chance floodplain shows areas that, although out of the regulatory floodplain, are still subject to flood hazards.

Small areas within the floodplain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data. The procedures to remove these areas from the SFHA are described in Section 6.5 of this FIS Report.

2.2 Floodways

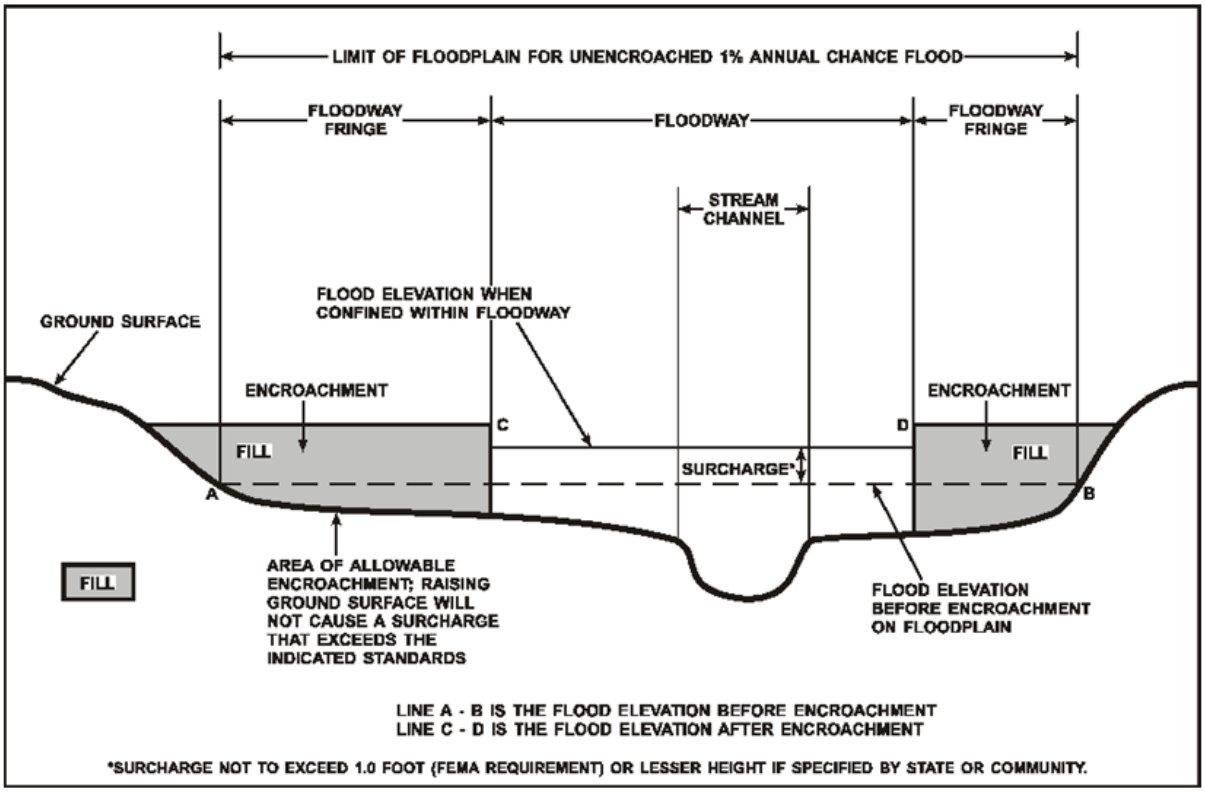
Encroachment on floodplains, such as structures and fill, reduces flood-carrying capacity, increases flood heights and velocities, and increases flood hazards in areas beyond the

encroachment itself. One aspect of floodplain management involves balancing the economic gain from floodplain development against the resulting increase in flood hazard.

For purposes of the NFIP, a floodway is used as a tool to assist local communities in balancing floodplain development against increasing flood hazard. With this approach, the area of the 1% annual chance floodplain on a river is divided into a floodway and a floodway fringe based on hydraulic modeling. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment in order to carry the 1% annual chance flood. The floodway fringe is the area between the floodway and the 1% annual chance floodplain boundaries where encroachment is permitted. The floodway must be wide enough so that the floodway fringe could be completely obstructed without increasing the water surface elevation of the 1% annual chance flood more than 1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 4.

To participate in the NFIP, Federal regulations require communities to limit increases caused by encroachment to 1.0 foot, provided that hazardous velocities are not produced. Regulations for Connecticut require communities in New Haven County to limit increases caused by encroachment to 1.0 foot. The floodways in this project are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway projects.

Figure 4: Floodway Schematic



Floodway widths presented in this FIS Report and on the FIRM were computed at cross sections.

Between cross sections, the floodway boundaries were interpolated. For certain stream segments, floodways were adjusted so that the amount of floodwaters conveyed on each side of the floodplain would be reduced equally. The results of the floodway computations have been tabulated for selected cross sections and are shown in Table 24, “Floodway Data.”

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Beacon Hill Brook	Town Of Bethany			01100005	1.8		N	A	
Beacon Hill Brook	Borough Of Naugatuck	confluence with Naugatuck River	corporate limits	01100005	3.0		Y	AE	11/1/1977
Beaver Brook				01100005	1.4		N	A	
Beaver Brook No. 1	City Of Ansonia	confluence with Naugatuck River	500 ft upstream of Water Company Drive	01100005	1.2		Y	AE	11/1/1989
Beaver Brook No. 2	City Of Milford	about 650 ft downstream of Naugatuck Avenue	150 ft upstream of Plains Rd	01100005	3.0		Y	AE	9/1/1985
Beaver Brook No. 3	City Of New Haven	confluence with WinterGreen Brook	about 4,000 ft upstream of confluence with WinterGreen Brook	01100004	0.7		Y	AE	9/1/1977
Beaver Pond Brook	City Of Waterbury	confluence with Mad River	about 950 ft upstream of Austin Rd	01100005	2.2		Y	AE	11/1/1977
Beaver Swamp Brook	Town of Branford			01100004	1.7		N	A	
Belden Brook	City Of New Haven			01100004	3.5		N	A	
Black Brook	Town Of Woodbridge			01100005	0.6		N	A	
Bladens River (Lower Reach)	Town Of Seymour	confluence with Naugatuck River	confluence with Bladens River Tributary	01100005	1.2		Y	AE	7/1/1977

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Bladens River (Upper Reach)	Town Of Woodbridge	corporate limits	about 200 ft upstream of State Route 67	01100005	2.3		Y	AE	12/1/1978
Bladens River Tributary	Town Of Seymour	confluence with Bladens River	about 450 ft upstream of Bunting Rd	01100005	0.4		Y	AE	7/1/1977
Branch Brook	Town Of Guilford			01100004	3.5		N	A	
Branford River (Lower Reach)	Town Of Branford			01100004	3.4		Y	AE	8/1/1977
Branford River (Upper Reach)	Town Of North Branford	1000 ft downstream of confluence with Munger Brook	Lake Gaillard	01100004	1.9		Y	AE	2/1/1977
Branford River	Town of Branford, Town of North Branford	approximately 900 ft downstream of East Main St, East Haven	outlet of Lake Gaillard, North Branford	01100004	5.7		Y	AE	9/1/2014
Broad Brook	Town Of Cheshire			01100004	3.1		N	A	
Bronson Brook	Town Of Beacon Falls	confluence with Naugatuck River	confluence with Bronson Brook Tributary	01100005	0.8		Y	AE	8/1/1977
Bronson Brook Tributary	Town Of Beacon Falls	confluence with Bronson Brook	600 ft upstream of Lasky Rd	01100005	1.0		Y	AE	8/1/1977
Brookdale Stream	Town Of Hamden	confluence with Eaton Brook	50 ft upstream of Still Hill Rd	01100004	0.3		Y	AE	7/1/1977
Brooksvale Stream	Town of Cheshire, Town of Hamden			01100004	3.2		N	A	
Bullet Hill Brook	Town Of Southbury			01100005	2.2		N	A	

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Burr Brook	Town Of North Branford	at conf with Farm River	State Route 80	01100004	1.3		Y	AE	2/1/1977
Butterworth Brook	Town Of Hamden			01100004	0.9		N	A	
Camp Laurelwood Brook	Town Of Madison	confluence with Hammonassett River (Upper Reach)	500 ft upstream of Summer Hill Rd	01100004	1.1		Y	AE	1/1/1977
Catlin Brook				01100004	0.6		N	A	
Chase Brook	City Of Waterbury			01100005	0.8		N	A	
Chestnut Branch				01100004	2.3		N	A	
Club Creek	City Of West Haven	to tidal	200 ft upstream of David St	01100004	0.9		Y	AE	5/29/2014
Coginchaug River	Town Of Guilford			01080205	1.3		N	A	
Cold Spring Brook	Borough Of Naugatuck	confluence with Fulling Mill Brook	7,320 ft upstream from confluence with Fulling Mill Brook	01100005	1.4		Y	AE	11/1/1977
Cove River	City Of West Haven	to tidal (about 2,500 ft downstream of Conrail)	corporate limits	01100004	3.4		Y	AE	2/1/1976
Crooked Brook	Town of Guilford, Town of North Branford			01100004	2.3		N	A	
Crow Hollow Brook	City Of Meriden	confluence with Sodom Brook	West Main St	01100004	0.3		Y	AE	
Cuff Brook	Town Of Cheshire			01100004	1.7		N	A	

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Dowd Hollow Brook	Town Of Madison			01100004	1.3		N	A	
East Mountain Brook	Town of Prospect, City of Waterbury			01100005	1.3		N	A	
East River	Town Of Guilford			01100004	0.5		N	A	
East River	Town Of Guilford	Bear House Hill Rd	about 2,000 ft upstream of dam and walkway below Capello Pond	01100004	2.3		Y	AE	12/1/1982
Eaton Brook	Town Of Hamden	confluence with Mill River	50 ft upstream of West Wood Road	01100004	2.2		Y	AE	7/1/1977
Eightmile Brook				01100005	0.7		N	A	
Eightmile Brook				01100005	10.5		N	A	
Eightmile Brook No. 1	Town Of North Branford	at corp limits	State Route 17	01100004	0.7		Y	AE	2/1/1977
Eightmile Brook No. 2	Town Of Oxford	confluence with Housatonic River	about 0.42 miles upstream of Loughlin Rd	01100005	0.9		Y	AE	6/1/1979
Farley Creek	City Of Milford			01100004	1.1		Y	AE	9/1/1985
Farm Brook	Town Of Hamden	corporate limits	3,600 ft upstream of confluence with West Branch Farm Brook	01100004	1.8		Y	AE	7/1/1977
Farm Brook	Town of Hamden, City of New Haven			01100004	3.0		N	A	
Farm River	Town Of North Branford			01100004	3.2		N	A	

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Farm River	Town Of East Haven	15,700 ft above mouth (LIS)	corporate limits (East Haven) river continues ….north branford?	01100004	10.5		Y	AE	2/1/1977
Farm River	Town Of East Haven			01100004	0.2		N	A	
Farm River	Town Of North Branford	at corp limits	800 ft downstream of White Hollow Road	01100004	5.5		Y	AE	9/1/1995
Farm River	Town of East Haven, Town of North Branford	Main Street	Hyla Lane	01100004	16.2		Y	AE	9/1/2014
Finch Brook	Town Of Wolcott			01100005	1.9		N	A	
Five Mile Brook	Town Of North Haven	confluence with Muddy River	North Hill Rd	01100004	1.5		Y	AE	7/1/1978
Fivemile Brook	Town Of Oxford	confluence with Housatonic River	about 1,600 ft upstream of East Hill Rd	01100005	0.5		Y	AE	6/1/1979
Fivemile Brook	Town Of Oxford			01100005	0.9		N	A	
Fourmile Brook	Town of Oxford, Town of Seymour			01100005	1.4		N	A	
Fulling Mill Brook	Town Of Prospect			01100005	1.6		N	A	
Fulling Mill Brook	Borough Of Naugatuck	confluence with Naugatuck River	about 400 ft upstream of Maple Hill Rd	01100005	1.5		Y	AE	11/1/1977

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Fulling Mill Brook Tributary	Town Of Prospect	about 240 ft downstream of Salem Rd/50 ft downstream of the dam located on the north side of Salem Rd	about 50 ft upstream of Salem Rd (upstream crossing)	01100005	0.4		Y	AE	12/1/1993
Goat Brook				01100005	1.9		N	A	
Great Brook	City Of Waterbury			01100005	0.2		N	A	
Grieb Court Brook	Town Of Wallingford	confluence with Muddy Brook	150 ft upstream of Grieb Trail	01100004	0.3		Y	AE	4/1/1977
Gulf Brook	Town Of North Branford	at conf with Farm River	Tommy's Path	01100004	0.4		Y	AE	2/1/1977
Hammonasset River	Town Of Madison			01100004	3.4		N	A	
Hammonasset River (Lower Reach)	Town Of Madison	US Route 1 (Boston Post Rd)	3.97 miles upstream from US Route 1	01100004	2.1		Y	AE	1/1/1979
Hammonasset River (Upper Reach)	Town Of Madison	US Route 1 (Boston Post Rd)	3.97 miles upstream from US Route 1	01100004	10.6		Y	AE	6/1/1991
Hancock Brook	City Of Waterbury	confluence with Naugatuck River	about 200 ft upstream of confluence with Tributary No. 1 to Hancock Brook	01100005	1.7		Y	AE	11/1/1977
Hanover Street Brook	Town Of Wallingford	confluence with Quinnipiac River	1,000 ft upstream of Brownstone Road	01100004	0.8		Y	AE	8/1/1987

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Harbor Brook	City Of Meriden	confluence with Quinnipiac River	confluence with Willow Brook	01100004	4.5		Y	AE	2/1/2013
Hemingway Creek	Town Of East Haven			01100004	1.3		N	A	
Hemp Swamp Brook	Town Of Beacon Falls	confluence with Naugatuck River	about 3,000 ft upstream of Rimmon Rd	01100005	1.0		Y	AE	8/1/1977
Hitchcock Lake Brook	Town Of Wolcott			01100005	0.4		N	A	
Hoadley Creek	Town of Branford, Town of Guilford			01100004	3.7		N	A	
Hockanum Brook	Town of Beacon Falls, Town of Bethany			01100005	2.4		N	A	
Hog Pond Brook	Town Of Madison			01100004	2.5		N	A	
Honeypot Brook	Town Of Cheshire			01100004	4.6		N	A	
Hop Brook	Town Of Middlebury			01100005	1.4		N	A	
Hop Brook	City of Waterbury			01100005	1.1		N	A	
Hop Brook (Lower Reach)	Borough Of Naugatuck	confluence with Naugatuck River	about 2,000 ft upstream of Porter Ave	01100005	1.1		Y	AE	11/1/1977
Hop Brook (Upper Reach)	Town Of Middlebury	about 150 ft downstream of Interstate 84	corporate limits (about 600 ft upstream of unnamed tributary)	01100005	3.8		Y	AE	11/1/1977

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Hopeville Pond Brook	City Of Waterbury	confluence with Naugatuck River	about 300 ft upstream of Springlake Rd	01100005	1.0		Y	AE	11/1/1977
Hopp Brook	Town Of Bethany	confluence with Bladens River	2,400 ft upstream of Hopp Brook Lane	01100005	1.7		Y	AE	12/1/1978
Housatonic River (Lower Reach)	City of Derby, Town of Oxford, Town of Seymour	corporate limits	corporate limits	01100005	8.5		Y	AE	3/1/1988
Housatonic River (Lower Reach)	City of Milford, Town of Orange	7,000 ft above Washington Bridge	corporate limits	01100005	6.9		Y	AE	4/1/1977
Housatonic River (Middle Reach)	Town Of Southbury	corporate limits	Shepaug Dam	01100005	10.3		Y	AE	12/1/1977
Humiston Brook	Town Of Wolcott			01100004	1.7		N	A	
Huzzle Guzzle Brook	Town Of Madison			01100004	3.1		N	A	
Indian River	City of Milford, Town of Orange	Woodmont Rd bridge and Clark Mill dam	State Route 114	01100004	4.4		Y	AE	6/1/1978
Iron Stream	Town of Guilford, Town of Madison			01100004	1.4		N	A	
Iron Stream	Town Of Madison	corporate limits (State Route 80)	Race Hill Rd	01100004	1.9		Y	AE	6/1/1991
Jacks Brook	Town Of Oxford			01100005	3.9		N	A	
Jepp Brook	Town Of Hamden	confluence with Willow Brook	100 ft upstream of Still Hill Rd	01100004	2.0		Y	AE	7/1/1977
Jones Hill Road Brook	City Of West Haven	to tidal	500 ft upstream of Hubbard Ave	01100004	0.7		Y	AE	2/1/1976

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Judd Brook	Town Of Cheshire	confluence with Tenmile River	corporate limits (Interstate 84)	01100004	1.0		Y	AE	4/1/2000
Karls Brook	City Of Milford	200 ft above confluence with Indian River	corporate limits (Woodruff Rd)	01100004	1.4		Y	AE	9/1/1985
Kinneytown Brook				01100005	0.2		N	A	
Lily Brook	Town Of Wolcott			01100005	3.5		N	A	
Lindsley Brook	Town Of Wolcott	confluence with Scoville Reservoir	Lindsley Drive	01100005	2.1		Y	AE	4/1/1980
Little Meadow Brook	Town Of Guilford			01100004	2.7		N	A	
Little Meadow Brook	Town Of Guilford	confluence with East River	600 ft upstream of Alden Drive	01100004	2.6		Y	AE	12/1/1982
Little River	Town Of Oxford	corporate limits	about 1,625 ft upstream of Christian St	01100005	7.3		Y	AE	6/1/1979
Little River	Town Of Seymour	confluence with Naugatuck River	corporate limits	01100005	0.9		Y	AE	7/1/1977
Long Meadow Pond Brook	Town Of Oxford			01100005	3.2		N	A	
Long Meadow Pond Brook	Borough Of Naugatuck	confluence with Naugatuck River	about 400 ft upstream of 6th crossing Rubber Ave	01100005	3.1		Y	AE	11/1/1977
Long Swamp Brook	Town Of Middlebury	confluence with Hop Brook	about 1,000 ft upstream of Kelly Road	01100005	1.8		Y	AE	11/1/1977

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Lyman Hall Brook	Town Of Wallingford	confluence with Wharton Brook	50 ft upstream of Harrison Rd	01100004	0.9		Y	AE	4/1/1977
Mad River	City of Waterbury, Town of Wolcott			01100005	2.4		N	A	
Mad River (Lower Reach)	City Of Waterbury	confluence with Naugatuck River	about 100 ft upstream of Sharon Rd	01100005	5.4		Y	AE	11/1/1977
Mad River (Upper Reach)	Town Of Wolcott	corporate limits	2,600 ft upstream of Mad River Hill Rd	01100005	4.0		Y	AE	4/1/1980
Maloney Brook	Town Of East Haven	confluence with Farm River (East Haven)	50 ft upsteam of Foxon Hill Rd (East Haven)	01100004	1.2		Y	AE	10/1/2000
Mansion Road Brook	Town Of Wallingford	confluence with Quinnipiac River	1,300 ft upstream of Jones Road	01100004	0.8		Y	AE	8/1/1987
Marks Brook	Town Of Prospect			01100005	1.9		N	A	
Meetinghouse Brook	City of Meriden, Town of Wallingford			01100004	2.2		N	A	
Meetinghouse Brook	Town Of Wallingford	confluence with Quinnipiac River	3,000 ft upstream of US Highway 5	01100004	1.1		Y	AE	4/1/1977
Mill River	Town Of Hamden	corporate limits (Hamden)	corporate limits	01100004	10.4		Y	AE	7/1/1977
Mill River	Town Of Cheshire	corporate limits (Old Lane Rd)	25 ft upstream of Mansion Road	01100004	4.4		Y	AE	8/1/1987
Mill River	Town of Cheshire, Town of Hamden	Lake Whitney dam	Williamsburg Drive	01100004	15.0		Y	AE	9/1/2014

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Mountain Brook	Town of Cheshire, Town of Prospect			01100004	1.8		N	A	
Mountain Brook	Town Of Prospect	50 ft downstream of Juggernaut Rd	about 4,600 ft upstream of Juggernaut Rd	01100004	0.9		Y	AE	12/1/1993
Muddy River (Lower Reach)	Town Of North Haven	confluence with Quinnipiac River	475 ft upstream of Old Clintonville Rd	01100004	5.3		Y	AE	7/1/1978
Muddy River (Upper Reach)	Town Of Wallingford	corporate limits	50 ft upstream of Hampton Trail	01100004	7.2		Y	AE	4/1/1977
Muddy River	Town of Wallingford	Old Clintonville Road	Riverside Drive	01100004	3.2		Y	AE	9/1/2014
Muddy River Tributary C	Town Of North Branford	at corp limits	Woodhouse Ave	01100004	1.3		Y	AE	2/1/1977
Munger Brook	Town Of North Branford	at conf with Branford River	Corp limits	01100004	2.6		Y	AE	2/1/1977
Munger Brook	Town of Guilford, Town of North Branford			01100004	1.5		N	A	
Naugatuck River	City of Derby, City of Ansonia, Town of Seymour, Town of Beacon Falls, Borough of Naugatuck, City of Waterbury	confluence with Housatonic River	corporate limits	01100005	24.6		Y	AE	12/1/1976
Neck River	Town Of Madison	Goulds Pond dam	about 1,500 ft upstream of Bradley Corners Rd	01100004	7.3		Y	AE	6/1/1991

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
North Branch Hamlin Brook				01100004	1.1		N	A	
North Branch Harbor Brook	City Of Meriden			01100004	1.7		N	A	
Notch Hill Brook	Town Of North Branford			01100004	2.4		N	A	
Oakdale Brook	Town Of Wallingford	confluence with Quinnipiac River	160 ft upstream of Montowese Trail Road	01100004	0.5		Y	AE	4/1/1977
Old Tannery Brook	Town Of Wolcott			01100005	0.8		N	A	
Old Tannery Brook	Town Of Wolcott	corporate limits	about 9,400 ft upstream of corporate limits	01100005	1.8		Y	AE	4/1/1980
Pine Brook	Town Of North Haven	from its mouth	Kings Highway	01100004	0.8		Y	AE	7/1/1978
Pisgah Brook	Town of Branford, Town of North Branford			01100004	4.4		N	A	
Pomperaug River	Town Of Southbury	confluence with Housatonic River	Southbury-Woodbury corporate limits	01100005	8.6		Y	AE	12/1/1977
Pond Brook	Town Of Madison			01100004	2.2		N	A	
Quinnipiac River	City Of Meriden	corporate limits	about 2,000 ft upstream of Hanover Pond	01100004	3.0		Y	AE	1/1/1995

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Quinnipiac River	Town Of Wallingford	downstream corporate limits(confluence with Wharton Brook)	upstream corporate limits	01100004	8.4		Y	AE	6/1/1998
Quinnipiac River	Town Of North Haven	southern corporate limits	northern corporate limits	01100004	5.6		Y	AE	8/1/1983
Quinnipiac River	Town Of Cheshire	corporate limits	corporate limits	01100004	4.5		Y	AE	8/1/1987
Race Brook	Town Of Woodbridge	corporate limits	State Route 313	01100004	2.1		Y	AE	12/1/1978
Race Brook	Town Of Woodbridge			01100004	1.5		N	A	
Race Brook	Town Of Orange	confluence with Race Brook	corporate limits	01100004	2.2		Y	AE	3/1/1993
Riggs Street Brook	Town Of Oxford	confluence with Little River	about 1.2 miles upstream of Riggs St	01100005	2.0		Y	AE	6/1/1979
Roaring Brook	Town of Wolcott			01100004	3.4		N	A	
Roaring Brook	Town of Cheshire			01100004	2.2		N	A	
Sanford Brook	Town of Bethany, Town of Cheshire			01100004	2.5		N	A	
Sargent River	Town of Bethany, Town of Woodbridge			01100004	1.1		N	A	
Schildgen Pond Brook	Borough Of Naugatuck	confluence with Fulling Mill Brook	about 1,200 ft upstream of Cemetery Rd	01100005	0.8		Y	AE	11/1/1977

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Shattuck Brook	Town of Middlebury, Borough of Naugatuck			01100005	3.3		N	A	
Shepard Brook	Town Of Hamden	confluence with Mill River	1,000 ft upstream of Sherman Ave	01100004	2.5		Y	AE	7/1/1977
Shepaug River				01100005	5.7		N	A	
Silver Brook	Town Of Orange	confluence with Indian River	Derby Turnpike	01100004	3.8		Y	AE	6/1/1978
Sixmile Brook	Town Of Oxford			01100005	1.8		N	A	
Sodom Brook	City Of Meriden			01100004	1.1		N	A	
Sodom Brook	City Of Meriden	confluence with Harbor Brook	about 3,500 ft upstream of Leonard St	01100004	3.2		Y	AE	1/1/1995
Spinning Mill Brook	Town Of Guilford			01100004	2.5		N	A	
Spoon Shop Brook	City of Meriden			01100004	1.5		N	A	
Spoon Shop Brook	City of Meriden			01100004	0.2		N	A	
Spoon Shop Brook	City Of Meriden	confluence with Harbor Brook	Birdsey Avenue	01100004	1.5		Y	AE	1/1/1995
Spoon Shop Brook	City of Meriden	Confluence with Harbor Brook	Fleming Road	01100004	2.9		Y	AE	9/1/2014
Spring Brook	Town Of Wallingford			01100004	3.5		N	A	

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Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Spruce Brook	Town of Beacon Falls, Borough of Naugatuck			01100005	1.9		N	A	
Spruce Brook	Town of Southbury			01100005	0.8		N	A	
Steele Brook	City Of Waterbury	confluence with Naugatuck River	about 500 ft upstream of Watertown Ave	01100005	2.2		Y	AE	11/1/1977
Stubby Brook	City Of Milford	confluence with Indian River	corporate limits (Woodruff Rd)	01100004	2.3		Y	AE	9/1/1985
Sucker Brook	Town Of Guilford			01100004	0.5		N	A	
Tenmile River	Town Of Prospect			01100004	0.7		N	A	
Tenmile River	Town of Cheshire, Town of Prospect	county boundary	about 100 ft upstream of State Route 68 (Cheshire Rd)	01100004	5.1		Y	AE	8/1/1987
Towantic Brook	Town Of Oxford			01100005	3.1		N	A	
Transylvania Brook	Town Of Southbury			01100005	3.2		N	A	
Tuttle Brook	Town of East Haven, City of New Haven			01100004	0.5		N	A	
Tuttle Brook	Town Of East Haven	Dodge Ave	50 ft upstream of Interstate 95	01100004	0.9		Y	AE	9/1/1995
Two Mile Brook	City Of Ansonia	Barthlomew Road Extended	about 600 ft upstream of Milan Street	01100005	1.6		Y	AE	11/1/1989
Twomile Brook				01100005	1.1		N	A	

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Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Twomile Brook				01100005	2.0		N	A	
Twomile Brook				01100005	0.6		N	A	
Watermans Brook	Town Of North Haven	from its mouth	Basset Road	01100004	2.1		Y	AE	7/1/1978
Webb Brook	Borough Of Naugatuck	confluence with Long Meadow Pond Brook	about 50 ft upstream of Gunntown Rd	01100005	0.9		Y	AE	11/1/1977
Welton Brook	City Of Waterbury			01100005	2.4		N	A	
Wepawaug River	Town of Woodbridge			01100004	0.2		N	A	
Wepawaug River (Lower Reach)	City Of Milford, Town of Orange	New Haven Ave dam	corporate limits (about 500 ft upstream of Flax Mill Rd)	01100004	6.6		Y	AE	6/1/1978
Wepawaug River (Upper Reach)	Town Of Woodbridge	corporate limits	State Route 114	01100004	3.3		Y	AE	12/1/1978
West Branch Farm Brook	Town Of Hamden	confluence with Farm Brook	620 ft upstream of Sanquist Circle	01100004	0.6		Y	AE	7/1/1977
West River				01100004	5.8		N	A	
West River				01100004	1.9		N	A	
West River No. 1	Town Of Guilford	US Route 1	about 6,000 ft upstream Race Hill Rd	01100004	8.0		Y	AE	5/1/1977
West River No. 2	Town Of Woodbridge	corporate limits	about 625 ft doake Dawson Dam	01100004	2.1		Y	AE	7/1/1989
West River No. 2	City Of New Haven	Chapel St	corporate limits (near State Route 15)	01100004	2.6		Y	AE	9/1/1977

Table 2: Flooding Sources Included in this FIS Report

Flooding Source	Community	Downstream Limit	Upstream Limit	HUC-8 Sub-Basin(s)	Length (mi) (streams or coastlines)	Area (mi^2) (estuaries or ponding)	Floodway (Y/N)	Zone shown on FIRM	Date of Analysis
Wharton Brook	Town Of Wallingford	confluence with Quinnipiac River	5,000 ft upstream of Grieb Road	01100004	7.0		Y	AE	4/1/1977
Whitemare Brook	City Of Ansonia			01100005	0.9			AE	11/1/1989
Willow Brook	City Of Meriden			01100004	0.8		N	A	
Willow Brook No. 1	Town Of Cheshire	corporate limits (Mt Sanford Road)	25 ft upstream of Higgins Road	01100004	4.3		Y	AE	8/1/1987
Willow Brook No. 1	Town Of Hamden	confluence with Mill River	confluence with Jepp Brook	01100004	1.5		Y	AE	7/1/1977
Willow Brook No. 2	City Of Meriden	confluence with Harbor Brook	about 4,000 ft upstream of Cinema Rd	01100004	2.7		Y	AE	1/1/1995
Wilmot Brook				01100004	0.5		N	A	
Wilmot Brook				01100004	2.3		N	A	
Wintergreen Brook	Town of Hamden, City of New Haven			01100004	4.7		N	A	
Wintergreen Brook	City Of New Haven	confluence with West River	Wilmont Ave	01100004	1.3		Y	AE	9/1/1977
Woodings Pond Brook	Town Of Wallingford	confluence with Quinnipiac River	50 ft upstream of Ridgewood Road	01100004	1.4		Y	AE	4/1/1977
Wooster Brook	Town of Middlebury, City of Waterbury			01100005	0.9		N	A	
Wooster Brook	City Of Waterbury	corporate limits	corporate limits	01100005	2.3		Y	AE	11/1/1977

All floodways that were developed for this Flood Risk Project are shown on the FIRM using the symbology described in Figure 3. In cases where the floodway and l% annual chance floodplain boundaries are either close together or collinear, only the floodway boundary has been shown on the FIRM. For information about the delineation of floodways on the FIRM, refer to Section 6.3.

2.3 Base Flood Elevations

The hydraulic characteristics of flooding sources were analyzed to provide estimates of the elevations of floods of the selected recurrence intervals. The Base Flood Elevation (BFE) is the elevation of the 1% annual chance flood. These BFEs are most commonly rounded to the whole foot, as shown on the FIRM, but in certain circumstances or locations they may be rounded to 0.1 foot. Cross section lines shown on the FIRM may also be labeled with the BFE rounded to 0.1 foot. Whole-foot BFEs derived from engineering analyses that apply to coastal areas, areas of ponding, or other static areas with little elevation change may also be shown at selected intervals on the FIRM.

Cross sections with BFEs shown on the FIRM correspond to the cross sections shown in the Floodway Data table and Flood Profiles in this FIS Report. BFEs are primarily intended for flood insurance rating purposes. For construction and/or floodplain management purposes, users are cautioned to use the flood elevation data presented in this FIS Report in conjunction with the data shown on the FIRM.

2.4 Non-Encroachment Zones

Some States and communities use non-encroachment zones to manage floodplain development. While not a FEMA designated floodway, the non-encroachment zone represents that area around the stream that should be reserved to convey the 1% annual chance flood event.

Non-encroachment determinations may be delineated where it is not possible to delineate floodways because specific channel profiles with bridge and culvert geometry were not developed. Any non-encroachment determinations for this Flood Risk Project have been tabulated for selected cross sections and are shown in Table 25, “Flood Hazard and Non-Encroachment Data for Selected Streams.”

2.5 Coastal Flood Hazard Areas

For most areas along rivers, streams, and small lakes, BFEs and floodplain boundaries are based on the amount of water expected to enter the area during a 1% annual chance flood and the geometry of the floodplain. Floods in these areas are typically caused by storm events. However, for areas on or near ocean coasts, large rivers, or large bodies of water, BFE and floodplain boundaries may need to be based on additional components, including storm surges and waves. Communities on or near ocean coasts face flood hazards caused by offshore seismic events as well as storm events.

Coastal flooding sources that are included in this Flood Risk Project are shown in Table 2.

2.5.1 Water Elevations and the Effects of Waves

Specific terminology is used in coastal analyses to indicate which components have been included in evaluating flood hazards.

The stillwater elevation (SWEL or still water level) is the surface of the water resulting from astronomical tides, storm surge, and freshwater inputs, but excluding wave setup contribution or the effects of waves.

- *Astronomical tides* are periodic rises and falls in large bodies of water caused by the rotation of the earth and by the gravitational forces exerted by the earth, moon and sun.
- *Storm surge* is the additional water depth that occurs during large storm events. These events can bring air pressure changes and strong winds that force water up against the shore.
- *Freshwater inputs* include rainfall that falls directly on the body of water, runoff from surfaces and overland flow, and inputs from rivers.

The 1% annual chance stillwater elevation is the stillwater elevation that has been calculated for a storm surge from a 1% annual chance storm. The 1% annual chance storm surge can be determined from analyses of tidal gage records, statistical study of regional historical storms, or other modeling approaches. Stillwater elevations for storms of other frequencies can be developed using similar approaches.

The total stillwater elevation (also referred to as the mean water level) is the stillwater elevation plus wave setup contribution but excluding the effects of waves.

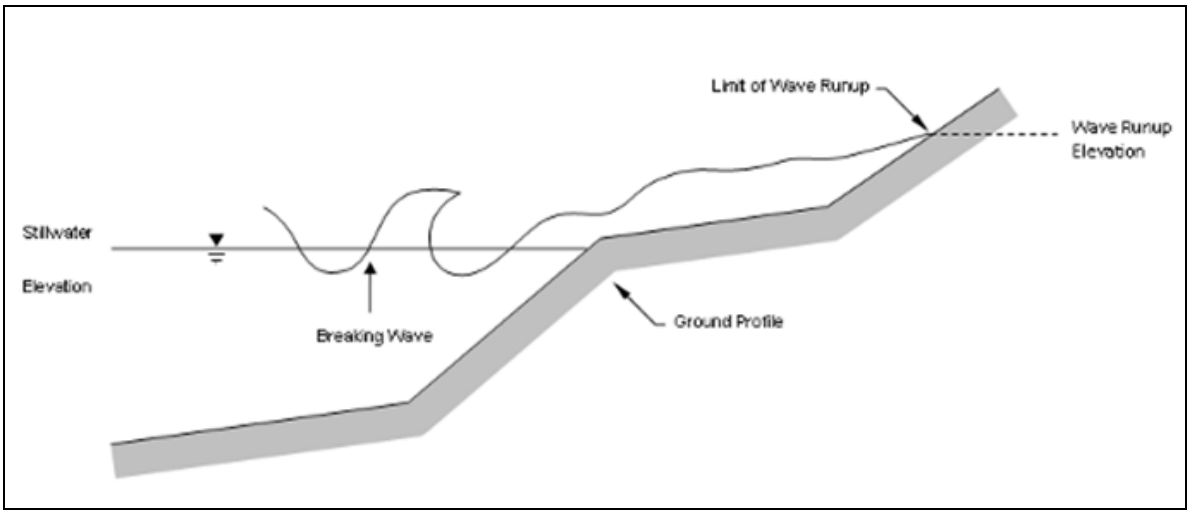
- *Wave setup* is the increase in stillwater elevation at the shoreline caused by the reduction of waves in shallow water. It occurs as breaking wave momentum is transferred to the water column.

Like the stillwater elevation, the total stillwater elevation is based on a storm of a particular frequency, such as the 1% annual chance storm. Wave setup is typically estimated using standard engineering practices or calculated using models, since tidal gages are often sited in areas sheltered from wave action and do not capture this information.

Coastal analyses may examine the effects of overland waves by analyzing storm-induced erosion, overland wave propagation, wave runup, and/or wave overtopping.

- *Storm-induced erosion* is the modification of existing topography by erosion caused by a specific storm event, as opposed to general erosion that occurs at a more constant rate.
- *Overland wave propagation* describes the combined effects of variation in ground elevation, vegetation, and physical features on wave characteristics as waves move onshore.
- *Wave runup* is the uprush of water from wave action on a shore barrier. It is a function of the roughness and geometry of the shoreline at the point where the stillwater elevation intersects the land.
- *Wave overtopping* refers to wave runup that occurs when waves pass over the crest of a barrier.

Figure 5: Wave Runup Transect Schematic



2.5.2 Floodplain Boundaries and BFEs for Coastal Areas

For coastal communities along the Atlantic and Pacific Oceans, the Gulf of Mexico, the Great Lakes, and the Caribbean Sea, flood hazards must take into account how storm surges, waves, and extreme tides interact with factors such as topography and vegetation. Storm surge and waves must also be considered in assessing flood risk for certain communities on rivers or large inland bodies of water.

Beyond areas that are affected by waves and tides, coastal communities can also have riverine floodplains with designated floodways, as described in previous sections.

Floodplain Boundaries

In many coastal areas, storm surge is the principle component of flooding. The extent of the 1% annual chance floodplain in these areas is derived from the total stillwater elevation (stillwater elevation including storm surge plus wave setup) for the 1% annual chance storm. The methods that were used for calculation of total stillwater elevations for coastal areas are described in Section 5.3 of this FIS Report. Location of total stillwater elevations for coastal areas are shown in Figure 8, "1% Annual Chance Total Stillwater Levels for Coastal Areas."

In some areas, the 1% annual chance floodplain is determined based on the limit of wave runup or wave overtopping for the 1% annual chance storm surge. The methods that were used for calculation of wave hazards are described in Section 5.3 of this FIS Report.

Table 26 presents the types of coastal analyses that were used in mapping the 1% annual chance floodplain in coastal areas.

Coastal BFEs

Coastal BFEs are calculated as the total stillwater elevation (stillwater elevation including storm surge plus wave setup) for the 1% annual chance storm plus the additional flood hazard from overland wave effects (storm-induced erosion, overland wave propagation, wave runup and wave overtopping).

Where they apply, coastal BFEs are calculated along transects extending from offshore to the limit of coastal flooding onshore. Results of these analyses are accurate until local topography, vegetation, or development type and density within the community undergoes major changes.

Parameters that were included in calculating coastal BFEs for each transect included in this FIS Report are presented in Table 17, "Coastal Transect Parameters." The locations of transects are shown in Figure 9, "Transect Location Map." More detailed information about the methods used in coastal analyses and the results of intermediate steps in the coastal analyses are presented in Section 5.3 of this FIS Report. Additional information on specific mapping methods is provided in Section 6.4 of this FIS Report.

2.5.3 Coastal High Hazard Areas

Certain areas along the open coast and other areas may have higher risk of experiencing structural damage caused by wave action and/or high-velocity water during the 1% annual chance flood. These areas will be identified on the FIRM as Coastal High Hazard Areas.

- *Coastal High Hazard Area (CHHA)* is a SFHA extending from offshore to the inland limit of the primary frontal dune (PFD) or any other area subject to damages caused by wave action and/or high-velocity water during the 1% annual chance flood.
- *Primary Frontal Dune (PFD)* is a continuous or nearly continuous mound or ridge of sand with relatively steep slopes immediately landward and adjacent to the beach. The PFD is subject to erosion and overtopping from high tides and waves during major coastal storms.

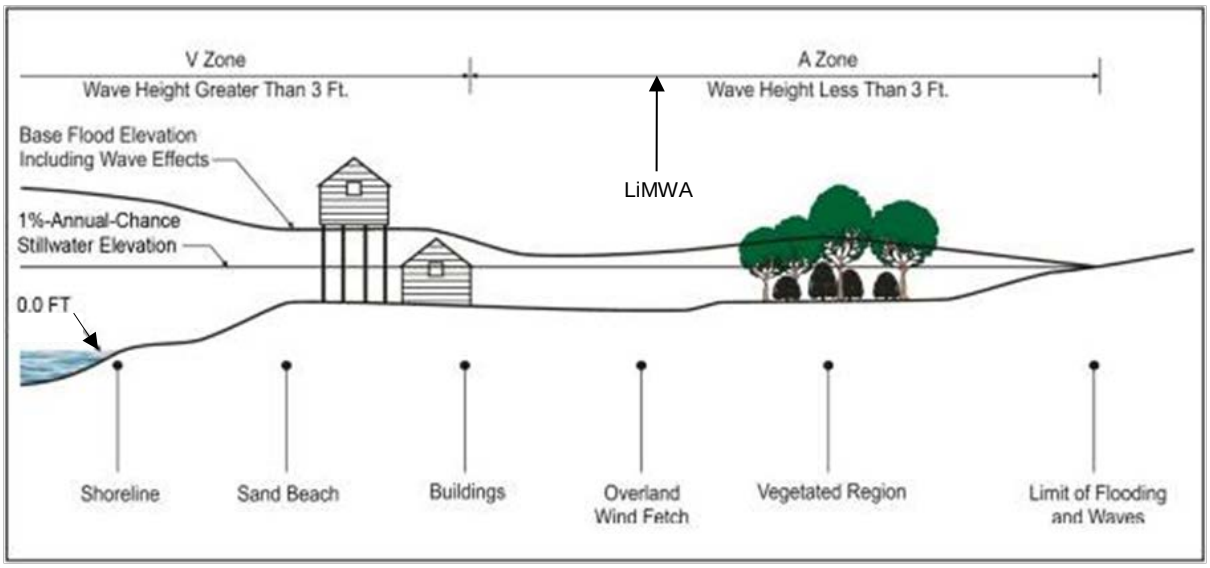
CHHAs are designated as "V" zones (for "velocity wave zones") and are subject to more stringent regulatory requirements and a different flood insurance rate structure. The areas of greatest risk are shown as VE on the FIRM. Zone VE is further subdivided into elevation zones and shown with BFEs on the FIRM.

The landward limit of the PFD occurs at a point where there is a distinct change from a relatively steep slope to a relatively mild slope; this point represents the landward extension of Zone VE. Areas of lower risk in the CHHA are designated with Zone V on the FIRM. More detailed information about the identification and designation of Zone VE is presented in Section 6.4 of this FIS Report.

Areas that are not within the CHHA but are SFHAs may still be impacted by coastal flooding and damaging waves; these areas are shown as "A" zones on the FIRM.

Figure 6, "Coastal Transect Schematic," illustrates the relationship between the base flood elevation, the 1% annual chance stillwater elevation, and the ground profile as well as the location of the Zone VE and Zone AE areas in an area without a PFD subject to overland wave propagation. This figure also illustrates energy dissipation and regeneration of a wave as it moves inland.

Figure 6: Coastal Transect Schematic



Methods used in coastal analyses in this Flood Risk Project are presented in Section 5.3 and mapping methods are provided in Section 6.4 of this FIS Report.

Coastal floodplains are shown on the FIRM using the symbology described in Figure 3, "Map Legend for FIRM." In many cases, the BFE on the FIRM is higher than the stillwater elevations shown in Table 17 due to the presence of wave effects. The higher elevation should be used for construction and/or floodplain management purposes.

2.5.4 Limit of Moderate Wave Action

Laboratory tests and field investigations have shown that wave heights as little as 1.5 feet can cause damage to and failure of typical Zone AE building construction. Wood-frame, light gage steel, or masonry walls on shallow footings or slabs are subject to damage when exposed to waves less than 3 feet in height. Other flood hazards associated with coastal waves (floating debris, high velocity flow, erosion, and scour) can also damage Zone AE construction.

Therefore, a LiMWA boundary may be shown on the FIRM as an informational layer to assist coastal communities in safe rebuilding practices. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave. The location of the LiMWA relative to Zone VE and Zone AE is shown in Figure 6.

The effects of wave hazards in Zone AE between Zone VE (or the shoreline where Zone VE is not identified) and the limit of the LiMWA boundary are similar to, but less severe than, those in Zone VE where 3-foot or greater breaking waves are projected to occur during the 1% annual chance flooding event. Communities are therefore encouraged to adopt and enforce more stringent floodplain management requirements than the minimum NFIP requirements in the LiMWA. The NFIP Community Rating System provides credits for these actions.

Where wave runup elevations dominate over wave heights, there is no evidence to date of significant damage to residential structures by runup depths less than 3 feet. Examples of these

areas include areas with steeply sloped beaches, bluffs, or flood protection structures that lie parallel to the shore. In these areas, the FIRM shows the LiMWA immediately landward of the VE/AE boundary. Similarly, in areas where the zone VE designation is based on the presence of a primary frontal dune or wave overtopping, the LiMWA is delineated immediately landward of the Zone VE/AE boundary.

SECTION 3.0 – INSURANCE APPLICATIONS

3.1 National Flood Insurance Program Insurance Zones

For flood insurance applications, the FIRM designates flood insurance rate zones as described in Figure 3, "Map Legend for FIRM." Flood insurance zone designations are assigned to flooding sources based on the results of the hydraulic or coastal analyses. Insurance agents use the zones shown on the FIRM and depths and base flood elevations in this FIS Report in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

The 1% annual chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (e.g. Zones A, AE, V, VE, etc.), and the 0.2% annual chance floodplain boundary corresponds to the boundary of areas of additional flood hazards.

Table 3 lists the flood insurance zones in the unincorporated and incorporated areas of New Haven County.

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
City of Ansonia	A, AE, X
Town of Beacon Falls	A, AE, X
Town of Bethany	A, AE, X
Town of Branford	A, AE, VE, X
Town of Cheshire	A, AE, X
City of Derby	A, AE, X
Town of East Haven	A, AE, VE, X
Town of Guilford	A, AE, VE, X
Town of Hamden	A, AE, X
Town of Madison	A, AE, VE, X
City of Meriden	A, AE, AO, X
Town of Middlebury	A, AE, X
City of Milford	A, AE, VE, X
Borough of Naugatuck	A, AE, X
City of New Haven	A, AE, VE, X
Town of North Branford	A, AE, X

Table 3: Flood Zone Designations by Community

Community	Flood Zone(s)
Town of North Haven	A, AE, X
Town of Orange	A, AE, AO, X
Town of Oxford	A, AE, X
Town of Prospect	A, AE, X
Town of Seymour	A, AE, X
Town of Southbury	A, AE, X
Town of Wallingford	A, AE, AO, X
City of Waterbury	A, AE, X
City of West Haven	A, AE, VE, X
Town of Wolcott	A, AE, X
Town of Woodbridge	A, AE, X
Borough of Woodmont	AE, VE, X

3.2 Coastal Barrier Resources System

The Coastal Barrier Resources Act (CBRA) of 1982 was established by Congress to create areas along the Atlantic and Gulf coasts and the Great Lakes, where restrictions for Federal financial assistance including flood insurance are prohibited. In 1990, Congress passed the Coastal Barrier Improvement Act (CBIA), which increased the extent of areas established by the CBRA and added "Otherwise Protected Areas" (OPA) to the system. These areas are collectively referred to as the John. H Chafee Coastal Barrier Resources System (CBRS). The CBRS boundaries that have been identified in the project area are in Table 4, "Coastal Barrier Resource System Information."

Table 4: Coastal Barrier Resources System Information

Primary Flooding Source	CBRS/OPA Type	Date CBRS Area Established	FIRM Panel Number(s)
Long Island Sound	CBRS	10/01/1983	0536
Long Island Sound	CBRS	11/16/1990	0463, 0464, 0514, 0576
Long Island Sound	CBRS	11/16/1991	0514, 0518, 0528, 0536, 0537, 0631
Long Island Sound	CBRS	11/15/1993	0514, 0518
Long Island Sound	OPA	11/16/1991	0439, 0443, 0444, 0528, 0536

SECTION 4.0 – AREA STUDIED

4.1 Basin Description

Table 5 contains a description of the characteristics of the HUC-8 sub-basins within which each community falls. The table includes the main flooding sources within each basin, a brief description of the basin, and its drainage area.

Table 5: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
Lower Connecticut	01080205	Connecticut River	The Connecticut River is the longest river in New England. The Connecticut River originates at the U.S. border with Quebec, Canada, and discharges at Long Island Sound and flows southward for 410 miles through four U.S. states. Its watershed encompasses five U.S. states and one Canadian province – 11,260 square miles– via 148 tributaries, 38 of which are major rivers. The Connecticut River produces about 70% of Long Island Sound's freshwater. The river as it enters Connecticut is regulated by 8 hydroelectric generation dams, by several lakes and reservoirs . Flooding along the main stem has been greatly reduced by reservoirs that control runoff from 20 percent of the basin. Flood dikes were built in 1940 to protect Hartford and East Hartford from floods, such as the March 1936 flood. Flooding of small uncontrolled streams and the Connecticut and Farmington River is expected to continue. One such flood occurred in 1984 (the 3rd largest flood ever recorded).	1085
Farmington	01080207	Farmington River	The Farmington River is a 46.7-mile-long river located in northwest Connecticut, with major tributaries extending into Massachusetts. The Farmington River's watershed is 609 square miles. Its two main branches start in southwestern Massachusetts and converge in New Hartford, Connecticut. The upper reaches of the river flow mostly southward, but the river turns northward in Farmington, Connecticut and continues to it's confluence with the Connecticut River, flowing in a mostly northern and easterly direction. In both October 2005 and May 2006, heavy rains deluged the Farmington River Valley. The Farmington River rose to flood numerous forests and fields near the Towns of Simsbury and East Granby.	607
Quinnipiac	01100004	Quinnipiac River	The Quinnipiac River watershed drains an area of approximately 165 square miles. The Quinnipiac River is a 45.5 miles long and flows southward, originating in Farmington (Hartford County) and outlets to Long Island Sound (New Haven County). The Quinnipiac River watershed has a long history of flooding and does not have any flood control dams. In 1982, 11 to 13 inches of rain fell on the Quinnipiac River basin in 48 hours causing the most severe flooding in the basin since 1807 and 1854 floods. There are four (non-flood control) dams, most of which are old remnants. The first dam is about 1/2 mile	512

Table 5: Basin Characteristics

HUC-8 Sub-Basin Name	HUC-8 Sub-Basin Number	Primary Flooding Source	Description of Affected Area	Drainage Area (square miles)
			south of Plantsville, the second dam is at the southeast corner of Hanover Pond in South Meriden, the third dam is in northeast Yalesville, and the fourth dam is at the south end of Community Lake in Wallingford. Flooding in the basin increased significantly around the early 1970, when the area became heavily urbanized. Harbor Brook, a tributary of the Quinnipiac River, floods from the area of Baldwin's Pond to Hanover Pond, through the City of Meriden.	
Housatonic	01100005	Housatonic River	The Housatonic River is approximately 149 miles long, located in western Massachusetts and western Connecticut. It drains about 1,950 square miles and flows south to southeast into Long Island Sound. The river's fall is 1,430 feet from the confluence of its east and west branches to Long Island Sound. The Naugatuck River is the Housatonic's largest tributary with a contributing watershed of 312 square miles. Less than 1 percent of the total drainage area (about 1.5 mi2) of the Housatonic River Basin is located in Hartford County. Low and medium flows are regulated by hydroelectric power plants: Falls Village, Bulls Bridge, Shepaug, Stevenson and Derby dams. The last three dams form a chain of lakes: Lake Lillinonah, Lake Zoar and Lake Housatonic, from New Milford south to Shelton. Notable floods have occurred in 1949, 1955, and 1984. Subsequent to the 1955 flood, extensive flood controls were installed at 7 sites in the Naugatuck River basin, and about one-third of the main-stem is controlled by 3 reservoirs.	1950

4.2 Principal Flood Problems

Table 6 contains a description of the principal flood problems that have been noted for New Haven County by flooding source.

Table 6: Principal Flood Problems

Flooding Source	Description of Flood Problems
Coastal Flooding	The most severe coastal flooding in recent history occurred from hurricanes in September of 1938 and August 1954. The storm surge accompanying these hurricanes represented a recurrence interval ranging from 22 years to more than 50 years. Five hurricanes have affected Connecticut in the last two decades, causing minimal damage to New Haven County. Hurricane Gloria in September 1985, Hurricane Bob in August 1991, Hurricane Grace in October 1991, Hurricane Bertha in July 1996, and Hurricane Tammy in October 2005. Hurricane Gloria made landfall in the Westport, CT (Fairfield County) area as a Category II hurricane. Relatively light rainfall minimized flooding and debris cleanup and power restoration were the major issues for this hurricane. Hurricane Bob travelled up the eastern seaboard and struck Newport, Rhode Island as a Category II hurricane and caused light to moderate tree damage in central Connecticut. Hurricane Grace resulted in 30-50 foot seas along the coastline from New Jersey to Maine but damage to Connecticut was minimal. Hurricane Bertha caused minimal damage to Connecticut resulting in downed power lines and damaged trees. The remnants of Hurricane Tammy combined with a low-pressure system caused heavy rainfall events from October 7-10th and October 14-15th, 2005. The combined rainfall across the state from both of these events totaled between 9 and 16 inches. Combined, the rainfall from these two events totaled 9 – 16 inches. The rainfall caused major flooding in Hartford County and Tolland County and moderate flooding across the entire state of Connecticut. A total of 14 dams completely failed or partially failed and another 30 dams were damaged across the state of Connecticut. Several dozen roads were washed out or undermined. Some residents of the two counties were evacuated. The remnants of hurricane Tammy caused $6.1 million in damages to municipal and non-profit properties, $6.9 million to businesses and an estimated $30 million of damages to private residences (CT DEP, 2007). A nor'easter in December 1992 eroded shorelines, killed 3 people, and destroyed 26 homes in Connecticut. The storm caused $4.3 million in damages to over 6,000 homes. Tides in Long Island Sound stacked up due to the 55 MPH winds which resulted in the third highest tide of 9.2 feet NAVD88 measured in Bridgeport, CT (CT DEP, 2007). In April of 2007 a nor'easter dropped greater than 7 inches of rain in Fairfield, Litchfield, Middlesex, New Haven and New London Counties. Rainfall in Fairfield County ranged from 3.57 inches to 7.81 inches. FEMA reported that flood damages in Connecticut exceeded an estimated $6.4 million. Over 200 people in Connecticut were forced to evacuate their residences. Residential damages were as follows, Fairfield: 48 major damages & 1,600 total residential units impacted, Middlesex: 3 major damages & 11 total residential units impacted, New Haven: 32 major damages & 446 total residential units impacted. Business damages were as follows, Fairfield: 5 businesses with major damage of an estimated cost of $958,000, Middlesex: 7 businesses with major damage with an estimated cost of damage of $598,000, New Haven: 2 businesses with major damage with an estimated cost of damage of $550,000, New London: 1

Table 6: Principal Flood Problems

Flooding Source	Description of Flood Problems
	business with major damage with an estimated cost of $2 million (CT DEP, 2007). An unnamed storm in December 2010 caused The National Weather Service to issue flood warnings for coastal areas and the Middletown area of Middlesex County where the melting snow and rainfall caused the Connecticut River levels to exceed flood stage (Middletown Press, 2010). Ella, a two day winter storm in February 2011 brought up to 10" of snow and up to 3/4" of ice to Connecticut. The Emergency Operations Center was opened by Gov. Daniel P. Malloy. Ice and winds knocked down power lines around the region, with a reported 1,400 outages in Fairfield County alone (Middletown Press, 2011). In 2011 Hurricane Irene and in 2012 Hurricane Sandy impacted the coastline of New Haven County. The impacts of these hurricanes have not been considered in the July 2013 coastal analysis study.
Riverine Flooding	Flooding in New Haven County results from overflow of streams associated with rainfall runoff events and from tidal surge and waves associated with a northeaster, hurricane, or tropical storm activity. Major rainfall events occur from hurricanes, tropical storms, and thundershowers associated with frontal systems. Floods have occurred in every season of the year. Some of the most severe flooding occurs in early spring as a result of snow melt and heavy rains. Late summer and autumn are another critical season for flood danger due to heavy rainfall and the possibility of hurricanes and tropical storms. Winter floods result from occasional thaws, particularly in years of heavy snowfall. Damaging floods have been experienced in the county since the earliest settlements with early reference to floods dating back to 1788. Reliable records kept for over 100 years indicate serious flooding has occurred in 1815, 1893, 1927, March 1936, January and September 1938, January 1949, August and October 1955, January 1978, June 1982, March and April 1987, and June 1992. The greatest flood of record within the Housatonic and Naugatuck Rivers watersheds occurred in August 1955 when Hurricanes Connie and Diane produced heavy precipitation within a week of each other. Hurricane Diane produced most of its rainfall over a 24-hour period on already saturated soils. In June 1982, a large low pressure system produced prolonged and heavy rainfall resulting in the flooding of small streams and rivers, especially in the south central portion of the county where flooding was estimated to be greater than a 200 year recurrence interval; very little flooding of large rivers occurred as a result of this storm.
Farm River	Flooding of the Farm River has been a problem for the communi ties of East Haven and North Branford for many years. Periodic floods have caused property damage and the temporary closure of several roads and bridges. Coordination with the Connecticut DEP and the Soil Conservation Service revealed eight areas of flood damage (USACE, 1994). Identification of affected structures and corresponding elevation information was obtained as a result of using past flood damage surveys performed by scs. About 260 structures, mostly residential, were identified as being susceptible to flooding. The area of flood damage extends from the Totoket Road crossing, in North Branford, south to the I-95 crossing in East Haven.
Housatonic River	An unnamed winter storm in March 2011 caused the Housatonic River to swell more than two feet over its flood mark. Several empty cars, two pickup trucks, and around 20 houses in New Haven County were swept into the rain-swollen Housatonic River. The River banks flooded, full from the heavy rain and

Table 6: Principal Flood Problems

Flooding Source	Description of Flood Problems
	melting snow and forced the evacuation of dozens of people. The storm dropped between 2-4 inches of snow, a month's worth, in just 24 hours.
Mill River	Flooding along Mill River has been a problem for the Town of Hamden. Mount Carmel Avenue in Hamden was closed during a March 2011 rain event between Whitney Avenue and New Road because of flooding.
Quinnipiac River	Residents of Wallingford's Yalesville Square Mobile Home Park, living as they do along the banks of the Quinnipiac River, are often affected by flooding.
Wepawaug River	The June 1982 flood caused extensive damage within the Town of Orange and Milford, primarily caused from the Wepawaug River. Within the Town of Milford, damages occurred to businesses on Daniel and River Streets, to City Hall and the library, a park north of City Hall, Milford Harbor, and to several bridges. CT Department of Health estimated 540 homes with minor damage and 60 with major damage (Johnston Assoc., 1983). CT Department of Economic Development estimated 57 businesses were damaged (Johnston Assoc., 1983).
West River	During June 1982 flood, the West River caused extensive flood damages in New Haven. Many businesses, such as Standard Tool & Dye Co. in New Haven which saw a 5 ft rise in 15 minutes to the water levels inside the building, suffered flood losses.

Table 7 contains information about historic flood elevations in the communities within New Haven County.

Table 7: Historic Flooding Elevations

[Not Available for this Flood Risk Project]

4.3 Non-Levee Flood Protection Measures

Table 8 contains information about non-levee flood protection measures within New Haven County such as dams, jetties, and or dikes. Levees are addressed in Section 4.4 of this FIS Report.

Table 8: Non-Levee Flood Protection Measures

Flooding Source	Structure Name	Type of Measure	Location	Description of Measure
Beaver Brook No. 1	—	floodwall and a protective dike	City of Ansonia	The USACE has constructed a local flood protection project along Beaver Brook No. 1 in the City of Ansonia. For most of its length through the City of Ansonia, dikes and floodwalls flank both banks of the Naugatuck River and the lower reach of Beaver Brook No. 1 in the commercially developed downtown district. The purpose of these structures, which range in height from 52 feet near the northern corporate limits to 34 feet at the Division Street Bridge, is to confine the design storm peak discharges to a predetermined conveyance channel. (USACE, 1958, 1965, 1966, 1968, and 1976)
Branford River	Lake Gaillard	reservoir	Town of North Branford	Lake Gaillard has abated flooding. It is a water-supply reservoir with no designated flood control storage. The effects of Lake Gaillard on flooding would depend on the amount of unused storage available at the time of the storm runoff (New Haven Water Co., unpublished).
Farm Brook and its tributaries	—	earthen dams	Town of Hamden, City of New Haven	Site 1 is an earthen dam which provides protection from West Branch Farm Brook; the dam is located within Hamden and is in series with two lower sites which protect the area below this dam. Sites 2A and 2B are also located within Hamden and are downstream of Site 1. These local flood protection projects provide protection from both Farm Brook and West Branch Farm Brook. More recently a flood control dam was constructed to divert some of the floodwater from the West Branch of the Farm Brook to the upstream side of flood control structure 2B. These structures do not provide flood protection below the confluence of Wintergreen Brook (Hamden, 1964).
Farm River-unnamed tributary	—	structure modification	Town of East Haven	In the mid-1900's, the town lowered an abandoned railroad crossing that acted like a dam during heavy rainfall to minimize upstream flooding off Mill Street. Farm River is a tributary of East Haven River.
Harbor Brook	—	channel modifications	City of Meriden	Several reaches of Meriden's streams are enclosed within walls or culverts, and more protection of this type is planned for the future. Harbor Brook has undergone channel modifications, particularly in the Glen Hills Road area.

Table 8: Non-Levee Flood Protection Measures

Flooding Source	Structure Name	Type of Measure	Location	Description of Measure
Little Meadow Brook	—	channel realignment and enlargement	Town of Guilford	Channel realignment and improvement at the lower segment of the Little Meadow Brook and below the outlet to the Guilford Lakes, together with the enlargement of a pond south of the Guilford Lakes School and the enlargement of Capello Pond, serve to protect the residential area southeast of the intersection of Nut Plains and Stepstone Hill Roads in Guilford from possible flooding.
Mad River	Chestnut Hill Reservoir, (2) Scovill Reservoirs, and Hitchcock Lake	reservoirs	Town of Wolcott	Four reservoirs located along the streams in Wolcott which help to store floodwaters and modify the severity of floods along the Mad River (Upper Reach). These include Chestnut Hill Reservoir located in the headwaters of Tannery Brook, the two Scovill Reservoirs located at the confluence of the Mad River (Upper Reach) and Lindsley Brook, and Hitchcock Lake located in the headwaters of Lily Brook. The net effect of these reservoirs is to delay the time of peak discharge on each watershed so that they all will not occur simultaneously and to provide storage for some of the flood waters.
Naugatuck River	—	channel improvements, a floodwall, and a protective dike	City of Waterbury	The USACE has constructed a local flood protection project along the east bank of the Naugatuck River in the Waterville section of the City of Waterbury extending from the Chase Brass and Copper Company Dam to the railroad crossing upstream. The flood protection project consists of channel improvements, a floodwall, and a protective dike. This confines the 0.2-percent-annual-chance flood to the Naugatuck River channel and protects a major industrial area.

Table 8: Non-Levee Flood Protection Measures

Flooding Source	Structure Name	Type of Measure	Location	Description of Measure
Naugatuck River	Thomaston Dam, Hall Meadow Brook Dam, East Branch Naugatuck River Dam, Northfield Brook Dam, Black Rock Dam, Hancock Brook Dam, and Hop Brook Dam	stream channel modification, flood-control dams	Torrington, City of Waterbury, and City of Derby	A large flood control dam was constructed on the main stem of the Naugatuck River at Thomaston and six additional flood control dams were constructed on tributaries. Along with the Thomaston Dam, the smaller Hall Meadow Brook, East Branch, Northfield Brook, Black Rock, Hancock Brook, and Hop Brook Dams provide a total flood capacity of 77,000 acre feet. Five local flood control projects were also constructed, resulting in extensive stream channel modifications in the Cities of Torrington, Waterbury, Ansonia and Derby. The system of dikes are designed to protect against a flood with a stage of 28 ft at O'Sullivan's Island (City of Derby).

4.4 Levees

For purposes of the NFIP, FEMA only recognizes levee systems that meet, and continue to meet, minimum design, operation, and maintenance standards that are consistent with comprehensive floodplain management criteria. The Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10) describes the information needed for FEMA to determine if a levee system reduces the risk from the 1% annual chance flood. This information must be supplied to FEMA by the community or other party when a flood risk study or restudy is conducted, when FIRMs are revised, or upon FEMA request. FEMA reviews the information for the purpose of establishing the appropriate FIRM flood zone.

Levee systems that are determined to reduce the risk from the 1% annual chance flood are accredited by FEMA. FEMA can also grant provisional accreditation to a levee system that was previously accredited on an effective FIRM and for which FEMA is awaiting data and/or documentation to demonstrate compliance with Section 65.10. These levee systems are referred to as Provisionally Accredited Levees, or PALs. Provisional accreditation provides communities and levee owners with a specified timeframe to obtain the necessary data to confirm the levee's certification status. Accredited levee systems and PALs are shown on the FIRM using the symbology shown in Figure 3 and in Table 9. If the required information for a PAL is not submitted within the required timeframe, or if information indicates that a levee system not longer meets Section 65.10, FEMA will de-accredit the levee system and issue an effective FIRM showing the levee-impacted area as a SFHA.

FEMA coordinates its programs with USACE, who may inspect, maintain, and repair levee systems. The USACE has authority under Public Law 84-99 to supplement local efforts to repair flood control projects that are damaged by floods. Like FEMA, the USACE provides a program to allow public sponsors or operators to address levee system maintenance deficiencies. Failure to do so within the required timeframe results in the levee system being placed in an inactive status in the USACE Rehabilitation and Inspection Program. Levee systems in an inactive status are ineligible for rehabilitation assistance under Public Law 84-99.

FEMA coordinated with the USACE, the local communities, and other organizations to compile a list of levees that exist within New Haven County. Table 9, "Levees," lists all accredited levees, PALs, and de-accredited levees shown on the FIRM for this FIS Report. Other categories of levees may also be included in the table. The Levee ID shown in this table may not match numbers based on other identification systems that were listed in previous FIS Reports. Levees identified as PALs in the table are labeled on the FIRM to indicate their provisional status.

Please note that the information presented in Table 9 is subject to change at any time. For that reason, the latest information regarding any USACE structure presented in the table should be obtained by contacting USACE and accessing the USACE national levee database. For levees owned and/or operated by someone other than the USACE, contact the local community shown in Table 31.

Table 9: Levees

Community	Flooding Source	Levee Location	Levee Owner	USACE Levee	Levee ID	Covered Under PL84-99 Program?	FIRM Panel(s)	Levee Status
City of Derby	Housatonic River	Left Bank	City of Derby	Yes	4305000033	Yes	09009C0404	Accredited
City of Derby	Naugatuck River	Right Bank	City of Derby	Yes	4305000033	Yes	09009C0404	Accredited
City of Ansonia	Naugatuck River	Left Bank	City of Ansonia, City of Derby	Yes	4305000035	Yes	09009C0402, 09009C0404	Accredited
City of Ansonia	Beaver Brook	Right Bank	City of Ansonia, City of Derby	Yes	4305000035	Yes	09009C0402, 09009C0404	Accredited

SECTION 5.0 – ENGINEERING METHODS

For the flooding sources in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded at least once on the average during any 10-, 25-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for floodplain management and for flood insurance rates. These events, commonly termed the 10-, 25-, 50-, 100-, and 500-year floods, have a 10-, 4-, 2-, 1-, and 0.2% annual chance, respectively, of being equaled or exceeded during any year.

Although the recurrence interval represents the long-term, average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (1-percent chance of annual exceedance) during the term of a 30-year mortgage is approximately 26 percent (about 3 in 10); for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

The engineering analyses described here incorporate the results of previously issued Letters of Map Change (LOMCs) listed in Table 27, “Incorporated Letters of Map Change”, which include Letters of Map Revision (LOMRs). For more information about LOMRs, refer to Section 6.5, “FIRM Revisions.”

5.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak elevation-frequency relationships for floods of the selected recurrence intervals for each flooding source studied. Hydrologic analyses are typically performed at the watershed level. Depending on factors such as watershed size and shape, land use and urbanization, and natural or man-made storage, various models or methodologies may be applied. A summary of the hydrologic methods applied to develop the discharges used in the hydraulic analyses for each stream is provided in Table 13. Greater detail (including assumptions, analysis, and results) is available in the archived project documentation.

A summary of the discharges is provided in Table 10. Frequency Discharge-Drainage Area Curves used to develop the hydrologic models may also be shown in Figure 7 for selected flooding sources. A summary of stillwater elevations developed for non-coastal flooding sources is provided in Table 11. (Coastal stillwater elevations are discussed in Section 5.3 and shown in Table 17.) Stream gage information is provided in Table 12.

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Bailey Creek	At Railroad	0.67	30	*	50	60	90
Bailey Creek	At Interstate Route 95	0.35	50	*	80	90	120
Bailey Creek	At a point approximately 170 feet downstream of Sandlewood Drive	0.35	60	*	110	130	190
Beacon Hill Brook	At mouth of Naugatuck River	10.44	975	*	1,610	1,940	2,870
Beacon Hill Brook	At Beacon Falls/Naugatuck corporate limits	10	845	*	1,380	1,675	2,500
Beacon Hill Brook	Below Straitsville Brook	9.13	815	*	1,335	1,620	2,400
Beacon Hill Brook	Below Marks Brook	7.77	765	*	1,250	1,520	2,250
Beacon Hill Brook	At upper study limit	5.33	665	*	1,080	1,320	1,950
Beaver Brook No. 1	At confluence with the Naugatuck River	3.53	497	*	892	12,201	20,001
Beaver Brook No. 2	At Naugatuck Avenue	2.17	450	*	890	1,100	1,425
Beaver Brook No. 2	At Bridgeport Avenue	1.6	390	*	760	920	1,100
Beaver Brook No. 2	At Bic Drive	1.5	460	*	750	900	1,150
Beaver Brook No. 2	At Interstate Route 95	0.98	315	*	524	607	768
Beaver Brook No. 2	At Naugatuck Avenue	0.57	270	*	400	450	600
Beaver Brook No. 2	At Plains Road	0.39	100	*	170	200	370
Beaver Brook No. 3	At Blake Street	2.03	150	*	230	280	370
Beaver Brook No. 3	At Crescent Street	1.77	80	*	100	110	130
Beaver Pond Brook	At mouth at Mad River (Lower Reach)	5.7	955	*	1,610	1,960	2,975
Beaver Pond Brook	Upstream of East Mountain Brook	4.8	795	*	1,335	1,625	2,465

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Beaver Pond Brook	Upstream of Turkey Hill Brook	3	515	*	865	1,055	1,595
Beaver Pond Brook	Upstream of Unnamed Tributary	2.5	430	*	715	870	1,315
Beaver Pond Brook	Downstream of Unnamed Tributary	1.7	305	*	515	625	940
Beaver Pond Brook	At upstream study limit	1.1	205	*	340	410	615
Bladens River (Lower Reach)	At confluence with the Naugatuck River	9.6	1,105	*	1,880	2,295	3,510
Bladens River (Lower Reach)	At confluence of Bladens River tributary	8.9	1,015	*	1,730	2,110	3,225
Bladens River (Upper Reach)	At Bethany/Seymour corporate limits	8.87	1,250	*	2,200	2,950	4,450
Bladens River (Upper Reach)	Upstream of confluence with Hopp Brook	5.51	800	*	1,400	1,900	2,800
Bladens River (Upper Reach)	At dam upstream of Bethmore Road	2.39	400	*	700	950	1,400
Bladens River (Upper Reach)	At Sanford Road	0.84	160	*	300	400	600
Bladens River Tributary	At confluence with the Bladens River (Lower Reach)	0.64	210	*	270	300	380
Bladens River Tributary	Approximately 438 feet upstream of Bunting Road	0.42	135	*	175	195	245
Branford River (Lower Reach)	See Frequency-Discharge, Drainage Area Curve - Figure 1	*	*	*	*	*	*
Branford River (Upper Reach)	At pipeline crossing	12.88	540	*	890	1,080	1,480

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Branford River (Upper Reach)	Above confluence with Munger Brook	8.43	180	*	410	520	880
Branford River (Upper Reach)	At road between Great Hill Road and North Street	8.07	135	*	345	455	805
Branford River (Upper Reach)	At Lake Gaillard	7.78	80	*	275	370	715
Bronson Brook	At mouth of Naugatuck River	4.71	680	*	1,135	1,380	2,070
Bronson Brook	Below Bronson Brook Tributary	4.39	620	*	1,030	1,250	1,875
Bronson Brook Tributary	At mouth of Bronson Brook	0.91	295	*	380	425	535
Bronson Brook Tributary	At Upper Study Limit	0.38	150	*	190	215	270
Brookdale Stream	At Johnson Road	0.7	200	*	300	350	500
Brookdale Stream	At Still Hill Road	0.69	200	*	300	350	500
Burr Brook	At confluence with Farm River	1.69	450	*	740	920	1,325
Burr Brook	At Brook Lane	1.45	405	*	660	820	1,180
Burr Brook	Above confluence with stream near Edwards Street	0.62	215	*	350	435	625
Camp Laurelwood Brook	At Summer Hill Road	1.04	260	*	370	470	820
Club Creek	See Frequency-Discharge, Drainage Area Curve - Figure 2	*	*	*	*	*	*
Coginchaug River	Upstream of Meeting House Hill Road	4.56	360	*	680	1,000	1,500
Cold Spring Brook	At mouth of Fulling Mill Brook	1.28	237	*	397	483	728
Cold Spring Brook	Downstream of tributary	0.59	196	*	253	282	358

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Cold Spring Brook	At upper study limit	0.31	106	*	137	153	193
Cove River	See Frequency-Discharge, Drainage Area Curve - Figure 3	*	*	*	*	*	*
Crow Hollow Brook	At the confluence with Sodom Brook	1.4	*	*	*	440	*
Crow Hollow Brook	Upstream of West Main Street	1	*	*	*	310	*
Crow Hollow Brook	Upstream of Notch Road	0.4	*	*	*	130	*
East River	Upstream of Clapboard Hill Road	17.6	1,000	*	1,700	2,000	3,800
East River	Downstream of confluence with Little	14	800	*	1,400	1,600	3,000
East River	Meadow Brook Upstream of confluence with Little Meadow Brook	10.1	636	*	1,113	1,271	2,384
Eaton Brook	At Whitney Avenue (State Route 10)	2.16	650	*	1,050	1,250	1,700
Eaton Brook	At Todd Street	1.83	550	*	900	1,100	1,450
Eaton Brook	At Shepard Avenue	1.37	450	*	700	850	1,100
Eaton Brook	At Johnson Road	0.44	250	*	400	500	650
Eaton Brook	At Westwoods Road	0.33	200	*	300	350	500
Eightmile Brook No. 1	At North Branford/North Haven corporate limits	1.27	235	*	385	475	665
Eightmile Brook No. 1	At Gail Drive	0.87	180	*	290	355	500
Eightmile Brook No. 1	At State Route 17	0.69	150	*	245	300	420
Eightmile Brook No. 2	At confluence with the Housatonic River	17.5	1,505	*	2,718	3,402	5,498

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Eightmile Brook No. 2	Approximately 0.42 mile upstream of Loughlin Road	17.3	1,487	*	2,682	3,354	5,390
Farley Creek	At the confluence with the Oyster River	1.27	160	*	267	323	523
Farley Creek	At Anderson Avenue	1.17	150	*	252	305	500
Farley Creek	At Brewster Street	0.78	103	*	174	209	340
Farley Creek	At Watrous Lane	0.6	80	*	136	163	265
Farm Brook	At Woodin Street	3.99	700	*	1,050	1,250	1,900
Farm Brook	At Wilbur Cross Parkway (State Route 15)	3.4	450	*	850	900	1,300
Farm River	See Frequency-Discharge, Drainage Area Curve - Figure 4	*	*	*	*	*	*
Farm River	At North Branford/East Haven corporate limits	15.83	2,320	*	3,760	4,660	6,520
Farm River	Above confluence with Burr Brook	13.9	2,160	*	3,520	4,370	6,300
Farm River	Above confluence with Tributary A	11.64	2,010	*	3,280	4,070	5,980
Farm River	Above confluence with Tributary B	9.45	1,720	*	2,810	3,480	5,110
Farm River	Above confluence with Gulf Brook	7.17	1,440	*	2,340	2,900	4,200
Farm River	At Cross Section U	5.6	1,230	*	1,990	2,470	3,570
Farm River	At Old Sols Path	3.7	1,050	*	1,610	1,940	2,700
Farm River	Above confluence with stream from Pistapaug Pond	1.95	470	*	740	890	1,250

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Five Mile Brook	At confluence with the Muddy River (Lower Reach)	2.51	400	*	550	660	950
Five Mile Brook	Just below the confluence with an unnamed tributary, approximately 400 feet downstream of North Hill Road	1.62	330	*	445	520	740
Fivemile Brook	At confluence the Housatonic River	1.94	408	*	738	923	1,492
Fivemile Brook	Approximately 1,600 feet upstream of East Hill Road	1.59	327	*	591	741	1,195
Fulling Mill Brook	At mouth of Naugatuck River	5.27	935	*	1,568	1,904	2,872
Fulling Mill Brook	Below Cold Spring Brook	5.09	881	*	1,479	1,796	2,709
Fulling Mill Brook	Below Schildgen Pond Brook	3.52	545	*	910	1,100	1,650
Fulling Mill Brook	At upper study limit	2.52	349	*	581	704	1,057
Fulling Mill Brook Tributary	At dam	0.82	170	*	255	320	460
Fulling Mill Brook Tributary	At Salem Road	0.55	130	*	190	240	355
Grieb Court Brook	At confluence with Muddy River	0.57	260	*	400	470	620
Gulf Brook	At confluence with Farm River	1.32	245	*	395	485	685
Gulf Brook	At Tommy's Path	1.2	225	*	370	455	635
Hammonasset River (Lower Reach)	At Boston Post Road	47.13	2,500	*	3,700	4,300	5,600
Hammonasset River (Lower Reach)	At Interstate Route 95	43.86	2,393	*	3,542	4,116	5,360

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Hammonasset River (Lower Reach)	At a point approximately 2.19 miles upstream of Interstate Route 95	39.97	2,261	*	3,346	3,888	5,064
Hammonasset River (Upper Reach)	At Chestnut Hill Road	24.8	1,700	*	2,550	2,900	3,950
Hammonasset River (Upper Reach)	At State Route 80	20.5	1,650	*	2,500	2,850	3,900
Hammonasset River (Upper Reach)	At Hammonasset Reservoir Dam	20.5	*	*	*	2,900	*
Hammonasset River (Upper Reach)	Above unnamed tributary	14.8	*	*	*	2300	*
Hammonasset River (Upper Reach)	Upstream of Bunker Hill Brook	7.9	*	*	*	2200	*
Hammonasset River (Upper Reach)	Upstream of Arrigoni Pond Brook	1.7	*	*	*	620	*
Hancock Brook	Mouth at Naugatuck River	3.5	980	*	1,720	2,190	3,850
Hancock Brook	Downstream of Unnamed Tributary	1.4	625	*	930	1,125	1,810
Hancock Brook	At upstream study limits	1.1	570	*	800	950	1,470
Hanover Street Brook	At confluence with the Quinnipiac River	0.47	60	*	110	160	220
Hanover Street Brook	Upstream of State Route 68	0.14	32	*	60	94	200
Harbor Brook	At the confluence with Quinnipiac River	12.1	*	*	*	3865	*
Harbor Brook	Upstream of Columbus Avenue	10.4	*	*	*	3685	*
Harbor Brook	Upstream of North Broad Street	8.6	*	*	*	3308	*
Harbor Brook	Upstream of Baldwin Pond	7.8	*	*	*	3153	*

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Hemp Swamp Brook	At mouth of Naugatuck River	2.73	485	*	830	1,015	1,540
Hemp Swamp Brook	Below Reservoir Tributary	2.61	395	*	680	830	1,275
Hemp Swamp Brook	Above Reservoir Tributary	0.93	260	*	335	375	475
Hemp Swamp Brook	Below Carrington Pond	0.75	205	*	260	290	370
Hop Brook (Lower Reach)	At mouth of Naugatuck River	17.5	677	*	722	742	1,907
Hop Brook (Lower Reach)	Below Pigeon Brook	17.3	663	*	700	716	1,869
Hop Brook (Lower Reach)	At Upper Study Limit	16.6	614	*	622	626	1,737
Hop Brook (Upper Reach)	Above Shattuck Brook	9.75	1,106	*	2,130	2,759	4,699
Hop Brook (Upper Reach)	Below Turtle Pond Brook	9.46	1,073	*	2,067	2,678	4,555
Hop Brook (Upper Reach)	Below Long Swamp Brook	9.24	1,049	*	2,018	2,617	4,446
Hop Brook (Upper Reach)	Above Long Swamp Brook	7.43	846	*	1,618	2,116	3,547
Hop Brook (Upper Reach)	Below Goat Brook	6.47	739	*	1,406	1,850	3,070
Hop Brook (Upper Reach)	Above Goat Brook	5.16	592	*	1,116	1,488	2,420
Hop Brook (Upper Reach)	Below Beetle Bung Pond Brook	4.47	515	*	964	1,296	2,078
Hop Brook (Upper Reach)	Below Miry Dam Pond Brook	4.24	489	*	913	1,233	1,964

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Hop Brook (Upper Reach)	Below Unnamed Tributary	3.36	391	*	719	989	1,527
Hop Brook (Upper Reach)	At Upper Study Limit	3.04	355	*	648	900	1,368
Hopeville Pond Brook	Mouth at NaugatuckRiver	1.3	280	*	480	585	890
Hopeville Pond Brook	Upstream of Unnamed Tributary	0.9	215	*	355	435	650
Hopeville Pond Brook	Upstream study limit	0.5	155	*	240	290	420
Hopp Brook	At confluence with Bladens River (Upper Reach)	3.36	450	*	850	1,050	1,650
Housatonic River (Lower Reach)	In Milford, below the Naugatuck River	1,890.00	60,000	*	125,000	170,000	330,000
Housatonic River (Lower Reach)	In Orange, below the confluence with the Naugatuck River	1,889.00	55,000	*	120,000	170,000	220,000
Housatonic River (Lower Reach)	Above confluence with the Naugatuck River	1,578.00	45,000	*	90,000	130,000	198,000
Housatonic River (Lower Reach)	Above Shelton/Derby Dam	1,574.00	45,000	*	90,000	130,000	198,000
Housatonic River (Lower Reach)	Below confluence with Eightmile Brook No. 2	1,559.00	45,000	*	90,000	130,000	198,000
Housatonic River (Lower Reach)	At Stevenson gaging station	1,541.00	42,000	*	87,000	126,000	196,000
Housatonic River (Upper Reach)	Southbury/Oxford corporate limits	1,522	42,000	*	87,000	126,000	196,000
Indian River	At Conrail	13.2	1,200	*	2,160	2,690	4,050
Indian River	At Clark Mill Dam	7.62	830	*	1,610	2,040	3,250

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Indian River	At Rose Mill Pond Dam	6.11	710	*	1,390	1,780	2,820
Indian River	At Orange/Milford corporate limits	5.76	680	*	1,330	1,700	2,700
Indian River	Downstream of the confluence with Silver Brook	5.39	650	*	1,260	1,620	2,570
Indian River	At Old Tavern Road	2.06	300	*	590	750	1,200
Indian River	At Racebrook Road (State Route 114)	0.82	135	*	265	340	535
Iron Stream	At Dream Lake	5.13	*	*	*	1250	*
Iron Stream	Upstream of Page Lot Brook	3.16	*	*	*	750	*
Jepp Brook	At Railroad Bridge	1.77	400	*	650	800	1,050
Jepp Brook	At Jepp Pond Dam	1.59	400	*	650	800	1,050
Jepp Brook	At Chatterton Way	1.13	300	*	500	600	800
Jepp Brook	At Still Hill Road	0.84	250	*	400	450	600
Judd Brook	At Interstate 84 culvert (Cheshire/Southington corporate limits)	4.69	560	*	1,030	1,280	1,850
Karls Brook	At the confluence with the Indian River	0.49	92	*	153	189	310
Karls Brook	At Boston Post Road	0.43	81	*	135	166	270
Jones Hill Road Brook	See Frequency-Discharge, Drainage Area Curve – Figure 2						
Lindsley Brook	At the confluence with Scovill Reservoir	1.94	240	*	445	620	895

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Lindsley Brook	At the intersection of Woodtick and Center Streets	1.18	190	*	360	500	720
Lindsley Brook	At the intersection of Woodtick and Upson Streets	0.94	170	*	325	455	650
Little Meadow Brook	At confluence with East River	3.9	355	*	466	578	1,360
Little Meadow Brook	Upstream of Little Meadow Road	2.8	276	*	363	450	1,058
Little River	At confluence with the Naugatuck River	15.7	1,340	*	2,330	2,865	4,435
Little River	At Seymour/Oxford corporate limits	15.12	1,340	*	2,330	2,860	4,430
Little River	Above confluence with Towantic Brook	7.78	760	*	1,400	1,725	2,750
Little River	Above confluence with Riggs Street Brook	4.54	496	*	918	1,160	1,880
Little River	Below Towner Lane	1.15	216	*	400	508	847
Little River	Above State Bridle Trail	0.8	172	*	320	408	675
Little River	Approximately 1,620 feet upstream of Christian Street	0.04	28	*	51	66	110
Long Meadow Pond Brook	At mouth of Naugatuck River	8.41	803	*	1,428	1,778	2,847
Long Meadow Pond Brook	Below Webb Brook	7	691	*	1,235	1,550	2,480
Long Meadow Pond Brook	At upper study limit	5.63	586	*	1,058	1,325	2,150
Long Swamp Brook	At Mouth	1.81	278	*	536	691	1,202
Long Swamp Brook	Above Brook Lane	1.57	241	*	465	600	1,044

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Long Swamp Brook	Above State Highway 64	1.45	223	*	430	555	965
Long Swamp Brook	Below Memorial School	1.18	182	*	351	453	787
Long Swamp Brook	At upper study limit	0.84	131	*	232	406	566
Lyman Hall Brook	At Reskin Drive	1.14	330	*	530	620	810
Mad River (Lower Reach)	Mouth at Naugatuck River	26.4	2,795	*	4,825	5,935	9,240
Mad River (Lower Reach)	Downstream of Beaver Pond Brook	23.9	2,350	*	4,060	4,990	7,775
Mad River (Lower Reach)	Upstream of Beaver Pond Brook	18	1,505	*	2,595	3,190	4,970
Mad River (Lower Reach)	At upstream study limit	15.9	1,410	*	2,435	2,995	4,660
Mad River (Upper Reach)	Above the confluence with Old Tannery Brook	12.6	1,295	*	2,195	2,665	4,190
Mad River (Upper Reach)	Above the confluence with Lily Brook	8.4	700	*	1,500	2,310	3,280
Mad River (Upper Reach)	At Scovill Reservoir	5.5	450	*	980	1,375	1,980
Maloney Brook	At confluence with Farm River	1	255	*	425	532	761
Mansion Road Brook	At confluence with the Quinnipiac River	0.9	115	*	215	330	660
Meetinghouse Brook	At confluence with the Quinnipiac River	3.72	1,580	*	2,310	2,680	3,440
Meetinghouse Brook	At cross section I	1.93	1,170	*	1,660	1,900	2,400
Mill River	At Whitney Dam	36.4	1,400	*	2,200	2,500	3,200
Mill River	At Connolly Parkway	32.9	1,300	*	2,000	2,300	3,000

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Mill River	At Clarks Pond Dam	25	1,100	*	1,700	1,900	2,500
Mill River	At River Road	20	900	*	1,400	1,600	2,100
Mill River	At the Cheshire/Hamden corporate limits	5.88	540	*	1,100	1,350	2,000
Mill River	Upstream of confluence with unnamed tributary (near Old Lane Road)	3.65	250	*	500	650	900
Mill River	At Mansion Road	2.12	145	*	292	387	760
Mill River	At Wallingford Road	0.88	44	*	89	119	232
Morris Creek	See Frequency-Discharge, Drainage Area Curves – Figure 5	*	*	*	*	*	*
Mountain Brook	At Juggernaut Road	1.39	225	*	330	405	590
Muddy River (Lower Reach)	At confluence with the Quinnipiac River	21.6	2,260	*	3,660	4,430	6,125
Muddy River (Lower Reach)	Just below the confluence with Five Mile Brook	20.4	2,200	*	3,565	4,315	5,965
Muddy River (Lower Reach)	Just below the confluence with an unnamed stream, approximately 3,750 feet downstream with Patten Road	17.4	2,050	*	3,320	4,020	5,550
Muddy River (Lower Reach)	Just below the confluence with Eightmile Brook No. 1	16.3	1,910	*	3,095	3,750	5,180
Muddy River (Lower Reach)	At Clintonville Road	14.6	1,735	*	2,810	3,400	4,700
Muddy River (Upper Reach)	At Wallingford/North Branford corporate limits	12.4	1,710	*	2,770	3,350	4,630

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Muddy River (Upper Reach)	At McKenzie Reservoir	8.92	1,560	*	2,490	2,980	4,030
Muddy River (Upper Reach)	At Railroad Bridge	6.06	850	*	1,320	1,780	2,150
Muddy River (Upper Reach)	At cross section AB	6.06	1,150	*	1,840	2,220	3,010
Muddy River (Upper Reach)	At confluence of Spring Brook	5.89	1,130	*	1,800	2,180	2,950
Muddy River (Upper Reach)	At Williams Road	1.95	440	*	710	860	1,180
Muddy River (Upper Reach)	At Hampton Trail	1.27	360	*	560	660	870
Muddy River Tributary C	At North Branford/North Haven corporate limits	0.78	165	*	265	330	460
Muddy River Tributary C	At Cross Section D	0.65	145	*	230	285	400
Muddy River Tributary C	At Woodvale Drive	0.32	85	*	135	170	235
Muddy River Tributary C	At Woodhouse Avenue	0.11	40	*	60	75	105
Munger Brook	At confluence with Branford River	4.09	430	*	720	870	1,250
Munger Brook	At Ciro Road	3.5	390	*	650	790	1,130
Munger Brook	At Beech Street	2.83	330	*	550	670	960
Munger Brook	At Manor Drive	1.29	185	*	310	370	530
Naugatuck River	At Ansonia/Derby corporate limits	309	11,400	*	25,900	36,000	81,900

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Naugatuck River	At Seymour/Ansonia corporate limits	300	11,400	*	25,900	36,000	81,900
Naugatuck River	Downstream of confluence with the Little River	297	11,200	*	25,500	35,500	80,800
Naugatuck River	Downstream of confluence with the Bladens River (Lower Reach)	281	10,300	*	23,400	32,700	74,900
Naugatuck River	Downstream of confluence with Rimmons Brook	271	9,700	*	22,200	30,900	71,100
Naugatuck River	At Beacon Falls Seymour corporate limits	269	9,600	*	21,900	30,500	70,400
Naugatuck River	Below Hemp Swamp Brook	267	9,500	*	21,600	30,100	69,600
Naugatuck River	Below Bronson Brook	264	9,300	*	21,200	29,600	68,500
Naugatuck River	Below Spruce Brook	257	8,900	*	20,300	28,200	65,700
Naugatuck River	Below Beacon Hill Brook	254	8,700	*	19,900	27,700	64,500
Naugatuck River	Below Long Meadow Pond Brook	244	8,100	*	18,500	25,700	60,500
Naugatuck River	Below Hop Brook	232	7,300	*	16,700	23,300	55,400
Naugatuck River	Below Fulling Mill Brook	215	7,300	*	16,700	23,200	53,500
Naugatuck River	Above Fulling Mill Brook	209	6,900	*	15,700	21,900	50,900
Naugatuck River	At Naugatuck/Waterbury corporate limits	206	6,900	*	15,700	21,900	50,900
Naugatuck River	Downstream of Mad River (Lower Reach)	205	6,650	*	15,100	21,100	49,100
Naugatuck River	Upstream of Mad River (Lower Reach)	179	5,800	*	10,850	15,100	36,800

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Naugatuck River	At Freight Street Bridge	175	5,700	*	9,600	13,350	33,100
Naugatuck River	Upstream of Steel Brook	155	5,500	*	5,600	8,580	23,200
Naugatuck River	At Chase Brass Bridge	137	5,300	*	5,400	8,000	21,600
Neck River	At Goulds Pond (Guilford)	4.3	680	*	1,100	1,270	1,800
Neck River	At Goulds Pond (Madison)	4.26	800	*	1,300	1,270	2,170
Neck River	Upstream of Blim Shed Road	3.06	*	*	*	1,270	*
Neck River	Upstream of Deepwood Drive	1.43	*	*	*	360	*
Oakdale Brook	At State Route 15	0.65	610	*	900	1040	1340
Oakdale Brook	At Montowese Trail Road	0.32	300	*	400	510	660
Old Field Creek	See Frequency-Discharge, Drainage Area Curves - Figure 6	*	*	*	*	*	*
Old Tannery Brook	At the confluence with the Mad River (Upper Reach)	3.16	290	*	600	820	1,175
Old Tannery Brook	At State Route 69	2.51	280	*	530	590	920
Pine Brook	At confluence with the Quinnipiac River	1.65	300	*	400	450	620
Pine Brook	At Kings Highway	1.45	250	*	360	400	560
Pomperaug River	Mouth at Housatonic River	88.7	7000	*	15000	21000	42000
Pomperaug River	At dam in South Britain	79.3	6000	*	13000	18000	36,000
Quinnipiac River	At the North Haven/Hamden corporate limits	160	4749	*	7849	9158	13082
Quinnipiac River	At Sackett Point Road	131	4129	*	6824	7961	11373
Quinnipiac River	At USGS gaging station No. 01196500	115	3900	*	5700	6500	7,380

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Quinnipiac River	At the Meriden/Wallingford corporate limits	96	*	*	*	6,400	*
Quinnipiac River	Upstream of confluence with Sodom Brook and Harbor Brook	76	*	*	*	5,400	*
Quinnipiac River	At the Cheshire/Meriden corporate limits	76	3,000	*	4,600	5,400	7,400
Quinnipiac River	Approximately 2,900 feet downstream of East Johnson Avenue	72.1	2,900	*	4,450	5,200	7,400
Race Brook	At the confluence with the Wepawaug River (Lower Reach)	4.16	475	*	670	790	1,150
Race Brook	Approximately 200 feet downstream of Lambert Road at confluence with tributary	3.63	425	*	600	710	1,030
Race Brook	Upstream of the confluence with tributary stream	2.33	300	*	500	630	1,000
Race Brook	At Woodbridge/Orange corporate limits	2.26	300	*	500	630	1,000
Riggs Street Brook	At confluence with Little River	2.8	272	*	505	640	1,068
Riggs Street Brook	Above confluence with Jacks Brook	0.86	196	*	300	356	512
Riggs Street Brook	Approximately 1.16 miles upstream of Riggs Street	0.32	155	*	200	223	282
Schildgen Pond Brook	At mouth of Fulling Mill Brook	0.75	230	*	294	328	415

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Schildgen Pond Brook	Below Dam	0.65	187	*	241	269	340
Schildgen Pond Brook	At upper study limit	0.08	39	*	50	56	71
Shepard Brook	At Wilbur Cross Parkway	3.6	1,040	*	1,620	1,870	2,330
Shepard Brook	At Dixwell Avenue	2.83	900	*	1,400	1,550	1,750
Shepard Brook	At Turners Pond Dam	2.51	900	*	1,400	1,650	2,200
Shepard Brook	At Sherman Avenue	1.14	400	*	650	750	1,000
Silver Brook	Just upstream of the confluence with the Indian River	2.91	310	*	440	500	770
Silver Brook	At the confluence with Trout Brook	1.91	220	*	310	355	550
Silver Brook	At Derby Avenue (State Route 34)	0.73	95	*	135	150	235
Sodom Brook	At the confluence with Quinnipiac River	5.5	*	*	*	1,200	*
Sodom Brook	Upstream of Crow Hollow Brook	3.8	*	*	*	760	*
Sodom Brook	Upstream of West Main Street	3.1	*	*	*	685	*
Sodom Brook	Upstream of Springdale Street	2.6	*	*	*	630	*
Sodom Brook	Upstream of Railroad	2.1	*	*	*	575	*
Sodom Brook	Upstream of State Route 66	1.5	*	*	*	450	*
Sodom Brook	Upstream of Kensington Avenue	1.1	*	*	*	300	*

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Spoon Shop Brook	At the confluence with Harbor Brook	3.8	*	*	*	1200	*
Spoon Shop Brook	Upstream of Maple Avenue	3.1	*	*	*	1000	*
Steel Brook	Mouth at Naugatuck River	17	1,970	*	3,820	4,950	8,705
Steel Brook	Downstream of Clough Brook	16.5	1,915	*	3,715	4,810	8,465
Steel Brook	Upstream of Clough Brook	16.2	1,870	*	3,630	4,700	8,265
Steel Brook	Downstream of Turkey Brook	14.9	1,725	*	3,345	4,335	7,620
Steel Brook	At upstream study limit	12.4	1,410	*	2,740	3,550	6,245
Stubby Brook	At the confluence with the Indian River	1.25	200	*	333	409	670
Stubby Brook	At Cherry Street	0.98	163	*	272	334	550
Stubby Brook	At Sunnyside Court	0.83	142	*	235	289	470
Stubby Brook	At the Connecticut Turnpike	0.74	128	*	213	262	425
Stubby Brook	At Cedarhurst Lane	0.68	120	*	200	245	400
Tenmile River	At the Cheshire/Southington corporate limits	20.3	900	*	1,500	1,800	2,300
Tenmile River	Upstream of confluence with Judd Brook	10.9	400	*	900	1,100	1,500
Tenmile River	Upstream of confluence with Cuff Brook	7.41	250	*	700	900	1,300
Tenmile River	Upstream of confluence with Mountain Brook	3.24	150	*	600	800	1,200
Tenmile River	At the Prospect/Cheshire corporate limits	2.53	320	*	480	580	830
Tumble Brook	At the confluence with the Indian River	0.35	67	*	110	136	220

*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Tumble Brook	At Boston Post Road	0.29	57	*	93	115	190
Tumble Brook	At Kindel Drive	0.23	47	*	76	94	150
Two Mile Brook	At Ansonia/Derby corporate limits	1.3	195	*	400	520	750
Two Mile Brook	At State Route 243 (Pulaski Highway)	1.02	155	*	340	425	615
Two Mile Brook	At Ford Street	0.64	110	*	225	310	445
Two Mile Brook	At Milan Street	0.25	60	*	90	155	220
Watermans Brook	At confluence with the Quinnipiac River	1.27	150	*	215	255	390
Watermans Brook	At Clintonville Road	0.97	120	*	170	200	305
Watermans Brook	At Bassett Road	0.46	90	*	120	140	210
Webb Brook	At mouth of Long Meadow Pond Brook	0.51	129	*	166	186	235
Webb Brook	Downstream of Tributary	0.27	118	*	152	169	214
Webb Brook	At upper study limit	0.11	45	*	58	65	82
Wepawaug River (Lower Reach)	At New Haven Avenue	19.8	1,600	*	2,820	3,430	5,100
Wepawaug River (Lower Reach)	At Walnut Street	18.4	1,510	*	2,700	3,310	4,950
Wepawaug River (Lower Reach)	Above Baldwin Swamp Tributary	16.6	1,430	*	2,530	3,110	4,650
Wepawaug River (Lower Reach)	At the Milford/Orange corporate limits	15.05	1,380	*	2,360	2,900	4,350
Wepawaug River (Lower Reach)	Downstream of the confluence with Race Brook	12.44	1,170	*	2,070	2,550	3,810

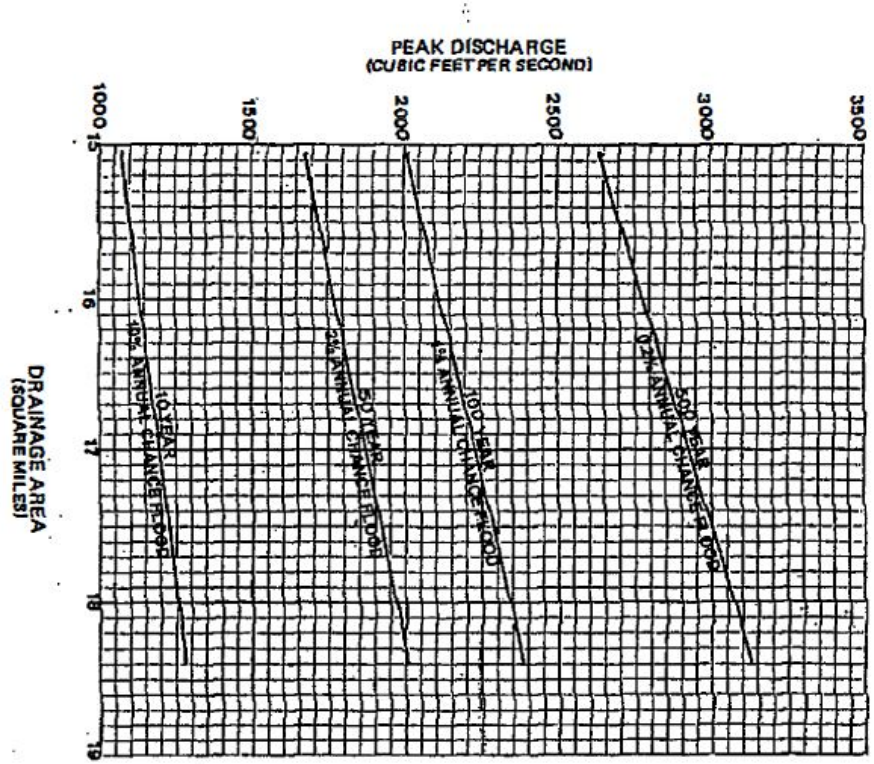
*Not calculated for this Flood Risk Project

Table 10: Summary of Discharges

Flooding Source	Location	Drainage Area (Square Miles)	Peak Discharge (cfs)				
			10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Whitemare Brook	At confluence with Beaver Brook No. 1	0.25	97	*	158	187	2551
Willow Brook No. 1	At confluence with Mill River	13.04	1,050	*	2,020	2,525	3,450
Willow Brook No. 1	Upstream of confluence with Jepp Brook	10.53	850	*	1,615	1,995	2,880
Willow Brook No. 1	At the Cheshire/Hamden corporate limits	9.09	495	*	1,070	1,460	2,800
Willow Brook No. 1	Upstream of Higgins Road	2.48	135	*	290	400	760
Willow Brook No. 2	At the confluence with Harbor Brook	3.3	*	*	*	1,400	*
Willow Brook No. 2	Upstream of Interstate Route 91	2	*	*	*	800	*
Willow Brook No. 2	Upstream of East Road	1	*	*	*	400	*
Wintergreen Brook	At Blake Street	10.88	1,600	*	2,300	2,750	3,550
Wintergreen Brook	At Wilmont Avenue	8.42	1,500	*	2,150	2,550	3,300
Woodings Pond Brook	At U.S. Route 5A	1.7	760	*	1,140	1,340	1,730
Woodings Pond Brook	At Ridgewood Road	0.58	320	*	470	540	700
Wooster Brook	At Mouth	1.74	286	*	526	665	1,102
Wooster Brook	At Middlebury/Waterbury corporate limits	1.3	285	*	525	665	1,100
Wooster Brook	Downstream of Route 64	1	230	*	380	465	720
Wooster Brook	At mouth of Tracy Pond	0.7	205	*	315	375	555
Wooster Brook	At upstream study limit	0.2	170	*	220	245	310

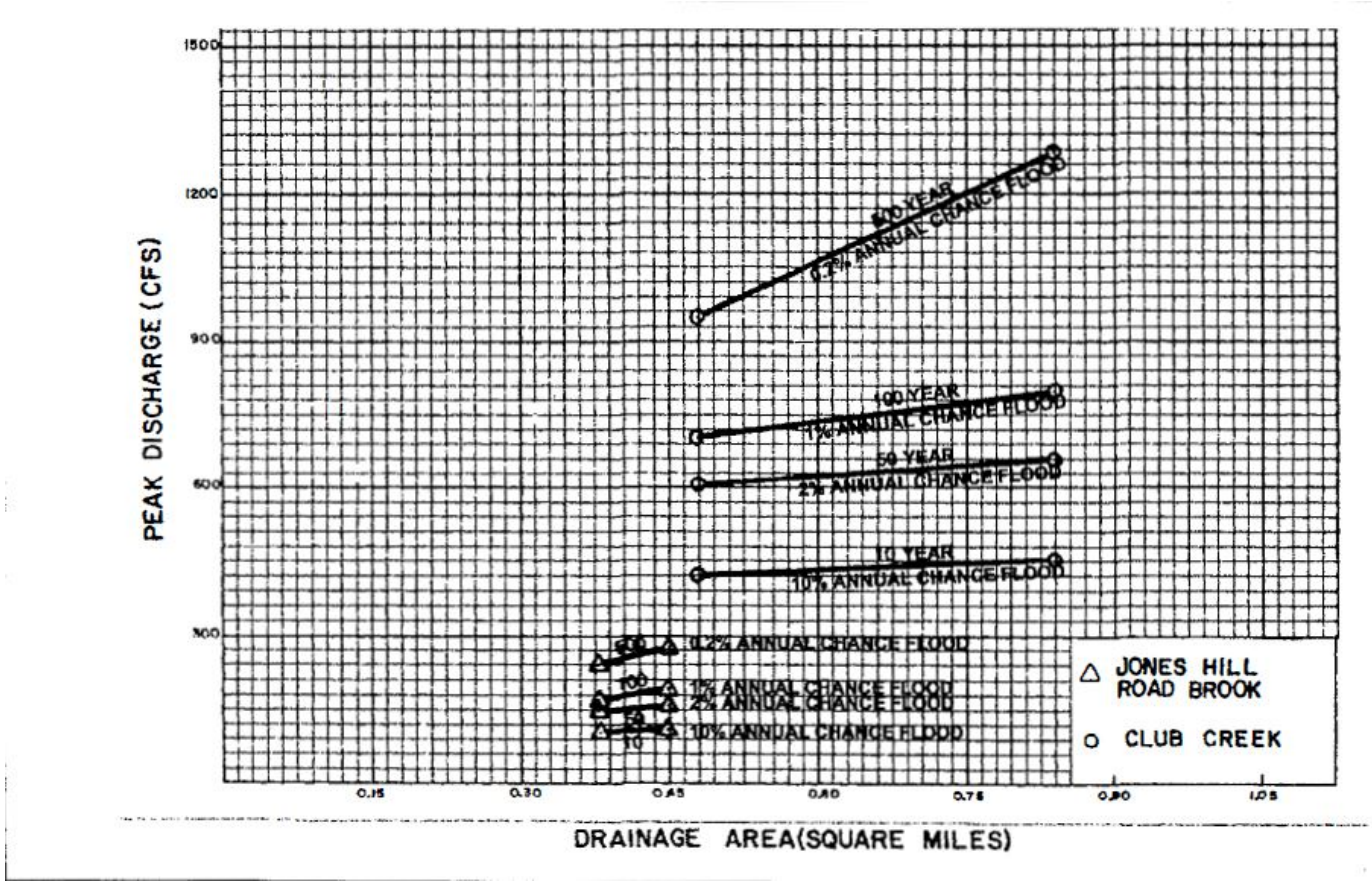
*Not calculated for this Flood Risk Project

Figure 7: Frequency Discharge-Drainage Area Curves



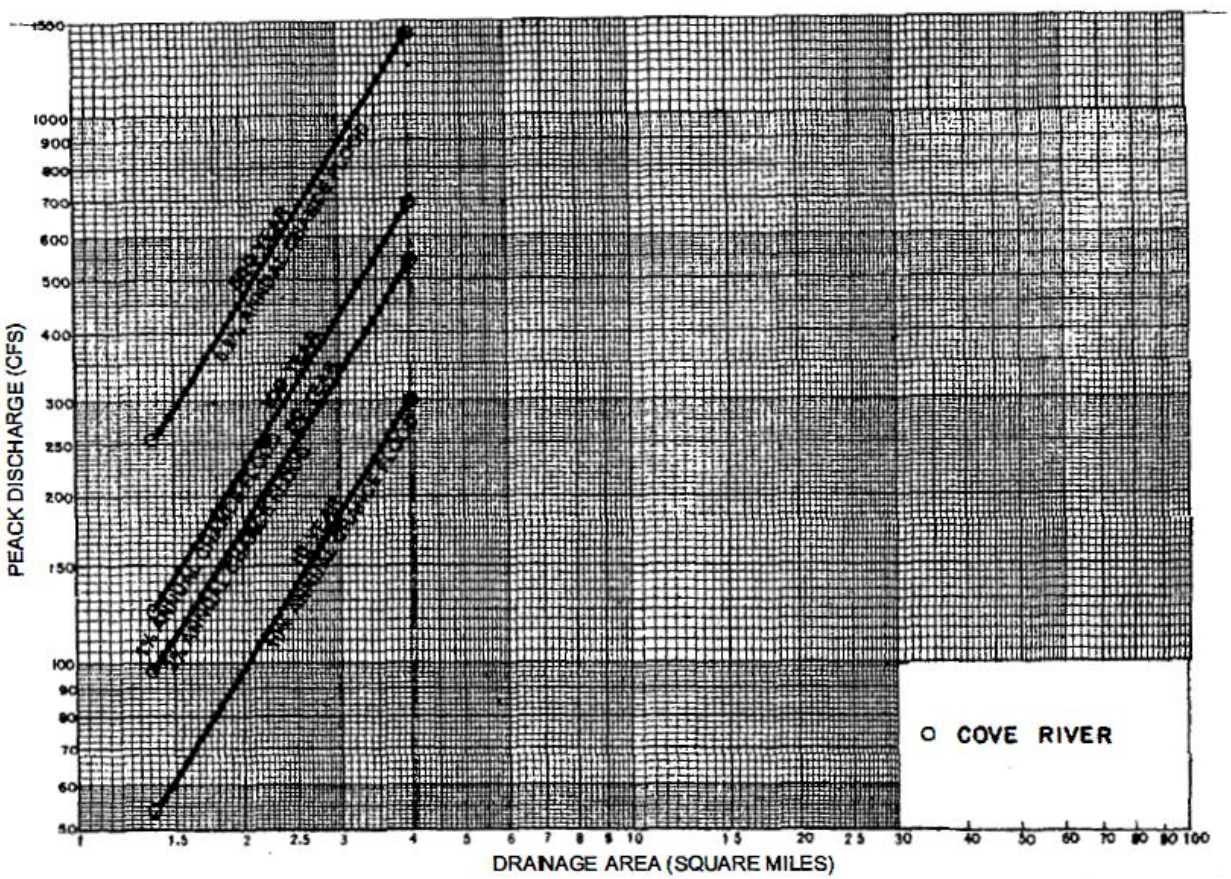
Branford River (Lower Reach)

Figure 8: Frequency Discharge-Drainage Area Curves



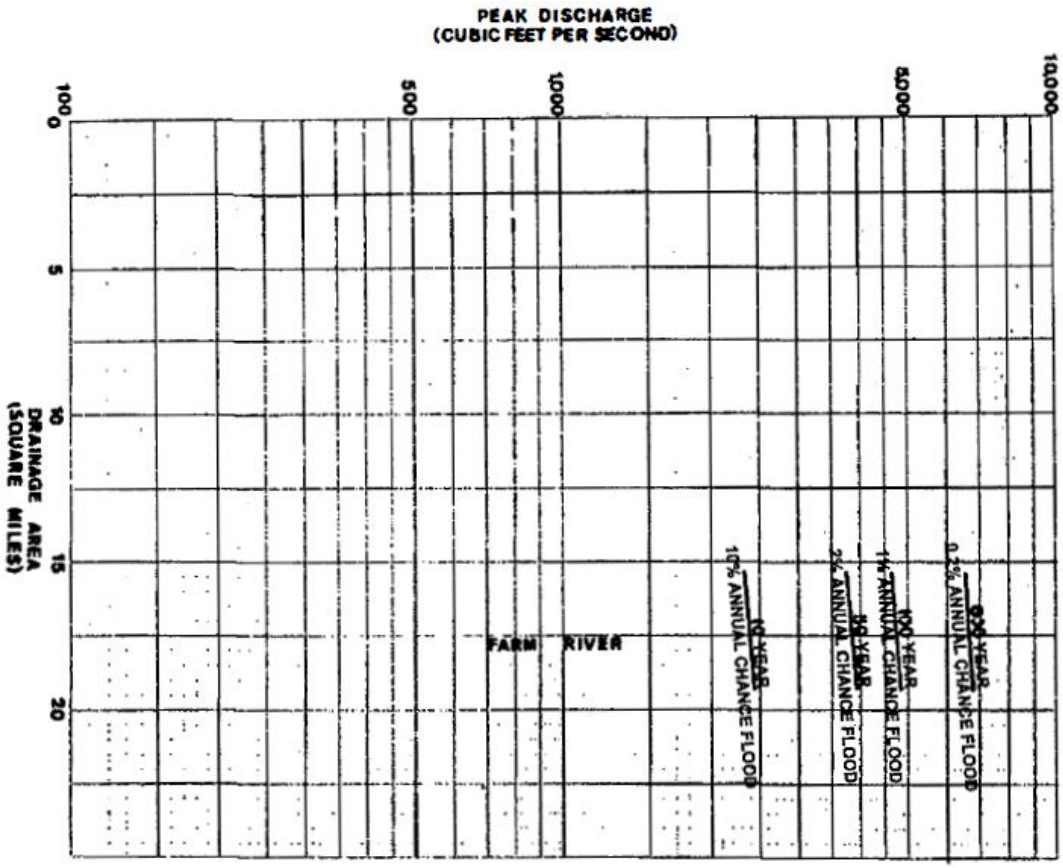
Jones Hill Road Brook and Club Creek

Figure 9: Frequency Discharge-Drainage Area Curves



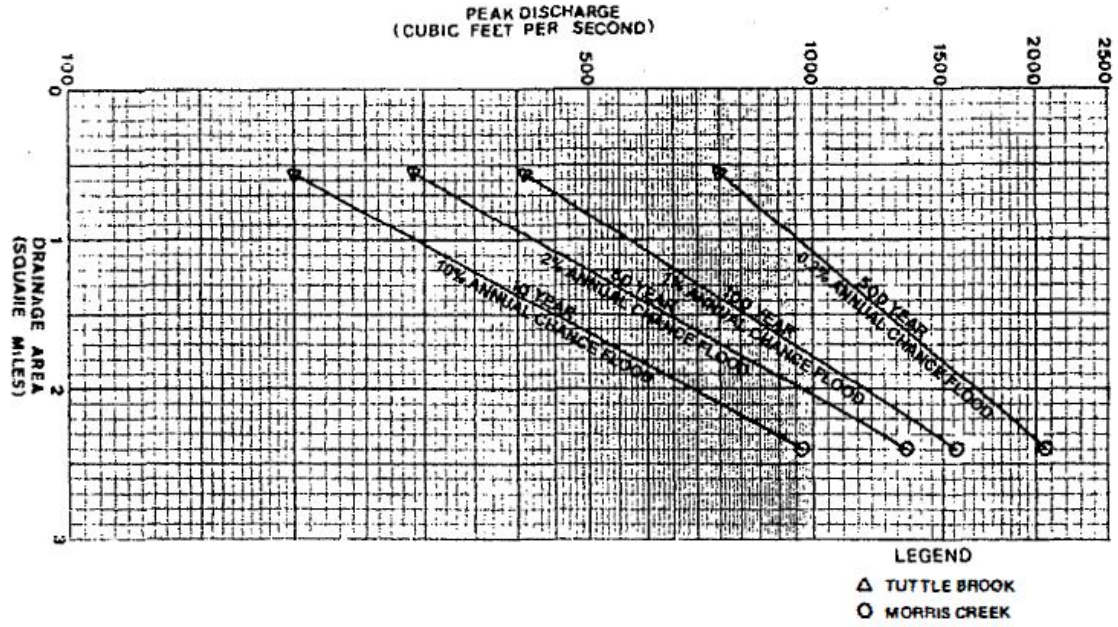
Cove River

Figure 10: Frequency Discharge-Drainage Area Curves



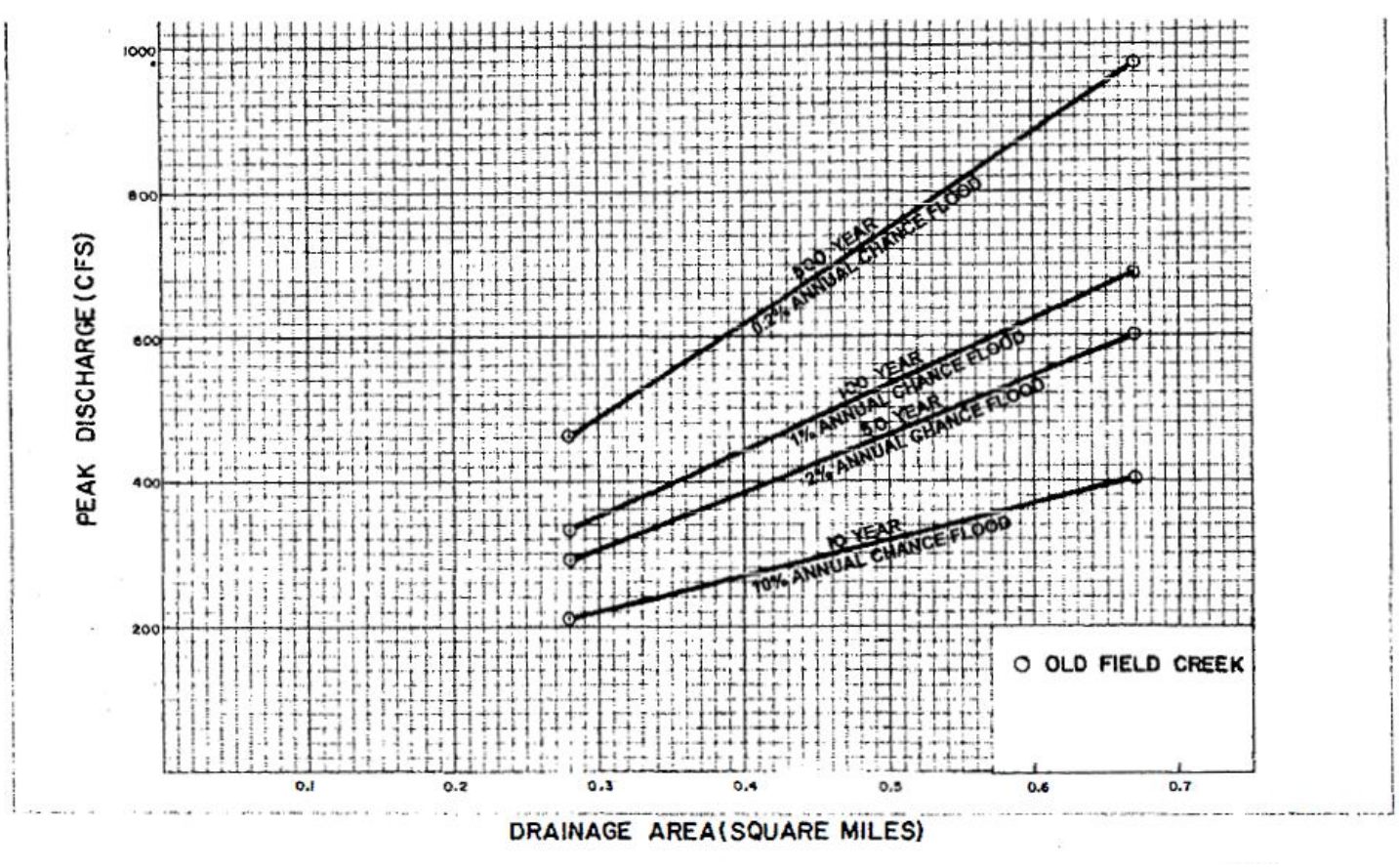
Farm River

Figure 11: Frequency Discharge-Drainage Area Curves



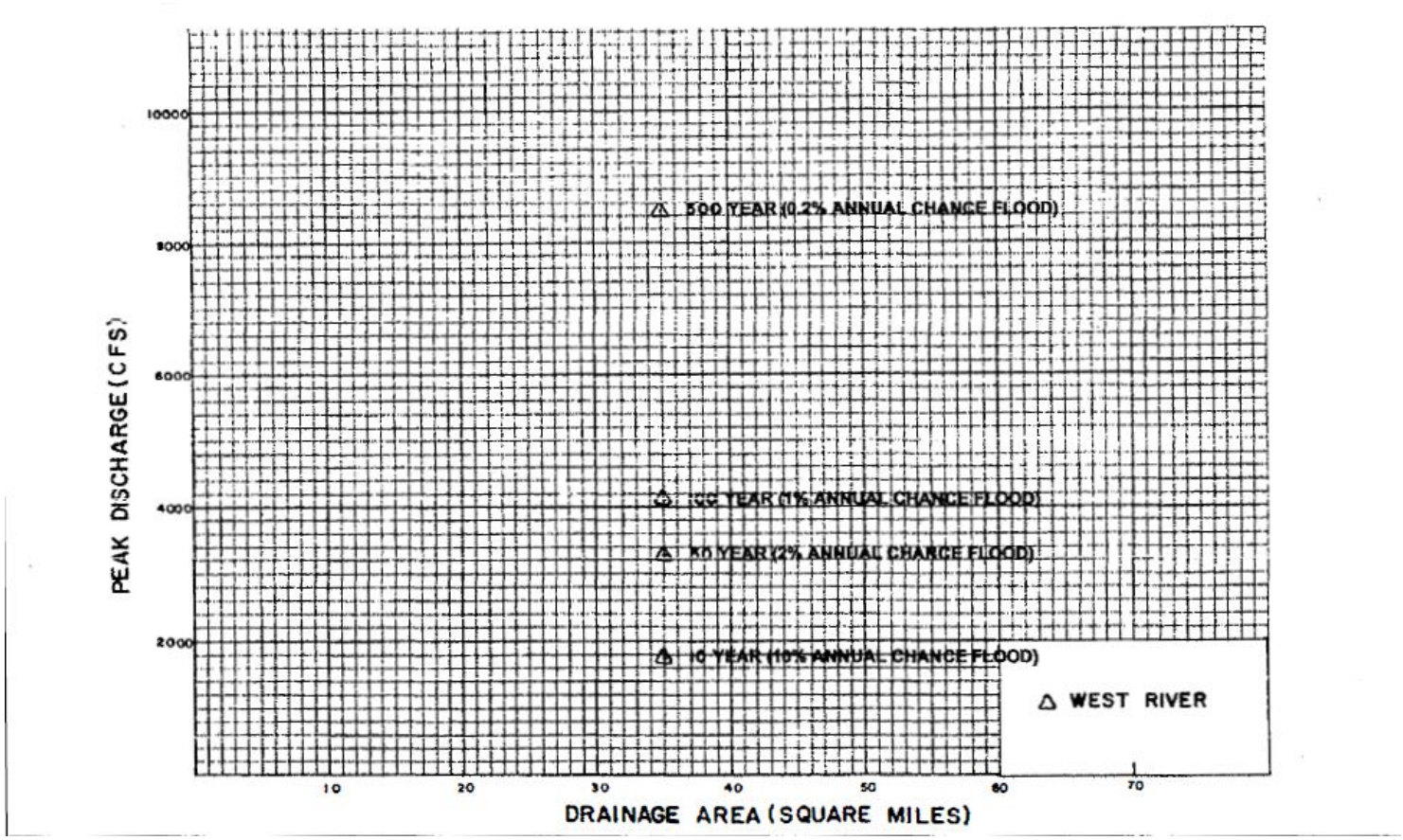
Morris Creek – Tuttle Brook

Figure 12: Frequency Discharge-Drainage Area Curves



Old Field Creek

Figure 13: Frequency Discharge-Drainage Area Curves



West River

Table 11: Summary of Non-Coastal Stillwater Elevations

Flooding Source	Location	Elevations (feet NAVD88)				
		10% Annual Chance	4% Annual Chance	2% Annual Chance	1% Annual Chance	0.2% Annual Chance
Lake Zoar on Housatonic River		100.0	*	105.0	108.2	115.0

*Not calculated for this Flood Risk Project

Table 12: Stream Gage Information used to Determine Discharges

Flooding Source	Gage Identifier	Agency that Maintains Gage	Site Name	Drainage Area (Square Miles)	Period of Record	
					From	To
Harbor Brook	01196259	USGS	Harbor Brook at Meriden, CT	11.9	1951	1984
Quinnipiac River	01196500	USGS	Quinnipiac River at Wallingford, CT	115	1931	2013
Muddy River	01196561	USGS	Muddy River near East Wallingford, CT	8.88	2008	2013
Muddy River	01196580	USGS	Muddy River near North Haven, CT	18	1963	1974
Willow Brook	01196600	USGS	Willow Brook near Cheshire, CT	9.34	1960	1983
Mill River	01196600	USGS	Mill River near Hamden, CT	24.5	1969	2013
Mill River	01196626	USGS	Mill River at Hamden, CT	36.4	1973	1982
Wepawaug River	01196700	USGS	Wepawaug River at Milford, CT	18.4	1962	1984
Pomperaug River	01204000	USGS	Pomperaug River at Southbury, CT	75.1	1932	—
Housatonic River	01205500	USGS	Housatonic River at Stevenson, CT		1929	—
Hop Brook	01208400	USGS	Hop Brook near Middlebury,CT	9.43	1962	1975
Hop Brook	01208420	USGS	Hop Brook near Naugatuck, CT	16.3	1955, 1970	2003
Naugatuck River	01208500	USGS	Naugatuck River at Beacon Falls, CT	260	1920	—
Little River	01208700	USGS	Little River at Oxford, CT	4.54	1960	1984