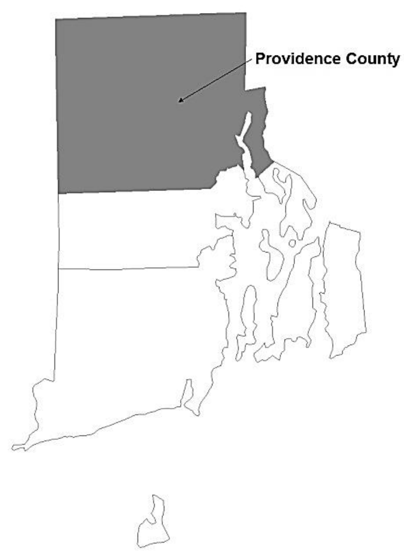
# FLOOD INSURANCE STUDY

## VOLUME 1 OF 3

# PROVIDENCE COUNTY, RHODE ISLAND
## (ALL JURISDICTIONS)

| COMMUNITY NAME | COMMUNITY NUMBER |
|---|---|
| BURRILLVILLE, TOWN OF | 440013 |
| CENTRAL FALLS, CITY OF | 445394 |
| CRANSTON, CITY OF | 445396 |
| CUMBERLAND, TOWN OF | 440016 |
| EAST PROVIDENCE, CITY OF | 445398 |
| FOSTER, TOWN OF | 440033 |
| GLOCESTER, TOWN OF | 440034 |
| JOHNSTON, TOWN OF | 440018 |
| LINCOLN, TOWN OF | 445400 |
| NORTH PROVIDENCE, TOWN OF | 440020 |
| NORTH SMITHFIELD, TOWN OF | 440021 |
| PAWTUCKET, CITY OF | 440022 |
| PROVIDENCE, CITY OF | 445406 |
| SCITUATE, TOWN OF | 440024 |
| SMITHFIELD, TOWN OF | 440025 |
| WOONSOCKET, CITY OF | 445411 |




REVISED
OCTOBER 2, 2015

Federal Emergency Management Agency

**FLOOD INSURANCE STUDY NUMBER**
**44007CV001C**

NOTICE TO
FLOOD INSURANCE STUDY USERS

Communities participating in the National Flood Insurance Program have established repositories of flood hazard data for floodplain management and flood insurance purposes. This Flood Insurance Study (FIS) may not contain all data available within the repository. It is advisable to contact the community repository for any additional data.

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

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

Part or all of this Flood Insurance Study may be revised and republished at any time. In addition, part of this Flood Insurance Study may be revised by the Letter of Map Revision process, which does not involve republication or redistribution of the Flood Insurance Study. It is, therefore, the responsibility of the user to consult with community officials and to check the community repository to obtain the most current Flood Insurance Study components.

Initial Countywide FIS Effective Date: March 2, 2009

Revised Countywide FIS Effective Date: September 18, 2013

Second Revised Countywide FIS Effective Date: October 2, 2015

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**FLOOD INSURANCE STUDY**
**BRISTOL COUNTY, MASSACHUSETTS (ALL JURISDICTIONS)**

# 1.0 INTRODUCTION

## 1.1 Purpose of Study

This Flood Insurance Study (FIS) revises and updates information on the existence and severity of flood hazards in the geographic area of Providence County, including the Cities of Central Falls, Cranston, East Providence, Pawtucket, Providence, and Woonsocket and the Towns of Burrillville, Cumberland, Foster, Glocester, Johnston, Lincoln, North Providence, North Smithfield, Scituate, and Smithfield (referred to collectively herein as Providence County). Please note that the Town of Foster had no published FIS text. This study aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood-risk data for various areas of the community that will be used to establish actuarial flood insurance rates and to assist the community in its efforts to promote sound floodplain management. Minimum floodplain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, floodplain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence, and the state (or other jurisdictional agency) will be able to explain them.

## 1.2 Authority and Acknowledgments

The sources of authority for this FIS report are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

This FIS was prepared to incorporate all the communities within Bristol County in a countywide format. Information on the authority and acknowledgements for each jurisdiction included in this countywide FIS, as compiled from their previously printed FIS reports, is shown below:

| | |
|---|---|
| Burrillville, Town of: | The hydrologic and hydraulic analyses for the FIS report dated January 1979 were prepared by the Soil Conservation Service (SCS) for the Federal Emergency Management Agency (FEMA) under Inter-Agency Agreement No. IAA-H-9-96. That work was completed in April 1977. |
| Central Falls, City of: | The hydrologic and hydraulic analyses for the FIS report dated June 6, 1981 represent a revision of the original analyses by the U.S. Army Corps of Engineers (USACE) and were prepared by Harris-Toups Associates for FEMA. That work was completed in December 1979. |

| | |
|---|---|
| Cranston, City of: | The hydrologic and hydraulic analyses for the FIS dated May 1, 1984 represent a revision of the original analyses by the SCS for FEMA under Inter-Agency Agreement No. IAA-H-9-71. The updated version was prepared by Harris-Toups Associates under Contract No. EMW-C-0543. That work was completed in July 1981. |
| Cumberland, Town of: | For the February 16, 1990 FIS report, the hydrologic and hydraulic analyses were prepared by the USACE for FEMA under Inter-Agency Agreement No. EMW-84-E-1506, Project Order No. 1, Amendment No. 26. That work was completed in September 1987.<br><br>For the June 16, 1992 FIS report, the hydrologic and hydraulic analyses were prepared by Garofalo & Associates, Inc. That work was completed in June 1991. |
| East Providence, City of: | The hydrologic and hydraulic analyses for the original FIS were prepared by the USACE for FEMA. For the December 1, 1982 FIS report, the hydrologic and hydraulic analyses were prepared by Harris-Toups Associates for FEMA under Contract No. H-4776. That work was completed in November 1986. The wave-height analyses were prepared by D&D for FEMA under Contract No. EMW-C-0543. That work was completed in November 1981. |
| Glocester, Town of: | The hydrologic and hydraulic analyses for the original February 1979 FIS report were prepared by the SCS for FEMA under Inter-Agency Agreement No. IAA-H-9-76, Project Order No. 9. That work was completed in April 1977.<br><br>For the March 3, 1992 FIS report, the hydrologic analysis was prepared by Roald Haestad, Inc., for FEMA under Contract No. EMW-90-C-3126. That work was completed in October 1990. Also for the March 3, 1992 FIS, the hydraulic analysis for Mary Brown Brook was taken from the FIS for the Town of Putnam, Connecticut (FEMA, October 18, 1988). |
| Johnston, Town of: | The hydrologic and hydraulic analyses for the FIS report dated March 1978 were prepared by the SCS for FEMA under Inter-Agency Agreement No. IAA-H-9-76. That work was completed in April 1977. |

Johnston, Town of – continued:

For the November 17, 1993 FIS report, the hydrologic and hydraulic analyses for the Pocasset River were prepared by Storch Engineers for FEMA, under Contract No. EMW-89-C-2819. That work was completed in December 1990. The hydrologic and hydraulic analyses for the Woonasquatucket River were prepared by the U.S. Geological Survey (USGS) during preparation of the FIS for the Town of North Providence under Inter-Agency Agreement No. EMW-89-E-2997, Project No. 5. That work was completed on January 27, 1992.

Lincoln, Town of:

The hydrologic and hydraulic analyses for the original FIS report were prepared by the USACE for FEMA. For the February 2, 1982 FIS report, the hydrologic and hydraulic analyses were prepared by Harris-Toups Associates under Contract No. H-4776. That work was completed in March 1980.

North Providence, Town of:

The hydrologic and hydraulic analyses for the original FIS report dated June 1977 were prepared by SCS for the Federal Insurance Administration (FIA) under Inter-Agency Agreement No. IAA-H-4-73, Project Order No. 11. For the September 30, 1993 FIS report, the hydrologic and hydraulic analyses were prepared by the USGS for FEMA under Inter-Agency Agreement No. EMW-89-E-2997, Project Order No. 5. That work was completed in January 1992.

For the December 6, 1999 FIS report, the hydrologic and hydraulic analyses were prepared by Green International Affiliates, Inc., for FEMA under Contract No. EMB-96-CO-0403, Task 5. That work was completed in October 1997.

North Smithfield, Town of:

The hydrologic and hydraulic analyses for the original FIS report dated February 1, 1978 were prepared by the SCS for FEMA under Inter-Agency Agreement No. H-9-76, Project Order No. 9. That work was completed in April 1977. For the December 3, 1993 FIS report, the hydrologic and hydraulic analyses were taken from the FIS for the Town of Lincoln (FEMA, August 2, 1982).

Pawtucket, City of:

The hydrologic and hydraulic analyses for the

| | |
|---|---|
| Pawtucket, City of – continued: | original FIS report were prepared by the USACE for FEMA. For the January 3, 1986 FIS report, the hydrologic and hydraulic analyses were prepared by PRC Harris for FEMA under Contract No. H-4776. The riverine and stillwater analyses were completed in July 1980. The coastal analyses were completed in November 1983. |
| Providence, City of: | The hydrologic and hydraulic analyses for the original April 16, 1976 FIS report, were prepared by the New England District of the USACE. For the April 15, 1986 FIS report, the hydrologic and hydraulic analyses were prepared by PRC Engineering for FEMA under Contract No. H-4766. The riverine analyses were completed in August 1980; the wave-height analyses were completed in January 1984. For the June 6, 2000 FIS report, the hydrologic and hydraulic analyses were prepared by Green International Associates for FEMA under Contact No. EMB-96-0CO-0403, Task No. 6. That work was completed in December 1997. |
| Scituate, Town of: | The hydrologic and hydraulic analyses for the FIS dated July 2, 1980 were prepared by Sverdrup and Parcel and Associates, Inc., for FEMA under Contract No. H-9307. That work was completed in March 1979. |
| Smithfield, Town of: | The hydrologic and hydraulic analyses for the original FIS report, dated September 1976, were prepared by the New England District of the USACE for FEMA under Inter-Agency Agreement No. IAA-H-15-72, Project Order No. 18. That work was completed in September 1973.<br><br>For the March 4, 1991 FIS report, the hydrologic and hydraulic analyses were prepared by the New England District of the USACE for FEMA under Inter-Agency Agreement No. EMW-84-1506, Project Order No. 1, Amendment No. 26. That work was completed in April 1987. |
| Woonsocket, City of: | The hydrologic and hydraulic analyses for the original FIS report were prepared by the USACE for FEMA under Contract No. H-4776. For the July 6, 1981 FIS report, the hydrologic and hydraulic analyses were prepared by Harris-Toups Associates for FEMA. That work was completed in January 1980. |

For the March 2, 2009 countywide FIS, the hydrologic and hydraulic analyses for the Blackstone River were prepared by CDM for FEMA under Contract No. EME-2003-CO-0340. This study was completed March 30, 2007.

Base map information shown on this FIRM was provided in digital format by the Rhode Island Geographic Information System (RI GIS). This information was derived from digital orthophotos produced at a scale of 1:5,000 with 2-foot Ground Sample Distance (GSD) from photography dated April 1997. The projection used in the preparation of this map was Rhode Island State Plane FIPSZONE 3800. The horizontal datum was North American Datum 1983 (NAD 83), GRS80 spheroid.

For the October 2, 2015 revision of the countywide FIS, hydrologic and hydraulic analyses were prepared by the U.S. Geological Survey (USGS) for FEMA under Contract No. HSFE01-11-X-0083, affecting SFHAs in the Cities of Central Falls, Cranston, East Providence, Pawtucket, and Providence and the Towns of Cumberland, Johnston, Lincoln, North Providence, North Smithfield, Scituate, and Smithfield. This study was completed March 24, 2014.

Base map information shown on this FIRM was derived from digital orthophotography. Base map files were provided in digital form by the USGS. Ortho imagery was produced at a scale of 1:2,400. Aerial photography is dated April and May 2011. The projection used in the preparation of this map was Rhode Island State Plane zone (FIPSZONE3800). The horizontal datum was NAD83, GRS1980 spheroid.

## 1.3 Coordination

The purpose of an initial Consultation Coordination Officer's (CCO) meeting is to discuss the scope of the FIS. A final meeting is held to review the results of the study.

The dates of the initial, intermediate and final CCO meetings held for the incorporated communities within Providence County are shown in Table 1, "CCO Meeting Dates for Precountywide FIS."

TABLE 1 – CCO MEETING DATES FOR PRECOUNTYWIDE FIS

| Community Name | Initial CCO Date | Final CCO Date |
|---|---|---|
| Town of Burrillville | January 13, 1977 | July 25, 1978 |
| City of Central Falls | April 1978 | December 30, 1980 |
| City of Cranston | April 1978 | March 10, 1982 |
| Town of Cumberland | May 1, 1985 | April 26, 1989 |
| City of East Providence | April 1978 | June 9, 1982 |
| Town of Glocester | September 24, 1990 | * |
| Town of Johnston | June 2, 1988 | December 15, 1992 |
| Town of Lincoln | April 1978 | September 21, 1981 |
| Town of North Providence | September 17, 1996 | December 8, 1998 |
| Town of North Smithfield | January 13, 1976 | July 21, 1977 |
| City of Pawtucket | May 5, 1981 | January 21, 1985 |

*Data not available

TABLE 1 – CCO MEETING DATES FOR PRECOUNTYWIDE FIS - continued

| Community Name | Initial CCO Date | Final CCO Date |
|---|---|---|
| City of Providence | September 17, 1996 | December 8, 1998 |
| Town of Scituate | May 19, 1976 | February 14, 1980 |
| Town of Smithfield | May 22, 1984 | April 10, 1990 |
| City of Woonsocket | April 1978 | December 2, 1980 |

For the March 2, 2009 countywide revision, initial CCO meetings were held on December 16, 2003, January 23, 2004, February 3, 2004, and February 6, 2004. The meetings were attended by representatives of the communities of Providence County, Massachusetts Department of Conservation and Recreation - Flood Hazard Management Program, Massachusetts Geographic Information System (MassGIS), Central Massachusetts Regional Planning Commission (CMRPC), Rhode Island Emergency Management Agency (RIEMA), RI GIS, and FEMA.

For the October 2, 2015 revision, the Discovery meeting for Providence County was held on December 20, 2011 at the Warwick Sewer Authority. Two workmap meetings were held on November 12, 2013 that communities in Providence County could attend: one at the Warwick Sewer Authority, and the second at the public library in Smithfield. The initial CCO meeting was held on November 12, 2013, and was attended by representatives of FEMA Region I, STARR, USGS, the Rhode Island Emergency Management Agency (RIEMA), and the communities. The results of the study were reviewed at the final CCO meeting held on August 5, 2014, which was attended by representatives of the same organizations. All problems raised at that meeting have been addressed in this study.

## 2.0 AREA STUDIED

### 2.1 Scope of Study

March 2, 2009 Countywide Analysis

The March 2, 2009 FIS report covers the geographic area of Providence County, Rhode Island, including the incorporated communities listed in Section 1.1. The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction.

All or portions of the flooding sources listed in Table 2, "Flooding Sources Studied by Detailed Methods," were studied by detailed methods in the precountywide FISs. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM. The areas studied by detailed methods were selected with priority given to all known flood hazards and areas of projected development or proposed construction.

TABLE 2 – FLOODING SOURCES STUDIED BY DETAILED METHODS

| Flooding Source Name | Description of Study Reaches |
|---|---|
| Assapumpset Brook | From confluence with Woonasquatucket River to Sweets Hill Road |

TABLE 2 – FLOODING SOURCES STUDIED BY DETAILED METHODS - continued

| Flooding Source Name | Description of Study Reaches |
|---|---|
| Blackstone River[1] | From Main Street to Massachusetts/Rhode Island state boundary |
| Branch River | From mouth at Slatersville Reservoir to confluence with Clear River |
| Centerdale Brook[2] | From confluence with Woonasquatucket River to South Locust Avenue |
| Chepachet River | From confluence with Branch River to upstream end of pond above US Route 44 |
| Cherry Brook | From North Smithfield corporate limit to State Route 104 |
| Clear River | From confluence with Branch River to East Wallum Lake Road |
| Cranberry Brook[2] | From confluence with Allendale Pond to Humbert Street |
| Crookfall Brook | From confluence with Blackstone River to about 650 feet upstream of Old Great Road |
| Dry Brook[2] | From confluence with Pocasset River to Goss' Dam |
| East Branch West River[2] | From confluence with West River to Conifer Road |
| Furnace Hill Brook[2] | From confluence with Meshanticut Brook to Pippin Orchard Road |
| Furnace Hill Brook Tributary | From confluence with Furnace Hill Brook to near Century Lane |
| Lincoln Downs Brook[2] | From confluence with West River to Angell Road |
| Meshanticut Brook[2] | From county boundary to Scituate Avenue |
| Mill River | From 1150 feet upstream of confluence with Blackstone River to corporate limits |
| Moshassuck River[2] | From confluence with Woonasquatucket River to State Route 246 |

[1]Flooding source re-studied during March 2, 2009 countywide study (see Table 3)
[2]Flooding source re-studied during October 2, 2015 countywide revision (see Table 3)

TABLE 2 – FLOODING SOURCES STUDIED BY DETAILED METHODS - continued

| Flooding Source Name | Description of Study Reaches |
|---|---|
| North Branch Pawtuxet River[2] | From 1,000 feet above first crossing of county boundary to 1,500 feet below outflow of Scituate Reservoir |
| Pascoag River | From confluence with Clear River to 200 feet above State Route 107 |
| Pawtuxet River[2] | From Broad Street to county boundary |
| Peters River | From 1,180 feet above confluence with Blackstone River to state boundary |
| Pocasset River[2] | From confluence with Pawtuxet River to Belfield Drive |
| Providence River[2] | From Fox Point Hurricane Barrier to confluence with Moshassuck River |
| Runnins River | From Mobile Company Dam to Edward Street |
| Simmons Brook[2] | From confluence with Pocasset River to Simmonsville Avenue |
| South Branch Assapumpset Brook | From confluence with Assapumpset Brook to Greenville Avenue |
| Stillwater River | From confluence with Stillwater Reservoir to 400 feet below outflow of Waterman Reservoir |
| Ten Mile River[2] | From Omega Pond Dam to state boundary |
| Unnamed Tributary | From confluence with Stillwater River to Slack Reservoir Dam |
| Upper Canada Pond Brook[2] | From confluence with West River to Garfield Street |
| West River[2] | From confluence with Moshassuck River to Asylum Road |
| Willett Pond Brook | From Francis Avenue (extended) to Willett Pond Dam |
| Woonasquatucket River[2] | From confluence with Providence River to Smithfield/North Smithfield corporate limit |

[2]Flooding source re-studied during October 2, 2015 countywide revision (see Table 3)

For the March 2, 2009 countywide FIS revision, portions of the Blackstone River were studied by detailed methods from the mouth at Providence Harbor and Narragansett Bay in the City of Pawtucket to the upstream corporate limit in the Town of North Smithfield (see Table 3). For continuity purposes, the restudy of this reach of the Blackstone River included a 2-mile reach that flows through the Town of Blackstone, Massachusetts. The study area includes the Blackstone River and its backwater affecting portions of Crookfall Brook, Mill River, and Peters River. For the 2013 countywide revision, the reach of the Blackstone River

October 2, 2015 Countywide Analysis

The riverine flooding analysis for the October 2, 2015 countywide study was prepared by USGS. This new analysis updated the hydrologic and hydraulic engineering data for Centerdale Brook, Cranberry Brook, Dry Brook, East Branch West River, Furnace Hill Brook, Lincoln Downs Brook, Meshanticut Brook, Moshassuck River, North Branch Pawtuxet River, Pawtuxet River, Pocasset River, Sevenmile River, Simmons Brook, Ten Mile River, Upper Canada Pond Brook, West River, West River Diversion, and Woonasquatucket/Providence River, as described in Table 3, in Providence County and its neighboring counties. The analysis resulted in revisions to the FIRM for the Cities of Central Falls, Cranston, East Providence, Pawtucket, and Providence and the Towns of Cumberland, Johnston, Lincoln, North Providence, North Smithfield, Scituate, and Smithfield. No LOMCs were incorporated into this revision.

Detail-studied streams that were not re-studied as part of the March 2, 2009 or October 2, 2015 studies may include a profile baseline on the FIRM. The profile baselines for these streams were based on the best available data at the time of their study and are depicted as they were on the previous FIRMs. In some cases the transferred profile baseline may deviate significantly from the channel or may be outside of the floodplain.

For flooding sources studied by detailed methods for the March 2, 2009 countywide study and October 2, 2015 revision, see Table 3, "Scope of Revision."

TABLE 3 – SCOPE OF REVISION

| Flooding Source | Limits of Revised or New Detailed Study |
|---|---|
| BLACKSTONE RIVER[1] | From mouth at Providence Harbor to North Smithfield corporate limit |
| CENTERDALE BROOK[2] | From confluence with Woonasquatucket River to Locust Avenue |
| CRANBERRY BROOK[2] | From confluence with Woonasquatucket River to US Route 44 |
| DRY BROOK[2] | From confluence with Pocasset River to Reservoir Avenue |

[1]March 2, 2009 study
[2]October 2, 2015 study

TABLE 3 – SCOPE OF REVISION - continued

| Flooding Source | Limits of Revised or New Detailed Study |
|---|---|
| EAST BRANCH WEST RIVER[2] | From confluence with West River to outflow of unnamed pond about 900 feet above Forest View Drive |
| FURNACE HILL BROOK[2] | From confluence with Meshanticut Brook to Pippen Orchard Road |
| LINCOLN DOWNS BROOK[2] | From confluence with West River to Louisquisset Country Club |
| MESHANTICUT BROOK[2] | From county boundary to State Route 12 |
| MOSHASSUCK RIVER[2] | From confluence with Woonasquatucket River to outflow of unnamed pond about 1,800 feet above State Route 246 |
| NORTH BRANCH PAWTUXET RIVER[2] | From first crossing of county boundary to outflow of Scituate Reservoir |
| PAWTUXET RIVER[2] | From confluence with Providence River to county boundary |
| POCASSET RIVER[2] | From confluence with Pawtuxet River to Interstate 295 |
| SEVENMILE RIVER[2] | From confluence with Ten Mile River to state boundary |
| SIMMONS BROOK[2] | From confluence with Pocasset River to Shun Pike |
| TEN MILE RIVER[2] | From confluence with Seekonk River to state boundary |
| UPPER CANADA POND BROOK[2] | From confluence with West River to Chandler Avenue (extended) |
| WEST RIVER[2] | From confluence with Moshassuck River to Wenscott Reservoir |
| WEST RIVER DIVERSION[2] | From confluence with Moshassuck River to divergence from West River |
| WOONASQUATUCKET RIVER/PROVIDENCE RIVER[2] | From confluence with Seekonk River to about 1,600 feet above State Route 104 |

[2]October 2, 2015 study

All or portions of numerous flooding sources in the county were studied by approximate methods. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards. The scope and methods of study were proposed to, agreed upon by, FEMA and the individual communities within Providence County. For the countywide revisions, no new approximate studies were executed.

The countywide FISs also incorporate, where applicable, the determinations of letters issued by FEMA resulting in map changes (Letter of Map Revision (LOMR), and Letter of Map Revision Based on Fill (LOMR-F)).

## 2.2 Community Description

Providence County is located in the northern part of Rhode Island. In Providence County, there are 16 incorporated communities. The Towns of Burrillville, Cumberland, Glocester, Lincoln, North Smithfield, and Smithfield and the Cities of Central Falls and Woonsocket are located in the north part of the county. The Towns of Foster, Johnston, North Providence, and Scituate and the Cities of Cranston, East Providence, Pawtucket, and Providence form the south part of the county.

Providence County is bordered on the north by Worcester County, Massachusetts, including the Towns of Blackstone, Douglas, and Uxbridge and the City of Millville; and by Norfolk County, Massachusetts, including the Towns of Bellingham, Plainville, and Wrentham. It is bordered on the east by Bristol County, Massachusetts, including the City of Attleboro and the Towns of North Attleborough and Seekonk. To the south, Providence County is bordered by Kent County, Rhode Island, including the Towns of Coventry and West Warwick and the City of Warwick; and by Bristol County, Rhode Island, including the Town of Barrington. It is bordered on the west by Windham County, Connecticut, including the Towns of Killingly, Sterling, and Thompson and the City of Putnam.

According to the U.S. Census, the population of Providence County was 621,602 in 2000. The land area in Providence County consists of 413 square miles.

The topography of Providence County is moderate with drumlin-shaped land forms underlain by compact subsoils. There are numerous coarse sands and outwash materials above the drainage ways which have very poorly drained soils. Vegetation is made up of mixed deciduous forests at the higher elevations and red maples in the swamps. Between the infiltration in the coarse sands and the storage in numerous swamps and ponds, discharges are relatively low in the downstream reaches. Land use within the county is primarily agricultural, open forest, or wetlands. Of the urban uses, residential makes up the largest portion.

The climate is typical of the North Temperate Zone, having a mean annual temperature of approximately 50 degrees Fahrenheit. The mean annual precipitation is 43.0 inches with an annual snowfall of approximately 40 inches. Snowfall may occur in appreciable amounts from December to March. A portion of the county is located in the prevailing westerlies zone that often includes cyclonic disturbances that cross the country from the west or southwest. It is also exposed to occasional coastal storms, some of tropical origin, which travel northward along the Atlantic seaboard. In late summer and autumn, these storms occasionally attain to hurricane intensity. At times during the winter, the weather is tempered by Narragansett Bay and the Atlantic Ocean; thus, major storms may create precipitation in the form of rain rather than snow.

The main flooding sources in Providence County are Blackstone River, Pawtuxet River, Pocasset River, Ten Mile River, and West River.

## 2.3 Principal Flood Problems

Floods have occurred in the area during all seasons of the year, but spring and fall have historically produced those with greatest magnitude and effect. The most severe floods have been caused by storms of tropical origin, such as hurricanes, usually occurring in late summer and early fall. Winter and spring flooding is commonly caused by transcontinental storms in combination with snowmelt or ice jams. Mid-spring and fall thunderstorms can also produce limited local flooding.

The greatest flood of record on the Blackstone River occurred in August 1955 and was the result of Hurricane Diane dropping an average of nearly 12 inches of rain over the drainage basin. This storm has an approximate return interval of 150 years, and the areas below High Street were inundated by several feet of water. The second-greatest flood of record occurred in March 1968, the result of about five inches of rainfall combined with snowmelt and nearly 100-percent runoff due to the impermeability of frozen ground. The magnitude of this flood would have been about ten percent greater if it had not been reduced by the West Hill flood control dam. The estimated recurrence interval for this event is 25 years.

The flood of July 18-24, 1938, was a high-flow event for the main channel of the Pawtuxet River since the construction of the Scituate Reservoir. Flooding resulted from a coastal storm producing an average of 7 inches of rainfall over the Pawtuxet River basin at a time when both the Scituate and Flat River Reservoirs were already almost full. The estimated peak discharge at Cranston was approximately 6,300 cubic feet per second (cfs) (U.S. Department of the Interior, 1964). The 1938 hurricane produced an abnormal tide of 15.7 feet in Narragansett Bay near the mouth of the Pawtuxet River, which was 10.2 feet above the crest of the Pawtuxet Dam. Due to the topping of the dam, extensive tidal flooding in the lower portions of the Pawtuxet River occurred. A high-flow event occurred on March 17-18, 1968, when 4 to 7 inches of rainfall fell in a 24-hour period, creating a peak discharge of 3,100 cfs at the USGS stream gage on the Pawtuxet River at Cranston. Flooding damages were minor due to the storage capacity of the Scituate Reservoir (U.S. Department of the Interior, 1964).

In March 1968, high flows occurred on both Woonasquatucket and Moshassuck Rivers. The recurrence interval for this flood on Woonasquatucket River at the USGS gaging station in Centerdale was estimated to be 35 years. Flooding on Moshassuck River occurred near Canal and Mill Streets below the USGS gage and along Interstate 95. Gage records showed this flood to be a 38-year event on the Moshassuck River. Flooding resulting from this storm was also extensive on West River.

The Seekonk River forms the northern tip of Narragansett Bay and is subject to flooding during hurricanes, as evidenced by the hurricane of September 1938 and Hurricane Carol in 1954. The 1938 hurricane, which had a recurrence interval of approximately 100 years, caused flood levels of approximately 16 feet on the Seekonk River.

Flooding can occur along the entire coast from storm-driven tide and along the Ten Mile River and the Runnins River from excessive storm runoff.

The Mill and Peters River watersheds have also experienced floods of large magnitude, particularly the record flood of August 1955. The flood was responsible for several dam failures along the watercourses, including the breaching of Harris Pond Dam on Mill River in Woonsocket.

In late February through March 2010, three separate rainfall events resulted in about 17 to 23 inches over much of southern New England, causing major flooding across eastern Massachusetts and Rhode Island. These rain storms caused most rivers in Providence County to rise above flood stage. Several USGS stream gages in Providence County operating during this time experienced their new period of record peak. For the stream gages on the Moshassuck River at Providence, Pawtuxet River at Cranston, Tenmile River at Pawtucket Ave. at East Providence, and Woonasquatucket River at Centerdale (all with from 25 to 70 or more years of record) the March 30-31, 2010 peak flow was from about 1.1 to 2.7 times higher than the next highest peak flow recorded. The 2010 peak flows at these stream gages were estimated to have an Annual Exceedance Probability (AEP) ranging from 2-percent (50-year recurrence interval) to 0.2-percent (500-year recurrence interval). This flood event resulted in several communities having areas that were closed for several days to weeks due to this historic flooding. This flood is often referred to as "the great Rhode Island flood of 2010."

Six hurricanes have affected Rhode Island in the last two decades, causing minimal to moderate damage to the Rhode Island coastline. Some of these hurricanes caused mild to moderate damage to Providence County. Hurricane Gloria in September 1985 caused moderate beach erosion along the Rhode Island beaches and wind gusts up to 92 miles per hour (mph). Hurricane Gloria arrived at low tide and the storm surges were less than 5 feet above normal. Statewide, there were approximately 300,000 power outages due to the storm. Hurricane Bob made landfall as a strong Category II hurricane. With winds of 75 to 100 mph, the storm severely affected coastal communities and caused extensive beach erosion. Hurricane Bob caused a storm surge of 5 to 8 feet along the Rhode Island shore. The hurricane damaged trees and utility poles leaving more than 60 percent of southeast Rhode Island residents without power. Remnants of Hurricane Bertha formed waterspouts near Washington County and caused structural roof damage to a few homes in Bristol County. Wind damage across New England led to fallen trees and power lines. Sustained winds reached 60 knots (69 mph) over nearby Atlantic waters. High surf induced by Hurricane Earl in September 2010 resulted in minor coastal flooding in Providence County and left ocean debris behind. Several school districts in Rhode Island released students from school early on September 3, as well as Bristol-Warren and Cumberland school districts, which closed schools in anticipation of Hurricane Earl. In August 2011, Hurricane Irene produced storm surge and coastal flooding, resulting in property damages within the coastal counties. Several large trees were downed and widespread power outages were reported. Wind gusts were reported as high as 51 knots (59 mph). The automated surface-observing system at Newport State Airport recorded sustained winds of 30 knots (35 mph) and wind gusts to 48 knots (55 mph). In October 2012, Hurricane Sandy resulted in some storm surge and coastal flooding. Hurricane Sandy caused some property damage and power outages within Providence County. Inland wind gusts ranged from about 48 to 56 knots (55 to 65 mph, respectively) and coastal wind gusts ranged from 61 to 70 knots (70 to 80 mph, respectively). A peak wind gust of 75 knots (86 mph) was reported in the Town of Westerly, Rhode Island. Coastal flooding and beach erosion occurred along the south coast of Rhode Island, mainly in the Towns of Westerly, Charlestown, South Kingstown, Narragansett, and New Shoreham.

From December 2010 through February 2011, the State of Rhode Island saw a series of six winter storms that led to record snowfalls across the state. These storms caused a number of problems statewide with transportation, power outages, and collapses. Snow accumulation from a winter storm on December 27, 2010 reached between 10 and 16 inches and left over 480,000 Rhode Island National Grid customers without power.

## 2.4 Flood Protection Measures

One hydroelectric dam, Pawtuxet Dam, is located within the study area. The West Hill Dam and Reservoir are located upstream of the study area. Reservoirs that also control flooding in the county include Flat River Reservoir and Scituate Reservoir. Subsequent to the floods of 1938 and 1954, a hurricane barrier was constructed at Fox Point where the Providence River empties into Narragansett Bay. This structure is equipped with large gates to prevent the inflow of hurricane tides and pumps to discharge the riverine flows downstream of the barrier. Appurtenant structures include gates at certain road underpasses, dikes, and embankments of Interstate 95.

For the countywide map revisions, the landward areas protected by the Fox Point Hurricane Barrier and appurtenant structures have been mapped as a shaded Zone X based on the 1-percent-chance stillwater elevation of 15.2 feet NAVD88 for Narragansett Bay assuming coastal storm surge inundation without the effects of waves.

The Scituate Reservoir has a modifying effect on flooding on the main channel of the Pawtuxet River. The reservoir alone covers nearly 6 square miles, and the surface of the impounded water is often several feet below the main spillway. The Pawtuxet Dam, constructed at the mouth of the Pawtuxet River in 1870, has a crest elevation of 5.3 feet. The dam prevents normal tides from affecting the lower Pawtuxet River but can be overtopped by abnormal storm tides in Narragansett Bay.

Though originally built for water supply impoundment, the many dams in the Scituate area provide flood protection by storing runoff.

Flood-protection measures on local and private levels consist of sandbagging low-lying structures and low bank areas, as well as zoning ordinances designed to minimize flood damage. In the City of Woonsocket, there is a Local Protection Plan in place and approved by the USACE, New England Division, which includes a control dam, dikes and floodwalls along Blackstone River, and underground conduit, dikes, and floodwalls along Mill and Peter Rivers. The Woonsocket Falls Dam is part of this local protection plan.

Dyerville Dam, Geneva Pond Dam, Manton Pond Dam, Paragon Dam, Rising Sun Dam, Upper Canada Pond Dam, Whipples Pond Dam, and several unnamed dams are located within Providence County. These dams, however, do not provide any flood protection for the area.

Following the August 1955 and March 1968 floods, extensive local flood-protection work was done in the City of Woonsocket to reduce the hazard of extensive damage. The existing local protection measures include a control dam (Woonsocket Falls Dam), dikes, and floodwalls along the Blackstone River. However, due to deficiencies noted during a recent USACE inspection, the levee along the Blackstone River in Woonsocket may not meet the operation and maintenance requirements of Title 44 of the Code of Federal Regulations, Section 65.10 for certification under the NFIP. Therefore, for the purpose of this floodplain mapping study, the levee at Woonsocket was conservatively assumed to be ineffective.

The New England River Basins Commission recommends that flood-prone areas be protected by non-structural floodplain management measures and that wetlands be preserved as natural flood retention areas since they help minimize tidal flood damage.

Flood warning and forecasting services are performed by the National Weather Service on a regional scale. Adoption of federal, state, and local development regulations concerning floodplain management will help alleviate storm-related losses.

Historic flood elevations are shown in Table 4, "High-Water Mark Elevations."

TABLE 4 – HIGH-WATER MARK ELEVATIONS

| | ELEVATION (feet NAVD88[1]) | | |
|---|---|---|---|
| LOCATION | HURRICANE September 21, 1938 | HURRICANE CAROL August 31, 1954 | HURRICANE September 14, 1944 |
| NARRAGANSETT BAY | | | |
| Newport | | | |
| Bailey Beach | 12.7 | * | * |
| Price Neck | 14.2 | 10.2 | * |
| Brenton Point | 19.1, 17.8 | * | * |
| Newport Harbor | 10.6 | * | * |
| USC&GS Tidal Gage | 12.0 | 9.0 | 5.8 |
| Middletown | | | |
| Coddington Cove | * | 9.7 | * |
| Portsmouth | | | |
| South End Providence Island | 11.5 | 10.2 | * |
| Melville | 11.6 | 10.6 | * |
| Homestead | 13.4 | 11.2 | * |
| Barrington | | | |
| Rumstick Neck | 14.3 | * | * |
| Barrington Beach | 14.7 | 14.2 | * |
| Nayatt Point | 14.6 | 14.3 | * |
| Bullock Cove | 14.4 | 13.7 | * |

[1]North American Vertical Datum of 1988
*Data not available

TABLE 4 – HIGH-WATER MARK ELEVATIONS - continued

| LOCATION | ELEVATION (feet NAVD88[1]) HURRICANE September 21, 1938 | HURRICANE CAROL August 31, 1954 | HURRICANE September 14, 1944 |
|---|---|---|---|
| NARRAGANSETT BAY - continued | | | |
| Warren | | | |
| Warren River Mouth | 13.8 | 12.4 | * |
| East Providence | | | |
| Bullock Point | 15.0 | 14.0 | * |
| Crescent Park | 15.3 | * | * |
| Squantum Point | 15.1 | 15.4 | * |
| Providence | | | |
| Seekonk River | 15.3 | 14.1 | * |
| Point Street Bridge | 15.8 | 14.5 | * |
| USC&GS Tidal Gage | 15.0 | 14.0 | 9.2 |
| SAKONNET RIVER | | | |
| Little Compton | | | |
| Breakwater Point | 13.0 | 9.9 | * |
| Portsmouth | | | |
| Sandy Point | * | 11.0 | * |
| McCurry Point | * | 10.5 | * |
| Island Park | 14.5 | 13.6 | * |
| Railroad Bridge | 14.8 | * | * |
| Common Fence Point | 13.4 | 11.2 | * |
| Warren River | | | |
| Laurel Park | * | 13.2 | * |
| Kickamuit River | 12.4 | 12.7 | * |
| Fall River | | | |
| USC&GS Tidal Gage | 13.0 | 12.6 | 8.5 |

[1]North American Vertical Datum of 1988
*Data not available

## 3.0 ENGINEERING METHODS

For the flooding sources studied by detailed methods in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that is expected to be equaled or exceeded once on the average during any 10-, 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-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent 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 1-percent-annual-chance flood in any 50-year period is approximately 40 percent (4 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 county at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

## 3.1 Riverine Hydrologic Analyses

Hydrologic analyses were carried out to establish peak discharge-frequency relationships for each flooding source studied by detailed methods affecting the community.

For each community within Providence County that has a previously printed FIS report, the hydrologic analyses described in those reports have been compiled and are summarized below.

Precountywide Analyses

The SCS synthetic rainfall-runoff method (SCS, May 1965) was used for Assapumpset Brook, Branch River, Clear River, Chepachet River, Dry Brook, Pascoag River, Runnins River, Simmons Brook, South Branch Assapumpset Brook, and Ten Mile River to the obtain the 10-, 2-, 1-, and 0.2-percent-annual-chance peak discharges. This method utilizes (1) soils and land-use information to develop the runoff curve numbers which relate the rainfall to runoff (allowing for abstraction losses), (2) topography and stream hydraulics from which are calculated times of concentration (U.S. Department of Agriculture, Soil Conservation Service, August 1972), and (3) rainfall and the distribution of rainfall taken from a Weather Bureau publication (U.S. Department of Commerce, May 1961). The program computes surface runoff resulting from synthetic or natural storms and routes the resulting hydrographs through a given watershed. It takes into account such factors as soil type and land use, which affect the amount of surface runoff. The program combines the routed hydrograph with those from other tributaries and computes peak discharges, time of occurrence, and water-surface elevations at selected cross sections. The discharges for the Chepachet River were checked with the stream gage on the Branch River at Forestdale, Rhode Island (USGS station 01115000). This gage has been in operation since 1940. The TR-20 discharges were 25 percent higher at the first dam into North Smithfield than the discharges computed using a statistical approach at the gage. However, there are 3 dams between the gage and the dams ending the TR-20 calculations, one of which has appreciable possible storage. Therefore, the discharges would compare more favorably if the TR-20 were extended downstream of the gage.

There are no long-term continuous recording gaging stations along the Ten Mile River; however, private records and observations are available at some locations. These data are concentrated primarily at river dams. The discharge-frequency relationships for the Ten Mile River were determined from methodology developed by the SCS that analyzes anticipated rainfall and resulting runoff (U.S. Department of Agriculture, SCS, 1972).

The 10-, 2-, 1-, and 0.2-percent-annual-chance synthetic storms were then flood-routed through the upstream areas of the watershed using the SCS TR-20 computer program (U.S. Department of Agriculture, SCS, 1965). The program computes surface runoff resulting from synthetic or natural rainstorms. It takes into account conditions which have a bearing on runoff and routes the flow through stream channels and reservoirs. It combines the routed hydrograph with those from other tributaries and computes the peak discharges, time of occurrence, and water-surface elevation at selected cross sections and reservoirs.

Rainfall data for the various frequency storms were obtained from U.S. Weather Bureau publications (U.S. Department of Commerce, 1963; U.S. Department of Commerce, 1964). A 48-hour storm distribution, which included the standard SCS 24-hour Type II rainfall distribution, was used for all frequency storms. The March 1968 flood was used to verify the watershed model by comparing the discharge per square mile of watershed with stream gage records of similar watersheds in southeastern Massachusetts. The comparison was well matched on the stage-discharge of flat gradient streams.

Most of the hydrologic information for the Pawtuxet River was taken from a flood-control study for the Pawtuxet River watershed by the USACE (USACE, 1976). Due to the complexity of the upstream reservoirs on flood flows on the main channel of the Pawtuxet River, conventional statistical flood-frequency analysis was not considered applicable. Instead, recorded annual peak flows and historical flood peaks were plotted using Beard’s plotting positions and a composite frequency curve was fitted to the plotted data (Beard, 1976). The USGS gage at Cranston (01165000), located downstream of State Route 37 and having a period of record of 26 years, was also used for the study.

The discharge assigned to the 0.2-percent-annual-chance recurrence interval flood is that which was used by the USACE as their Standard Project Flood (SPF). The SPF was selected for use in this study because the USACE has performed detailed hydrologic analyses in conjunction with a flood-control plan developed for the Pawtuxet River Basin. The SPF is defined as a major flood that can be expected to occur from a combination of meteorological and hydrological conditions. These conditions are considered characteristic of the geographic area in which the area studied is located, excluding rare combinations. The USACE, in cooperation with the National Weather Service, has made comprehensive studies and investigations based on historical records of storms and floods and has developed generalized procedures for estimating the potential flood heights of streams. The SPF has no specific frequency but usually has a recurrence interval between the 200 to 500 years. The SPF is used in the study as the 0.2-percent-annual-chance recurrence interval flood because it was based on a thorough hydrologic analysis of the flood potential of the basin rather than on an extrapolation of a statistically derived frequency curve (USACE, 1976).

The hydrology for Furnace Hill Brook Tributary is based on flood-flow equations developed by the USGS in cooperation with the Rhode Island Department of Transportation (USGS, 1976). The report, entitled “Flood Magnitude and Frequency of Small Rhode Island Streams,” was utilized for streams with a drainage area less than 10 square miles (USGS, 1976). Multiple regression techniques were used to define the relationships between stations maintained by the USGS and a set of watershed basin characteristics.

The discharge-frequency relationships for Pocasset River, Meshanticut Brook, and Furnace Hill Brook were determined from methodology developed by the SCS which analyzed anticipated rainfall and the resulting runoff (U.S. Department of Agriculture, SCS, August 1972). The watersheds of Pocasset River and Meshanticut Brook were divided into areas of uniform characteristics. An analysis of slope, soils, vegetation, land use, and stream channels of these areas was made to compute composite runoff curve numbers, times of concentration, and travel times. Storage capacity and stage-discharge curves were computed for all significant reservoirs and natural storage areas. The 10-, 2-, 1-, and 0.2-percent-annual-chance synthetic storms were then flood-routed through the upstream area of the watersheds using the SCS Computer Program for Formulation-Hydrology, TR-20 (U.S Department of Agriculture, SCS, 1965). The program computes surface runoff resulting from synthetic or natural rainstorms. It takes into account conditions affecting runoff and routes flow through stream channels and reservoirs. The program combines the routed hydrograph with those from other tributaries and computes peak discharge, time of occurrence, and water-surface elevation at selected cross sections and reservoirs.

Rainfall data for the selected recurrence intervals were obtained from U.S. Weather Bureau publications (U.S. Department of Commerce, 1963; U.S. Department of Commerce, 1964). A 48-hour storm distribution, which included the standard SCS 24-hour Type III rainfall distribution, was used for all frequency storms.

The hydrology for Willett Pond Brook was based on flood-flow equations developed in a report prepared by the USGS in cooperation with the Rhode Island Department of Transportation (USGS, 1976). The report was utilized for streams in Rhode Island that have drainage areas of less than 10 square miles. Multiple regression techniques were used to define the relation between flood peaks, as based on records collected at a network of gaging stations maintained by the USGS, and a set of watershed characteristics.

The Pocasset River hydrology was investigated for flow-rate reduction based on existing reports, studies, and gaged data.

For the Woonasquatucket River, the 1-percent-annual-chance flood discharge was based on stream gaging records at USGS station 01114500 located in Centerdale on the Woonasquatucket River (Water Resources Council, March 1976). The 1-percent-annual-chance discharge was then extended to the Providence-North Providence corporate limit.

The peak discharge-frequency relationships for Moshassuck River were based on stream gaging records of the USGS gage 01114000, located in Providence, Rhode Island, on the Moshassuck River. The gage has a recording period from 1963. A log-Pearson Type III distribution of the annual peak flows at the gage was calculated as described by the Water Resources Council (Water Resources Council, March 1976).

The hydrology for Crookfall Brook is based upon flood-flow equations developed by the USGS in cooperation with the Rhode Island Department of Transportation (USGS, 1976).

In the Town of North Providence, for West River, East Branch West River, Lincoln Downs Brook, and Upper Canada Pond Brook, flood discharges were determined using the SCS TR-20 project formulation hydrology program. This program was selected because of its capability to analyze the different magnitude storm runoffs, as modified by the numerous ponds and reservoirs located in the area. The 10-, 2-, 1-, and 0.2-percent-annual-chance frequency storm runoffs were computed and flood-routed through the study area. Rainfall intensity-frequency relationships were obtained from U.S. Weather Bureau Rainfall Atlas TP-40 (U.S. Department of Commerce, 1963). All reservoirs that were flood-routed were assumed to have a spillway crest.

In the City of Providence, the hydrology for West River and Upper Canada Pond Brook is based on flood-flow equations developed by the USGS in cooperation with the Rhode Island Department of Transportation. The report, titled "Flood Magnitude and Frequency of Small Rhode Island Streams," was utilized for streams in Rhode Island with drainage areas less than 10 square miles (USGS, 1976). Multiple regression techniques were utilized to define the relationship between flood peaks, based on records collected at a network of gaging stations maintained by the USGS, and a set of watershed basin characteristics.

A separate analysis was performed to consider the effects of the diversion conduit on the hydrology of Moshassuck and West Rivers. During floods with a recurrence interval greater than 10 years, floodwaters from West River flow out of the main channel at Charles Street and the Amtrak tracks. Before the installation of the diversion conduit, flow was channelized along the railroad right-of-way to just below Smith Street where it flowed through the capital redevelopment area and into Woonasquatucket River. Considerable ponding and inundation of the redevelopment occurred. Therefore, as part of the redevelopment program, a diversion conduit was built to divert the flow from the railroad tracks to the Moshassuck River (Deleuw Cather/Parsons, March 1983). The conduit is a drop-inlet structure in the track bed, which will intercept the flow from the tracks. The conduit is designed to operate against a 1-percent-annual-chance flood on the Moshassuck River.

Flood discharge was recomputed for the West River to account for the diversion down the railroad tracks. Discharges were decreased for the portion of the river downstream of Charles Street and the railroad tracks based on the amount of flow which could be expected to be diverted at a given flood elevation.

Peak discharges for Centerdale Brook and Cranberry Brook were calculated using the USACE HEC-1 Computer Program (USACE, September 1990). The amount of flow being carried in each closed drainage system was subtracted from the total 1-percent-annual-chance peak discharge, and the remaining overland flow was then determined using the HEC-RAS Computer Program (USACE, April 1997).

For Cherry Brook, the SCS synthetic rainfall-runoff method was used to obtain the peak discharges (U.S. Department of Agriculture, SCS, September 1983). This method utilizes soils and land-use information to develop runoff curve numbers that relate to the amount of rainfall-to-surface runoff (allowing for initial abstraction losses). The method also utilized topographic information and stream hydraulics of the watershed to calculate times of concentration (U.S. Department of Agriculture, SCS, August 1972). Rainfall distribution was obtained from the U.S. Weather Bureau Technical Paper No. 40 (U.S. Department of Commerce, 1963).

Peak discharge-frequency relationships for the Moshassuck River were based on USGS records at the gage No. 01114000 located in Providence on the Moshassuck River. The gage has been in operation since 1963. A log-Pearson Type III distribution of the annual peak flow of the gage was calculated as outlined by the Water Resources Council (Water Resources Council, 1976).

For the City of Providence, peak discharge-frequency relationships for Providence River, Woonasquatucket River, and Moshassuck River were based on stream gaging records at the USGS gage located in Centerdale on the Woonasquatucket River (01114500) and at the USGS gage located in Providence on the Moshassuck River (01114000). The Woonasquatucket River gage has a recording period from 1941, while the Moshassuck River gage has a recording period from 1963. A log-Pearson Type III distribution of the annual peak flows of the rivers at the gages was calculated using the method recommended by the Water Resources Council (Water Resources Council, March 1976).

For the Moshassuck River, discharges below the point of entry of the diverted flow were increased to account for flows from the conduit. Discharges upstream of the conduit would not be affected. It is not likely that the diversion conduit will affect peak discharges on the Woonasquatucket River. The concentration times of the river would be considerably longer than the concentration time for the flow from the railroad tracks. The peak flow from the tracks would enter the river before the river’s flood peak occurs. Thus, diversion of the track flow would only slightly lower the peak discharge on the Woonasquatucket River, not enough to affect peak flood elevations.

The hydrologic analyses of the North Branch Pawtuxet River were carried out using the SCS TR-20 computer program (U.S. Department of Agriculture, SCS, 1965). Data for land use and soil type were used in conjunction with values for area and times of concentration (Commonwealth of Massachusetts, 1970; State of Rhode Island, June 1975) to compute run-off hydrographs for storms of the selected intervals. The resulting floods were then routed through the stream reach using standard routing procedures. The results were then compared to those developed at the Pawtuxet River gaging station in Cranston, Rhode Island, and were found to be within acceptable limits (Sverdrup and Parcel and Associates, Inc., 1971).

For the Town of Smithfield, peak discharge frequencies for the Woonasquatucket River were computed at the gaging station in North Providence using a log-Pearson Type III distribution of the annual peak flows (USGS, 1977; USGS, September 1981). These values were then transferred upstream, by ratio of respective drainage areas to the 0.7-exponential power, in order to determine the inflow to the Stillwater Reservoir. The resulting inflow was routed through reservoir-surcharge storage to calculate the peak outflow discharges at the reservoir. With this value, peak flows on the river between the reservoir and the downstream corporate limit were determined, using the same drainage-area-ratio method previously described. Since the inflow to the Stillwater Reservoir was also known, discharges along the portion of the Woonasquatucket River upstream of this location were also calculated using the drainage-area-ratio method.

Discharge-frequency information for the Stillwater River and Unnamed Tributary followed the same methodology as the downstream portion of the Woonasquatucket River. Slack Reservoir is located upstream on the Stillwater River, and Unnamed Tributary receives the outflow from Waterman Reservoir.

The hydrologic analyses for the Mill River flood-flow frequencies were based on the FIS for Woonsocket and the FIS for Blackstone (Federal Insurance Administration, July

1971; Federal Insurance Administration, September 30, 1977). The starting 10- and 1-percent-annual-chance flood flows are the same as the 10- and 100-year flood flows in the FIS. To obtain the starting 2- and 0.2-percent-annual-chance flood flows, a discharge-frequency graph was plotted so that the flows would correspond to those of the Blackstone FIS. The flood flows from the Blackstone FIS were introduced at the bottom of the Harris Pond Spillway.

The hydrologic analyses for the Peters River flood flow frequencies were based on the USACE FIS for Woonsocket (Federal Insurance Administration, July 1971). The preliminary report contained discharge-frequency data and water-surface elevations for the 10- and 1-percent-annual-chance and standard project floods. To find the 2- and 0.2-percent-annual-chance flood flows, a reduction ratio was introduced to obtain the flood flows from the standard project flood.

The 1-percent-annual-chance peak discharges for Ponaganset Reservoir, Keech Pond, Smith and Sayles Reservoir, Spring Grove Pond, Pascoag Reservoir, and Waterman Reservoir were calculated using the SCS TR-20 Computer Program (U.S. Department of Agriculture, SCS, 1965). The dams' pertinent information was obtained from field surveys of the dams by Roald Haestad, Inc., the USACE Phase-I Inspection Report, and the SCS Floodplain Management Study (USACE, June 1979; U.S. Department of Agriculture, SCS, March 1989). The rainfall data used in the TR-20 program was obtained from U.S. Weather Bureau Technical Paper No. 40 (U.S. Department of Commerce, 1963). The 1-percent-annual-chance discharge for Mary Brown Brook was taken from the FIS for the Town of Putnam, Connecticut (FEMA, October 18, 1988). That study based its determinations on an American Society of Civil Engineers article entitled "Flood Flows for Urbanized and Nonurbanized Areas of Connecticut" (American Society of Civil Engineers, 1975).

The 1-percent-annual-chance flood elevation of 204.2 feet NAVD88 was computed for Wenscott Reservoir. The 1-percent-annual-chance flood discharge entering the reservoir was determined from USGS estimating equations for peak flows. A reasonable lag time due to storage in the reservoir was determined and the resultant flood elevation was computed by using that storage-reduced flow in the height-over-dam computation.

March 2, 2009 Countywide Analysis

For the March 2, 2009 countywide FIS, hydrologic analyses were conducted to establish the peak discharge-frequency relationships for floods of selected recurrence intervals for Blackstone River within Providence County.

For gaged locations, peak flood discharges were calculated using standard hydrologic methods described in Bulletin 17B (USGS, 1981). The Pearson Type III distribution with log transformation of the flood data (log-Pearson Type III) was applied to annual peak discharge data from USGS gages located in or within 10 miles of the Blackstone watershed that were found to have gaging records of sufficient length (at least 10 years) and basins not appreciably altered by reservoir regulation in order to define annual flood series. Statistical parameters of the flow distributions were determined from the station data for Blackstone River, including a generalized skew coefficient. The annual flood frequency analysis PeakFQ computer program (USGS, 2002) was used to compute the flood discharges based on these statistical parameters and annual flood series (CDM, 2004).

For ungaged locations, discharges were developed using the following drainage-area transfer equation:

$$Q_1/Q_2 = (DA_1/DA_2)^{0.75}$$

where $Q_1$ and $Q_2$ are discharges at specific locations, and $DA_1$ and $DA_2$ are the drainage areas at these locations with the exponent (0.75) reflecting a relevant value for the area (Wandle, 1983).

The peak discharge-frequency relationships used for Blackstone River flows in Providence County were based on stream gaging records of the USGS gage 01112500 located on Blackstone River at Woonsocket, Rhode Island. The gage has a recording period from 1929 to present.

Geographic data for the analysis was obtained from RIGIS (RIGIS 03/04 Digital Orthophotos of Rhode Island 2003-2004) and digital USGS 1:24,000-scale topographic maps. Drainage basins for selected discharge locations were delineated using GIS software and based on the digital watershed and subwatershed hydrologic unit boundaries for Rhode Island (RIGIS, 2003).

September 18, 2013 Countywide Analysis

For the September 18, 2013 countywide analysis, no new riverine hydrologic analyses were performed.

October 2, 2015 Countywide Analysis

For the October 2, 2015 countywide analysis, hydrologic analyses were conducted for Centerdale, Cranberry, Dry, Furnace Hill, Lincoln Downs, Meshanticut, Simmons, and Upper Canada Pond Brooks; East Branch West, Moshassuck, North Branch Pawtuxet, Pawtuxet, Pocasset, Sevenmile, Ten Mile, West, and Woonasquatucket/Providence Rivers; and West River Diversion.

**Centerdale and Cranberry Brooks**

The modeled reach on Centerdale Brook is 0.7 mile long, and the modeled reach on Cranberry Brook is 1 mile long. Cranberry Brook starts at Intervale Drive south of the Dr. Edward A. Ricci Middle School, crosses over Humbert Brook on Laurel Street, and extends to the confluence with Woonsquatucket River, 12 feet from where Humbert Brook enters the Woonsquatucket River. Although the culverts on Humbert Brook and Cranberry Brook cross and parallel each other, it appears that they do not connect and stay separate from each other throughout the stream reaches. It is impossible to know this for certain without detailed plans of the culverts.

Estimates of the 10-, 2-, 1-, and 0.2-percent AEPs at selected locations along Centerdale Brook and Cranberry Brook were calculated using a cubic-feet-per-second-per-square-mile drainage-area ratio method described below based on the USGS streamgage Blackstone River Tributary at Woonsocket, RI (01112700). The peak flows used were the from an extended record EMA analysis. These peak flows were divided by the drainage area of the streamgage (2.07 $mi^2$) to convert to cubic feet per second per square mile

(CFSM) and then multiplied by the drainage area of the stream reach sites on Centerdale Brook and Cranberry Brook.

**Dry Brook**
Dry Brook is a tributary to Pocasset River, starting at the confluence in the Town of Johnston and ending about 3 miles upstream at Reservoir Avenue.

The updated flow for the 10-, 2-, 1-, and 0.2-percent AEPs for Dry Brook used regional regression equations developed by Zarriello and others (2012). The estimates calculated using regional regression equations are based on the basin characteristics drainage area ($mi^2$), stream density ($mi/mi^2$), and open water and wetland storage (percent). The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008).

**East Branch West River**
East Branch West River is a tributary to West River, starting at the confluence in the Town of North Providence and ending about 0.6 mile upstream near the Lincoln/North Providence corporate boundary. The confluence of East Branch West River is about 3.5 miles upstream of the confluence of West River with Moshassuck River.

Estimates of the 10-, 2-, 1-, and 0.2-percent AEPs on East Branch West River were determined from the difference in the flows determined above and below the confluence with the West River by the regional regression equations. The estimates calculated using regional regression equations are based on the basin characteristics drainage area ($mi^2$), stream density ($mi/mi^2$), and open water and wetland storage (percent). The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008).

**Furnace Hill Brook**
Furnace Hill Brook begins at the confluence with Meshanticut Brook in the City of Cranston and ends 2.6 miles upstream at Pippin Orchard Road.

Estimates of the 10-, 2-, 1-, and 0.2-percent AEPs on Furnace Hill Brook were calculated using regional regression equations (Zarriello and others, 2012). The regional regression equations are based on the basin characteristics drainage area ($mi^2$), stream density ($mi/mi^2$), and open water and wetland storage (percent) at the ungaged site. The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008).

**Lincoln Downs Brook**
Lincoln Downs Brook is a tributary to West River, starting at the confluence in the Town of North Providence and ending about 1 mile upstream in the Town of Lincoln. The confluence of Lincoln Downs Brook and West River is about 2.7 miles upstream of the confluence of West River with Moshassuck River.

Estimates of the 10-, 2-, 1-, and 0.2-percent AEPs on Lincoln Downs Brook were determined from the difference in the flows determined above and below the confluence with the West River by the regional regression equations. The estimates calculated using regional regression equations are based on the basin characteristics drainage area ($mi^2$), stream density ($mi/mi^2$), and open water and wetland storage (percent). The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008).

**Meshanticut Brook**

Meshanticut Brook begins at the confluence with the Pawtuxet River in the City of Warwick and ends 4.6 miles upstream at State Route 12 (Scituate Avenue) in the City of Cranston.

Estimates of the 10-, 2-, 1-, and 0.2-percent AEPs on Meshanticut Brook were calculated using regional regression equations (Zarriello and others, 2012). The regional regression equations are based on the basin characteristics drainage area ($mi^2$), stream density ($mi/mi^2$), and open water and wetland storage (percent) at the ungaged site. The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008).

**Moshassuck River**

The Moshassuck River model begins at the confluence with the Woonasquatucket River in the City of Providence and ends about 10 miles upstream at the outlet of Limerock Reservoir in the Town of Lincoln. The lower part of the river runs through the Cities of Pawtucket and Providence.

Estimates of the 10-, 2-, 1-, and 0.2-percent annual exceedance probabilities (AEPs) at the USGS Moshassuck River at Providence, RI streamgage (01114000) were taken from Zarriello and others (2012). The estimated AEP discharges used for the Moshassuck River streamgage were the weighted values calculated with the USGS Weighted Independent Estimator (WIE) program (Cohn and others, 2012).The program combines at-site log-Pearson Type III flow-frequency estimates with regional regression estimates. The estimates calculated using regional regression equations are based on the basin characteristics drainage area ($mi^2$), stream density ($mi/mi^2$), and open water and wetland storage (percent). The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008).

Flows for 10-, 2-, 1-, and 0.2-percent AEP floods at the USGS Moshassuck River at Providence, RI streamgage (01114000) were determined by the standard log-Pearson Type III method described in Bulletin 17B of the Hydrology Subcommittee (U.S. Interagency Advisory Committee on Water Data, 1982) and a modification of this method called the expected moments algorithm (EMA) (Cohn and others, 1997, 2001; Griffis and others, 2004).

The Moshassuck River streamgage is about 750 feet downstream of the Stevens Street Bridge in the City Providence. Theoretical AEP flows were transferred upstream and downstream from the streamgage for stream sites that were within 50 percent of the drainage area of the streamgage using a drainage-area ratio method by Johnstone and Cross (1949).

Discharges at stream locations on the Moshassuck River with drainage areas from 7.2 to 10.9 square miles were determined with regional regression equations (Zarriello and others, 2012). The estimates calculated using regional regression equations are based on the basin characteristics drainage area ($mi^2$), stream density ($mi/mi^2$), and open water and wetland storage (percent). The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008). Discharges at locations with drainage areas less than 7.2 square miles were determined by the drainage-area ratio method by Johnstone and Cross (1949), described previously.

**North Branch Pawtuxet River**

North Branch Pawtuxet River begins at the confluence with South Branch Pawtuxet River, forming Pawtuxet River, in the Town of West Warwick and ends 6.6 miles upstream at the Scituate Reservoir in the Town of Scituate.

Flow in North Branch Pawtuxet River is affected by the Scituate Reservoir. To estimate flood-flow AEPs in this reach, a flood-frequency analysis was done using standard Bulletin 17B log-Pearson Type III methods (Interagency Advisory Committee on Water Data, 1982) of estimated annual peak flows for the reach. Annual peak flows were estimated by subtracting the streamgage annual peak flows at the South Branch Pawtuxet River at Washington, RI streamgage (01116000) from the concurrent annual peak flows at the Pawtuxet River at Cranston, RI streamgage (01116500). The resulting flow was adjusted by the drainage-area ratio (0.788) of the North Branch Pawtuxet River at the confluence with South Branch Pawtuxet River (108 $mi^2$) to the intervening area difference between the South Branch Pawtuxet River at the confluence with North Branch Pawtuxet River (62.8 $mi^2$) and Pawtuxet River at Cranston, RI streamgage (01116500) (200 $mi^2$).

Peak-flow records indicate that some of the annual peaks (water years 1941-2010) from the South Branch Pawtuxet River at Washington, RI streamgage (01116000) and Pawtuxet River at Cranston, RI streamgage (01116500) were not coincident. The assumption was made that the peak flow on North Branch Pawtuxet River would be coincident with the peak flow on Pawtuxet River and, therefore, that the South Branch Pawtuxet River peak flow needs to be coincident with these peak flows. To ensure that South Branch Pawtuxet River peak flows were coincident with Pawtuxet River peak flows, a regression model was developed using SAS version 9.1.3 (SAS Institute, Inc, 1990) to estimate instantaneous peak flows from daily flow values at the South Branch Pawtuxet at Washington, RI streamgage (01116000).

The adjusted coefficient of determination (adj-$r^2$) for the regression was 0.98, which was determined from 70 annual peak flows (water years 1941-2010) and the coincident daily flow at the South Branch Pawtuxet River streamgage.

The non-coincident annual peak flows for the South Branch Pawtuxet River at Washington, RI streamgage (01116000) were estimated, subtracted from the annual peak at Pawtuxet River at Cranston, RI streamgage (01116500), and adjusted by the drainage-area ratio (0.788) to compute annual peak flows for North Branch Pawtuxet River. The coincident annual peaks for the South Branch Pawtuxet River at Washington, RI streamgage (01116000) were subtracted from the annual peak at Pawtuxet River at Cranston, RI streamgage (01116500) and adjusted by the drainage-area ratio (0.788) to compute annual peak flows for the North Branch Pawtuxet River. The complete estimated annual peak flow series for the North Branch Pawtuxet River (water years 1941-2010) was then used to compute a log-Pearson Type III probability distribution using PeakFQ (Flynn and others, 2006). A single flow for a given AEP was specified for the model reach as the drainage area at the upstream end of the reach (94.3 $mi^2$) is only about 13 percent less than the drainage area at the downstream end of the reach (108 $mi^2$).

### Pawtuxet River

The Pawtuxet River begins at the confluence with the Providence River in Pawtuxet Cove in Narragansett Bay on the Cranston/Warwick border and ends 11.2 miles upstream at the confluence of the North Branch Pawtuxet River and South Branch Pawtuxet River in the Town of West Warwick.

Estimates of the 10-, 2-, 1-, and 0.2-percent AEPs at the USGS streamgage Pawtuxet River at Cranston, RI (01116500) were taken from Zarriello and others (2012). The estimated AEP discharges used for the Pawtuxet River streamgage were calculated with the EMA modification of the standard log-Pearson Type III method described in Bulletin 17B of the Hydrology Subcommittee (U.S. Interagency Advisory Committee on Water Data, 1982). The EMA values were used because weighted values cannot be calculated on the Pawtuxet River because the flows at the streamgage are affected by regulation, and the regional regression equations for Rhode Island (Zarriello and others, 2012) assume no regulations of flood flows. The EMA analyses are based on 61 years of record (1940-2010).

The Pawtuxet River at Cranston, RI (01116500) streamgage is just downstream of State Route 37. Theoretical AEP flows were transferred upstream and downstream of the streamgage for stream sites using a drainage-area ratio method by Johnstone and Cross (1949).

### Pocasset River

The Pocasset River model starts at the confluence with Pawtuxet River in the City of Cranston and ends about 11.8 miles upstream near the center of the Town of Johnston.

The hydraulic model was obtained from the Natural Resources Conservation Service (NRCS) (Kevin Farmer, NRCS, written commun., 2011) and is documented in Bachand and others (2007) and Schmidt and others (2007). The hydraulic model was updated with LiDAR data, with limited field surveys, and with flood flows published in Zarriello and others (2012).

The updated flows for the 10-, 2-, 1-, and 0.2-percent AEPs for the Pocasset River model used regional regression equations developed by Zarriello and others (2012). The estimates calculated using regional regression equations are based on the basin characteristics drainage area ($mi^2$), stream density ($mi/mi^2$), and open water and wetland storage (percent). The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008).

The amount of flow diverted to the cemetery reach was estimated by applying the same percentage of flow diverted to the cemetery reach in the NRCS model to the flow estimated by the regional regression. The flows through the main channel were then calculated by subtracting the flows from the cemetery reach from the flows upstream of the split and rounded up to account for the additional drainage area.

### Sevenmile River

Discharges for given AEPs on Sevenmile River were calculated using regional regression equations (Zarriello and others, 2012) and a drainage-area ratio method. The peak flow equations are based on the basin characteristics drainage area ($mi^2$), stream density (mi/mi$^2$), and open water and wetland storage (percent). The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008). This application was used for calculating the AEPs at the different stream sites along the Sevenmile River.

**Simmons Brook**

Simmons Brook is a tributary to Pocasset River, starting at the confluence in the Town of Johnston and ending about 3.6 miles upstream at the upstream end of Simmons Upper Reservoir in the Town of Johnston.

The updated flows for the10-, 2-, 1-, and 0.2-percent AEPs for Simmons Brook used regional regression equations developed by Zarriello and others (2012). The estimates calculated using regional regression equations are based on the basin characteristics drainage area (mi$^2$), stream density (mi/mi$^2$), and open water and wetland storage (percent). The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008).

**Ten Mile River**

Estimates of the 10-, 2-, 1-, and 0.2-percent AEPs at the USGS Tenmile River at Pawtucket Ave., at East Providence, RI streamgage (01109403) were taken from Zarriello and others (2012). The estimated AEP discharges used for the streamgage were the weighted values calculated with the USGS WIE program (Cohn and others, 2012). The program uses the at-site and regional regression estimates and the variance of these estimates. The at-site estimate for the streamgage used the Bulletin 17-B log-Pearson Type III analysis on 24 years of record and 61 years of estimated peaks. The regional regression estimates use the drainage area (mi$^2$), stream density (mi/mi$^2$), and open water and wetland storage (percent). The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008).

Flows for 10-, 2-, 1-, and 0.2-percent AEP floods at the USGS Tenmile River at Pawtucket Ave., at East Providence, RI streamgage (01109403) were determined by the standard log-Pearson Type III method described in Bulletin 17B of the Hydrology Subcommittee (U.S. Interagency Advisory Committee on Water Data, 1982) and the EMA modification of this method (Cohn and others, 1997, 2001; Griffis and others, 2004).

The streamgage is just upstream of Pawtucket Avenue in the City of East Providence. Theoretical AEP flows were transferred upstream and downstream from the gage using a weighted hybrid method (Guimaraes and Bohman, 1992) that combines regression equation estimates at the new location with the weighted estimate determined at the gaged site.

**Upper Canada Pond Brook**

Upper Canada Pond Brook is a tributary to West River, starting in the City of Providence, about 1.1 mile upstream of the confluence of West River and Moshassuck River, and ending in the City of Pawtucket. Upper Canada Brook was modeled in two separate hydraulic models. The lower model is from the confluence with West River to Canada Pond, and the upper model is from State Route 15 (Mineral Spring Avenue) in the Town of North Providence to McCallum Avenue in the City of Pawtucket.

Estimates of the 10-, 2-, 1-, and 0.2-percent AEPs at selected locations on the lower reach of Upper Canada Pond Brook were determined from the difference in the flows determined above and below the confluence with West River by the regional regression equations. The estimates calculated using regional regression equations are based on the basin characteristics drainage area ($mi^2$), stream density ($mi/mi^2$), and open water and wetland storage (percent). The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008).

Estimates of the 10-, 2-, 1-, and 0.2-percent AEPs at selected locations on the upper reach of Upper Canada Pond Brook were calculated using a cubic-feet-per-second-per-square-mile drainage-area ratio method (described below) based on the USGS Blackstone River Tributary at Woonsocket, RI streamgage (01112700). These peak flows were divided by the drainage area of the streamgage (2.07 $mi^2$) to convert to cubic feet per second per square mile (CFSM) and then multiplied by the drainage area of the stream-reach sites on Upper Canada Pond Brook.

**West River and West River Diversion**

The West River is the largest tributary to the Moshassuck River. It begins at the confluence with the Moshassuck River in the City of Providence and ends about 4.3 miles upstream at the outlet of Wenscott Reservoir in the Town of North Providence. Flows for the West River were determined from regional regression equations (Zarriello and others, 2012). The estimates calculated using regional regression equations are based on the basin characteristics drainage area ($mi^2$), stream density ($mi/mi^2$), and open water and wetland storage (percent). The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008).

A railroad corridor about 1,700 feet upstream of the mouth of the West River acts as an overflow conduit during high flow. The diversion conduit is modeled as the West River Diversion and channels the flow from the railroad corridor back into the Moshassuck River about 4,800 feet downstream of the West River confluence. The flow in this diversion channel was computed by the HEC-RAS model using the flow optimization option. The flow optimization was run once, and the computed flows then were specified as the flows in the diversion channel.

**Woonasquatucket River/Providence River**

The Woonasquatucket River model begins at the Fox Point Hurricane Barrier in the City of Providence and ends about 15 miles upstream, about 0.3 mile upstream of State Route 5 and 104 (Farnum Pike) in the Town of Smithfield. The river is bordered by the Towns of Johnston, North Providence, and Smithfield and the City of Providence. From the Fox Point Hurricane Barrier to the confluence with Moshassuck River, the river is known as the Providence River, but it was considered part of the Woonasquatucket River for the purposes of this study.

Estimates of the 10-, 2-, 1-, and 0.2-percent AEPs at the USGS Woonasquatucket River at Centerdale, RI streamgage (01114500) were taken from Zarriello and others (2012). The estimated AEP discharges used for the Woonasquatucket River streamgage were the weighted values calculated with the USGS WIE program (Cohn and others, 2012).The program combines at-site log-Pearson Type III flow-frequency estimates with regional regression estimates. The estimates calculated using regional regression equations are based on the basin characteristics drainage area ($mi^2$), stream density ($mi/mi^2$), and open water and wetland storage (percent). The peak-flow regional regression equations are incorporated into the USGS National StreamStats Web-based Application for Rhode Island (Ries, 2007; Ries and others, 2008).

Flows for 10-, 2-, 1-, and 0.2-percent AEP floods at the USGS Woonasquatucket River at Centerdale, RI streamgage (01114500) were determined by the standard log-Pearson Type III method described in Bulletin 17B of the Hydrology Subcommittee (U.S. Interagency Advisory Committee on Water Data, 1982) and the EMA modification of this method (Cohn and others, 1997, 2001; Griffis and others, 2004).

The Woonasquatucket River streamgage is just downstream of US Route 44 in Centerdale, Rhode Island. Theoretical AEP flows were transferred upstream and downstream from the gage using a drainage-area ratio method by Johnstone and Cross (1949).

Peak discharge-drainage area relationships for Providence County are shown in Table 5, "Summary of Discharges."

TABLE 5 – SUMMARY OF DISCHARGES

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (SQUARE MILES) | PEAK DISCHARGES (CUBIC FEET PER SECOND) 10-PERCENT ANNUAL CHANCE | 2-PERCENT ANNUAL CHANCE | 1-PERCENT ANNUAL CHANCE | 0.2-PERCENT ANNUAL CHANCE |
|---|---|---|---|---|---|
| ASSAPUMPSET BROOK | | | | | |
| At cross section A | 2.56 | 180 | 350 | 480 | 950 |
| At Amento Street | 1.50 | 110 | 310 | 400 | 790 |
| At George Waterman Road | 1.40 | 110 | 300 | 390 | 750 |
| At cross section O | 1.38 | 220 | 410 | 490 | 720 |
| At Sweet Hill Drive | 1.28 | 200 | 380 | 450 | 660 |
| BLACKSTONE RIVER | | | | | |
| Upstream of confluence with Branch River | 269.2 | 7,600 | 11,900 | 14,100 | 19,900 |
| At downstream end of Tupperware Mill Canal | 358.0 | 9,520 | 14,900 | 17,600 | 24,900 |
| Above Saranac Dam | 358.0 | 9,920 | 15,500 | 18,300 | 25,900 |
| At Woonsocket Falls Dam | 368.0 | 10,100 | 15,900 | 18,700 | 26,500 |
| At Manville Dam | 430.0 | 11,400 | 17,800 | 21,000 | 29,700 |
| At Albion Dam | 433.0 | 11,400 | 17,900 | 21,100 | 29,900 |
| At Ashton Dam | 436.0 | 11,500 | 18,000 | 21,200 | 30,000 |
| At Pratt Dam | 442.0 | 11,600 | 18,200 | 21,500 | 30,300 |
| Upstream of Sayles Dam | 444.0 | 11,700 | 18,300 | 21,500 | 30,500 |
| At confluence with Abbott Run | 470.0 | 12,200 | 19,100 | 22,500 | 31,800 |
| Upstream of Pantex Dam | 472.0 | 12,200 | 19,100 | 22,500 | 31,900 |
| At Slater Mill Dam | 473.0 | 12,200 | 19,200 | 22,600 | 31,900 |
| At Main Street | 478.0 | 12,300 | 19,300 | 22,800 | 32,200 |

TABLE 5 – SUMMARY OF DISCHARGES - continued

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (SQUARE MILES) | PEAK DISCHARGES (CUBIC FEET PER SECOND) | | | |
|---|---|---|---|---|---|
| | | 10-PERCENT ANNUAL CHANCE | 2-PERCENT ANNUAL CHANCE | 1-PERCENT ANNUAL CHANCE | 0.2-PERCENT ANNUAL CHANCE |
| BRANCH RIVER | | | | | |
| Inlet to Slatersville Reservoir | 73.0 | 2,800 | 5,100 | 6,300 | 9,500 |
| Confluence of Clear and Chepachet Rivers | 66.9 | 2,500 | 4,500 | 5,600 | 8,500 |
| CENTERDALE BROOK | | | | | |
| Confluence with Woonasquatucket River | 0.45 | 43 | 65 | 76 | 104 |
| Angell Avenue | 0.38 | 37 | 55 | 64 | 88 |
| Locust Avenue | 0.25 | 24 | 36 | 42 | 58 |
| CHEPACHET RIVER | | | | | |
| At Steeres Lower Pond Dam | 15.48 | 499 | 926 | 1,162 | 1,722 |
| Confluence with Clear River | 21.0 | 680 | 1,300 | 1,600 | 2,400 |
| Gazza Road | 18.8 | 600 | 1,100 | 1,400 | 2,100 |
| At Chepachet Pond Dam | 11.87 | 364 | 669 | 835 | 1,363 |
| CHERRY BROOK | | | | | |
| At Woonsocket corporate limits | 4.35 | 100 | 175 | 200 | 275 |
| Downstream of Providence and Worcester Railroad | 4.11 | 80 | 110 | 120 | 140 |
| Upstream of Providence and Worcester Railroad | 4.09 | 660 | 1,200 | 1,430 | 2,070 |
| At Woonsocket Hill Road | 3.33 | 510 | 950 | 1,130 | 1,640 |
| At Route 104 | 0.65 | 70 | 150 | 190 | 290 |

TABLE 5 – SUMMARY OF DISCHARGES - continued

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (SQUARE MILES) | PEAK DISCHARGES (CUBIC FEET PER SECOND) 10-PERCENT ANNUAL CHANCE | 2-PERCENT ANNUAL CHANCE | 1-PERCENT ANNUAL CHANCE | 0.2-PERCENT ANNUAL CHANCE |
|---|---|---|---|---|---|
| CLEAR RIVER | | | | | |
| Confluence with Chepachet River | 46.0 | 1,800 | 3,300 | 4,000 | 6,100 |
| Sherman Road | 41.8 | 1,800 | 3,200 | 3,900 | 5,800 |
| Above Nipmuc River | 25.0 | 730 | 1,200 | 1,500 | 2,200 |
| Below Pascoag River | 21.5 | 590 | 880 | 1,200 | 1,700 |
| Above Pascoag River | 12.8 | 440 | 700 | 1,000 | 1,500 |
| At Wilson Dam | 11.6 | 390 | 620 | 900 | 1,300 |
| CRANBERRY BROOK | | | | | |
| Confluence with Woonasquatucket River | 0.45 | 43 | 65 | 76 | 104 |
| Laurel Drive | 0.14 | 14 | 20 | 24 | 32 |
| CROOKFALL BROOK | | | | | |
| At confluence with Blackstone River | 8.0 | 350 | 690 | 940 | 2,020 |
| At upstream study limit | 5.7 | 250 | 490 | 675 | 1,500 |
| DRY BROOK | | | | | |
| At confluence with Pocasset River | 3.3 | 80 | 130 | 160 | 210 |
| Upstream of State Route 5 | 3.2 | 70 | 120 | 150 | 200 |
| Outlet of Almy Reservoir | 2.4 | 40 | 60 | 80 | 100 |
| EAST BRANCH WEST RIVER | | | | | |
| Confluence with West River | 0.9 | 60 | 100 | 120 | 170 |

TABLE 5 – SUMMARY OF DISCHARGES - continued

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (SQUARE MILES) | PEAK DISCHARGES (CUBIC FEET PER SECOND) 10-PERCENT ANNUAL CHANCE | 2-PERCENT ANNUAL CHANCE | 1-PERCENT ANNUAL CHANCE | 0.2-PERCENT ANNUAL CHANCE |
|---|---|---|---|---|---|
| FURNACE HILL BROOK | | | | | |
| Confluence with Meshanticut Brook | 5.64 | 430 | 750 | 900 | 1,320 |
| State Route 51 | 3.92 | 270 | 470 | 560 | 810 |
| Private driveway about 50 feet downstream of Kimberly Lane | 3.04 | 220 | 380 | 460 | 670 |
| FURNACE HILL BROOK TRIBUTARY | | | | | |
| At confluence with Furnace Hill Brook | 0.99 | 60 | 120 | 160 | 330 |
| Approximately 3,700 feet upstream of confluence with Furnace Hill Brook | 0.76 | 50 | 100 | 130 | 300 |
| KEECH POND | | | | | |
| Entire shoreline | 5.90 | * | * | 1,230 | * |
| LINCOLN DOWNS BROOK | | | | | |
| Confluence with West River | 1.99 | 150 | 250 | 300 | 440 |
| MARY BROWN BROOK | | | | | |
| At confluence with Five Mile River | 8.63 | * | * | 800 | * |
| MESHANTICUT BROOK | | | | | |
| Confluence with Pawtuxet River, West Warwick | 13.6 | 1,020 | 1,760 | 2,100 | 3,100 |
| About 1,000 feet downstream of I-295 | 9.55 | 682 | 1,180 | 1,410 | 2,060 |

*Data not available

TABLE 5 – SUMMARY OF DISCHARGES - continued

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (SQUARE MILES) | PEAK DISCHARGES (CUBIC FEET PER SECOND) 10-PERCENT ANNUAL CHANCE | 2-PERCENT ANNUAL CHANCE | 1-PERCENT ANNUAL CHANCE | 0.2-PERCENT ANNUAL CHANCE |
|---|---|---|---|---|---|
| MESHANTICUT BROOK - continued | | | | | |
| About 400 feet downstream of I-295 (downstream of bypass channel) | * | 682 | 1,180 | 1,410 | 1,543 |
| Bypass channel east of I-295 | * | 0.1 | 0.1 | 0.1 | 517 |
| About 300 feet upstream of Wilbur Avenue (upstream of bypass channel) | 8.94 | 682 | 1,180 | 1,410 | 2,060 |
| State Route 37 ramps to I-295 | 8.53 | 625 | 1,080 | 1,290 | 1,890 |
| About 300 feet upstream of confluence with Furnace Hill Brook | 2.89 | 246 | 433 | 521 | 769 |
| MILL RIVER | | | | | |
| At confluence with Blackstone River | 34.7 | 1,840 | 3,350 | 4,200 | 6,200 |
| At bottom of Harris Pond Spillway | 34.0 | 1,470 | 2,590 | 3,100 | 4,600 |
| MOSHASSUCK RIVER | | | | | |
| Steeple Street | 23.7 | 1,320 | 1,930 | 2,350 | 3,510 |
| Downstream of Stevens Street, near USGS streamgage 01114000 | 22.7 | 1,320 | 1,820 | 2,080 | 2,740 |
| Upstream of confluence with West River | 11.7 | 710 | 1,210 | 1,450 | 2,100 |
| Upstream of I-95 | 10.1 | 580 | 990 | 1,180 | 1,710 |

*Data not available

TABLE 5 – SUMMARY OF DISCHARGES - continued

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (SQUARE MILES) | PEAK DISCHARGES (CUBIC FEET PER SECOND) 10-PERCENT ANNUAL CHANCE | 2-PERCENT ANNUAL CHANCE | 1-PERCENT ANNUAL CHANCE | 0.2-PERCENT ANNUAL CHANCE |
|---|---|---|---|---|---|
| MOSHASSUCK RIVER - continued | | | | | |
| Downstream of State Route 15 | 8.9 | 490 | 840 | 1,000 | 1,440 |
| Downstream of confluence with Olney Pond outlet into Barney Pond | 7.2 | 380 | 640 | 760 | 1,090 |
| Inlet to Barney Pond | 5.4 | 280 | 480 | 570 | 810 |
| Fairlawn Golf Course at Sherman Avenue | 4.2 | 220 | 370 | 440 | 630 |
| Sherman Avenue | 3.0 | 160 | 270 | 320 | 460 |
| State Route 146 | 1.2 | 60 | 110 | 130 | 190 |
| NORTH BRANCH PAWTUXET RIVER | | | | | |
| Confluence with Pawtuxet River, Coventry | 108 | 1,960 | 3,320 | 4,090 | 6,450 |
| PASCOAG RESERVOIR | | | | | |
| Entire shoreline | 7.97 | * | * | 170 | * |
| PASCOAG RIVER | | | | | |
| At Grove Street | 8.6 | 150 | 180 | 200 | 270 |
| At Route 107 | 8.2 | 150 | 170 | 190 | 270 |
| PAWTUXET RIVER | | | | | |
| Broad Street | 232 | 4,300 | 7,760 | 9,860 | 16,780 |
| Upstream of confluence with Pocasset River | 202 | 3,860 | 6,970 | 8,850 | 15,060 |

*Data not available

TABLE 5 – SUMMARY OF DISCHARGES - continued

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (SQUARE MILES) | PEAK DISCHARGES (CUBIC FEET PER SECOND) 10-PERCENT ANNUAL CHANCE | 2-PERCENT ANNUAL CHANCE | 1-PERCENT ANNUAL CHANCE | 0.2-PERCENT ANNUAL CHANCE |
|---|---|---|---|---|---|
| PAWTUXET RIVER - continued | | | | | |
| USGS streamgage 01116500 | 201 | 3,840 | 6,940 | 8,820 | 15,000 |
| Downstream of confluence of North and South Branches Pawtuxet Rivers, West Warwick | 183 | 3,570 | 6,450 | 8,200 | 13,940 |
| PETERS RIVER | | | | | |
| At confluence with Blackstone River | 12.7 | 750 | 1,150 | 1,600 | 2,600 |
| POCASSET RIVER | | | | | |
| At confluence with Pawtuxet River | 20.6 | 770 | 1,280 | 1,530 | 2,150 |
| At confluence with cemetery diversion | 17.7 | 650 | 1,070 | 1,270 | 1,790 |
| Cemetery diversion | * | 80 | 210 | 310 | 550 |
| Mainstem below divergence of cemetery diversion | * | 550 | 840 | 940 | 1,220 |
| Downstream of confluence with Simmons Brook | 15.8 | 630 | 1,050 | 1,250 | 1,760 |
| Downstream of confluence with Dry Brook | 8.44 | 330 | 540 | 650 | 910 |
| Upstream of confluence with Dry Brook | 5.13 | 310 | 530 | 620 | 900 |
| Downstream of US Route 6 | 4.47 | 260 | 440 | 530 | 760 |
| Downstream of US Route 6A | 3.39 | 200 | 350 | 420 | 590 |

*Data not available

TABLE 5 – SUMMARY OF DISCHARGES - continued

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (SQUARE MILES) | PEAK DISCHARGES (CUBIC FEET PER SECOND) 10-PERCENT ANNUAL CHANCE | 2-PERCENT ANNUAL CHANCE | 1-PERCENT ANNUAL CHANCE | 0.2-PERCENT ANNUAL CHANCE |
|---|---|---|---|---|---|
| POCASSET RIVER - continued | | | | | |
| Downstream of I-295 | 2.52 | 160 | 270 | 320 | 460 |
| PONAGANSET RESERVOIR | | | | | |
| Entire shoreline | 1.86 | * | * | 20 | * |
| PROVIDENCE RIVER | | | | | |
| Fox Point Hurricane Barrier | 76.0 | 2,000 | 2,990 | 3,450 | 4,690 |
| RUNNINS RIVER | | | | | |
| At River Road | 9.6 | 275 | 450 | 535 | 800 |
| At Mink Street | 9.1 | 260 | 430 | 510 | 755 |
| At Highland Avenue | 7.5 | 195 | 315 | 375 | 605 |
| SEVENMILE RIVER | | | | | |
| Amtrak Railroad, Attleboro, Massachusetts | 12.6 | 577 | 961 | 1,144 | 1,620 |
| SIMMONS BROOK | | | | | |
| At confluence with Pocasset River | 5.92 | 290 | 490 | 580 | 830 |
| Downstream of Mill Street | 4.92 | 220 | 380 | 450 | 640 |
| Downstream of Simmonsville Avenue | 4.58 | 200 | 340 | 400 | 570 |
| Outlet of Simmons Lower Reservoir | 4.35 | 180 | 300 | 360 | 500 |

*Data not available

TABLE 5 – SUMMARY OF DISCHARGES - continued

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (SQUARE MILES) | PEAK DISCHARGES (CUBIC FEET PER SECOND) 10-PERCENT ANNUAL CHANCE | 2-PERCENT ANNUAL CHANCE | 1-PERCENT ANNUAL CHANCE | 0.2-PERCENT ANNUAL CHANCE |
|---|---|---|---|---|---|
| SMITH AND SAYLES RESERVOIR | | | | | |
| Entire shoreline | 7.60 | * | * | 440 | * |
| SOUTH BRANCH ASSAPUMPSET BROOK | | | | | |
| Above confluence with Assapumpset Brook | 1.15 | 150 | 210 | 280 | 550 |
| At Greenville Avenue | 1.08 | 50 | 190 | 280 | 580 |
| SPRING GROVE POND | | | | | |
| Entire shoreline | 0.86 | * | * | 130 | * |
| STILLWATER RIVER | | | | | |
| At confluence with Stillwater Reservoir | 13.4 | 516 | 873 | 1,068 | 1,609 |
| At downstream confluence of unnamed tributary | 9.4 | 381 | 645 | 789 | 1,189 |
| At outlet of Waterman Reservoir | 8.4 | 295 | 499 | 610 | 919 |
| TEN MILE RIVER | | | | | |
| Omega Pond Dam | 55.4 | 1,510 | 2,440 | 2,940 | 4,200 |
| Pawtucket Avenue (USGS streamgage 01109403) | 53.7 | 1,440 | 2,330 | 2,820 | 4,030 |
| Dam downstream of Pond Street, Seekonk, Massachusetts | 28.7 | 1,290 | 2,140 | 2,550 | 3,640 |

*Data not available

TABLE 5 – SUMMARY OF DISCHARGES - continued

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (SQUARE MILES) | PEAK DISCHARGES (CUBIC FEET PER SECOND) 10-PERCENT ANNUAL CHANCE | 2-PERCENT ANNUAL CHANCE | 1-PERCENT ANNUAL CHANCE | 0.2-PERCENT ANNUAL CHANCE |
|---|---|---|---|---|---|
| UNNAMED TRIBUTARY | | | | | |
| At confluence with Stillwater River | 2.1 | 45 | 76 | 93 | 140 |
| At outlet of Slack Reservoir | 1.9 | 28 | 48 | 58 | 87 |
| UPPER CANADA POND BROOK | | | | | |
| Confluence with West River | 1.96 | 140 | 230 | 280 | 400 |
| Upstream of State Route 15 | 1.18 | 110 | 170 | 200 | 270 |
| Lojai Boulevard and Garfield Street | 0.74 | 71 | 107 | 125 | 172 |
| McCallum Avenue and Chandler Avenue | 0.31 | 30 | 45 | 52 | 72 |
| WEST RIVER | | | | | |
| Confluence with Moshassuck River | 11.0 | 650 | 1,000 | 1,070 | 1,170 |
| Upstream of West River Diversion | 10.9 | 640 | 1,090 | 1,310 | 1,900 |
| Upstream of confluence with Upper Canada Pond Brook | 7.8 | 430 | 740 | 880 | 1,270 |
| Veazie Street | 7.3 | 380 | 640 | 770 | 1,110 |
| Downstream of confluence with Lincoln Downs Brook | 6.6 | 340 | 570 | 680 | 980 |
| Downstream of confluence with East Branch West River | 4.2 | 190 | 320 | 380 | 540 |

TABLE 5 – SUMMARY OF DISCHARGES - continued

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (SQUARE MILES) | PEAK DISCHARGES (CUBIC FEET PER SECOND) 10-PERCENT ANNUAL CHANCE | 2-PERCENT ANNUAL CHANCE | 1-PERCENT ANNUAL CHANCE | 0.2-PERCENT ANNUAL CHANCE |
|---|---|---|---|---|---|
| WEST RIVER - continued | | | | | |
| Upstream of confluence with East Branch West River | 3.2 | 130 | 220 | 260 | 370 |
| Douglas Terrace | 3.1 | 120 | 220 | 250 | 340 |
| WEST RIVER DIVERSION | | | | | |
| Upstream of confluence with Moshassuck River | * | 1 | 110 | 260 | 770 |
| WILLETT POND BROOK | | | | | |
| At Francis Avenue | 1.4 | 70 | 140 | 200 | 480 |
| At Willett Pond Dam | 1.2 | 65 | 135 | 185 | 445 |
| WOONASQUATUCKET RIVER | | | | | |
| Steeple Street | 50.8 | 1,450 | 2,180 | 2,530 | 3,450 |
| Atwells Avenue | 48.2 | 1,390 | 2,100 | 2,430 | 3,310 |
| Woonasquatucket River Greenway bike path | 44.6 | 1,310 | 1,980 | 2,290 | 3,130 |
| US Route 44 (USGS streamgage 01114500) | 37.8 | 1,140 | 1,730 | 2,010 | 2,750 |
| Greystone Mill Pond | 36.1 | 1,100 | 1,670 | 1,940 | 2,660 |
| Outlet of Georgiaville Pond Dam | 33.0 | 1,020 | 1,560 | 1,810 | 2,480 |
| Outlet of Stillwater Pond Dam | 28.0 | 900 | 1,370 | 1,600 | 2,190 |
| Outlet of Stillwater Reservoir Dam | 25.0 | 820 | 1,260 | 1,460 | 2,010 |

*Data not available

TABLE 5 – SUMMARY OF DISCHARGES - continued

| FLOODING SOURCE AND LOCATION | DRAINAGE AREA (SQUARE MILES) | PEAK DISCHARGES (CUBIC FEET PER SECOND) 10-PERCENT ANNUAL CHANCE | 2-PERCENT ANNUAL CHANCE | 1-PERCENT ANNUAL CHANCE | 0.2-PERCENT ANNUAL CHANCE |
|---|---|---|---|---|---|
| WOONASQUATUCKET RIVER - continued | | | | | |
| Old Forge Road | 5.0 | 230 | 360 | 420 | 590 |

Drainage area-peak discharge relationships for Upper Canada Pond Brook and Lincoln Downs Brook are shown in Figure 1. Drainage area-peak discharge relationships for West River are shown in Figure 2.

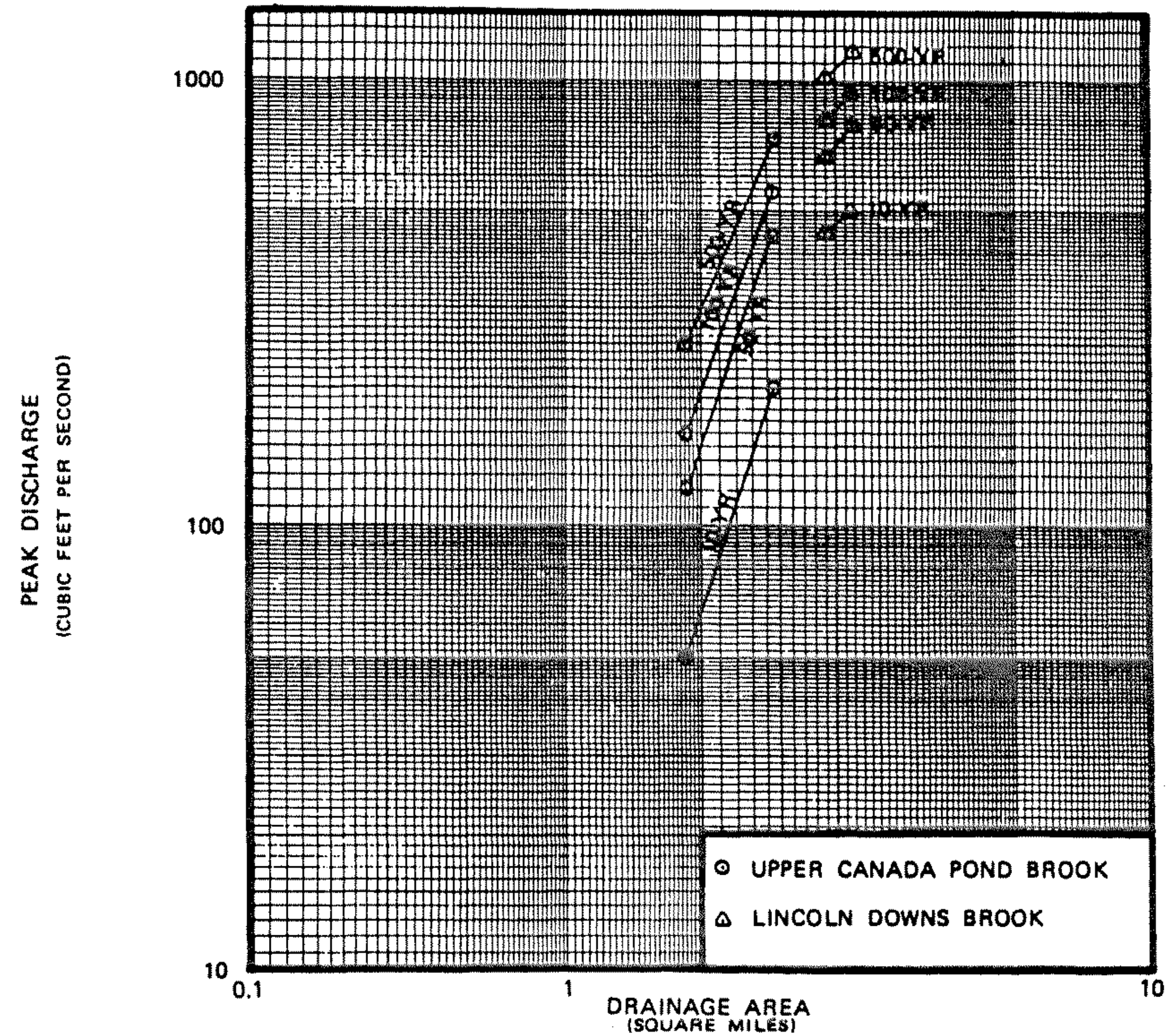


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

**PROVIDENCE COUNTY, RI**

(ALL JURISDICTIONS)

**FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES**

**UPPER CANADA POND BROOK AND LINCOLN DOWNS BROOK**

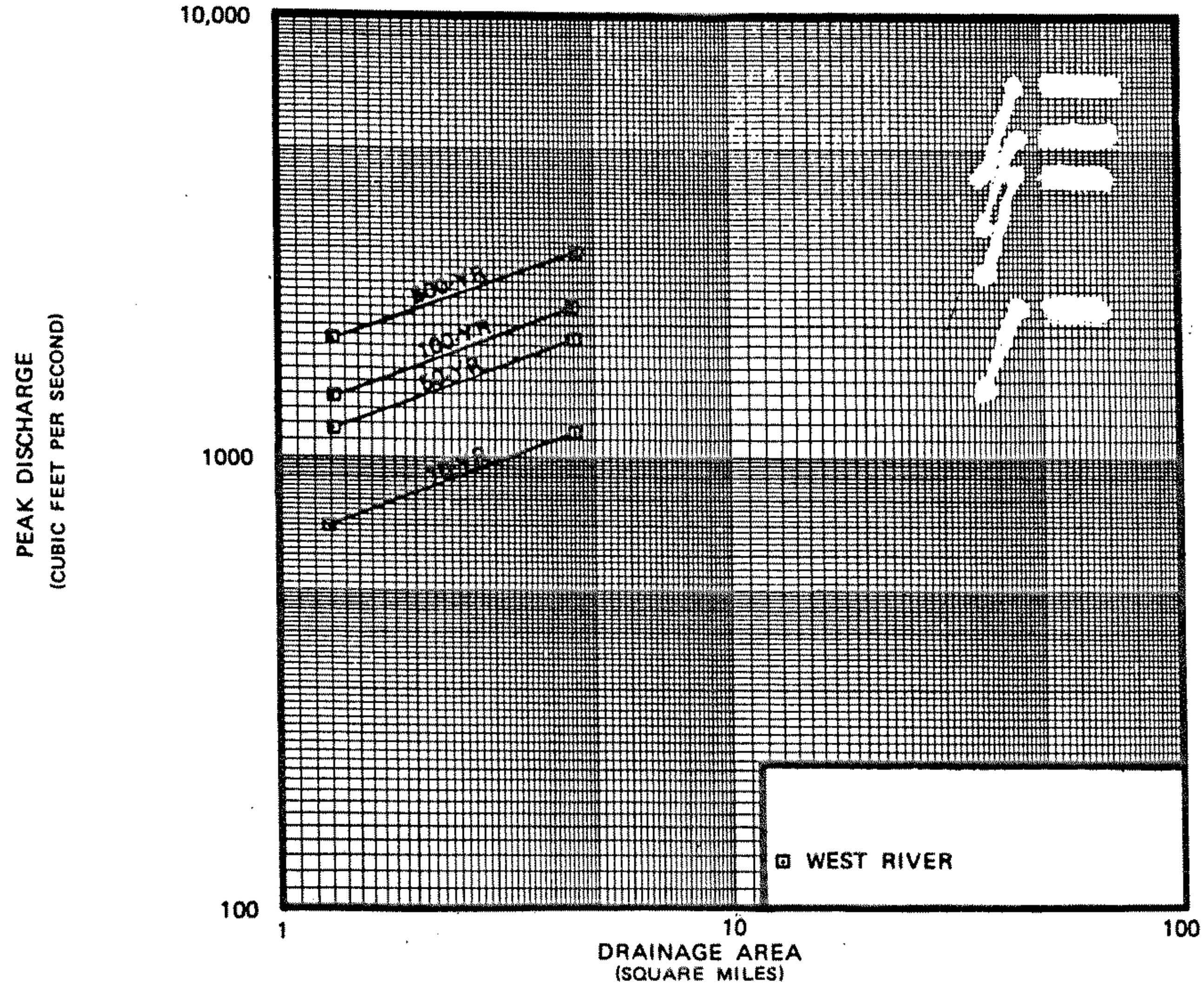


FIGURE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY

**PROVIDENCE COUNTY, RI**

(ALL JURISDICTIONS)

**FREQUENCY-DISCHARGE, DRAINAGE AREA CURVES**

**WEST RIVER**

## 3.2 Riverine Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals. Users should be aware that flood elevations shown on the FIRM [Flood Insurance Rate Map (FIRM)] represent rounded whole-foot elevations and may not exactly reflect the elevations shown on the Flood Profiles or in the Floodway Data tables in the FIS report. Flood elevations shown on the FIRM 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 in conjunction with the data shown on the FIRM.

Cross section data for the below-water sections were obtained from field surveys. Cross sections were located at close intervals above and below bridges, culverts, and dams in order to compute the significant backwater effects of these structures. In addition, cross sections were taken between hydraulic controls whenever warranted by topographic changes.

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the FIRM (Exhibit 2). All bridges, dams, and culverts were field-surveyed to obtain elevation data and structural geometry. Cross sections were selected immediately below changes in stream configuration. Roughness coefficients (Manning's "n") were determined by field inspection at each cross section using a step-by-step procedure (USGS, 1989).

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the Flood Profiles (Exhibit 1) are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals.

For each community within Providence County that has a previously printed FIS report, the hydraulic analyses described in those reports have been compiled and are summarized below.

<u>Precountywide Analyses</u>

For the Town of Burrillville, water-surface profiles were developed using the SCS WSP2 computer step-backwater model (SCS, 1976). Profiles were determined for the 10-, 2-, 1-, and 0.2-percent-annual-chance floods using starting elevations on the Branch River at the town line from the TR-20 reservoir routing of the downstream dam. Starting water-surface elevations for the Clear, Pascoag, and Chepachet Rivers were taken from the Branch River.

For the City of Cranston, water-surface elevations of floods of selected recurrence intervals for the Pawtuxet River and Furnace Hill Tributary were computed using the USACE HEC-2 step-backwater computer model (USACE, 1976). Water-surface elevations of floods of selected recurrence intervals for Pocasset River, Meshanticut Brook, and Furnace Hill Brook were computed using the SCS WSP-2 water-surface profile computer program (SCS, 1976).

Flood profiles of Pawtuxet River were previously computed by the USACE for the 1- and 0.2-percent-annual-chance recurrence intervals and the flood of March 1968. Since the peak discharge of the March 1968 flood is in the range of the 10- to 5-percent-annual-chance recurrence interval flood, it has been adopted as the 10-year event. Water-surface elevations for the 2-percent-annual-chance frequency flood were determined by elevation-discharge relationships at selected locations.

For Pawtuxet River, starting water-surface elevations were determined from rating curves developed by the USACE. Information for the study of Pawtuxet River was obtained from the FIS for the City of Warwick (Federal Insurance Administration, June 1976). The starting water-surface elevations were calculated using stage-discharge curves from "Flood Hazard Analyses, Pocasset River and Meshanticut Brook, Cranston, Rhode Island," published in September 1973, for Meshanticut Brook and from "Addendum, Flood Hazard Analyses, Pocasset River and Meshanticut Brook, Cranston, Rhode Island," published in December 1974 by the SCS, for Pocasset River (U.S. Department of Agriculture, SCS, September 1973; SCS, December 1974). By using back-up data from the SCS, stage-discharge curves were developed and the 2-percent-annual-chance flood elevations were calculated and plotted on profiles.

For Ten Mile River and Runnins River, water-surface elevations of floods of the selected recurrence intervals were computed using the SCS WSP-2 water-surface profile computer program (USACE, October 1973). Starting water-surface elevations were based on mean high water.

Cross sections were determined by field survey along the stream channel and mapped at a scale of 1:2,400 with a contour interval of 5 feet (Aero Service Corporation, 1963).

For the Town of Glocester, spillway and dam-crest profiles and spillway sections for the flood routing analyses were field-surveyed to obtain elevation data and structural geometry. At Waterman Reservoir, two bridges upstream of the spillway were field-surveyed to obtain elevation data and structural geometry.

Water-surface elevations of the selected recurrence intervals for the Chepachet River were developed using the SCS WSP-2 computer step-backwater model (U.S. Department of Agriculture, SCS, May 1976). The 1-percent-annual-chance flood elevations for Mary Brown Brook were taken from the Putnam FIS report (FEMA, October 18, 1998). That study utilized a USGS regional analysis that related depth of flooding to basin drainage area (USGS, unpublished). The starting water-surface elevation for the Chepachet River was determined using the critical depth method at the weir of Steeres Lower Pond. The starting water-surface elevation for Mary Brown Brook was taken from the confluence with the Five Mile River.

For Assapumpset Brook, Dry Brook, Simmons Brook, and South Branch Assapumpset Brook, water-surface elevations were computed using the SCS WSP-2 computer program (U.S. Department of Agriculture, SCS, May 1976). Water-surface elevations of floods of the selected recurrence intervals for Pocasset River and Woonasquatucket River were computed using the USACE HEC-2 step-backwater computer program (USACE, April 1984). Starting water-surface elevations were calculated using the SCS-prepared "Flood Hazard Analyses for the Pocasset River" (Water Resources Council, March 1976). Starting elevations for Woonasquatucket

River were obtained from the FIS for the City of Providence (FEMA, April 15, 1986). Assapumpset Brook, Dry Brook, Simmons Brook, and South Branch Assapumpset Brook all used the elevations from their parent streams for the determination of starting water-surface elevations.

Water-surface elevations for floods of the selected recurrence intervals for Moshassuck River and Crookfall Brook were computed using the USACE HEC-2 step-backwater computer program (USACE, November 1976). Starting water-surface elevations for Moshassuck River were based on the elevations established at the City of Pawtucket corporate limits from the FIS for the City of Pawtucket (FEMA, 1986). For Crookfall Brook, in the Town of North Smithfield, the starting water-surface elevations were taken from initially determined mainstream profiles of Blackstone River at the confluence of Crookfall Brook.

Water-surface elevations of floods at selected intervals for Cherry Brook, East Branch West River, Lincoln Downs Brook, West River, Woonasquatucket River, and Upper Canada Pond Brook were computed through use of the SCS WSP-2 program (SCS, March 27, 1989). Water-surface elevations for the 1-percent-annual-chance flood events associated with Centerdale Brook and Cranberry Brook were computed using the USACE HEC-RAS step backwater computer program (USACE, September 1990). Both of these brooks have been diverted into closed drainage systems. The maximum surcharge capacity of the closed drainage system was calculated using a standard step-backwater analysis (U.S. Department of Housing and Urban Development, April 28, 1968; USGS, 1987; Rhode Island Department of Transportation).

For the Town of North Smithfield, for Crookfall Brook, water-surface elevations of floods of the selected recurrence intervals were computed using the USACE HEC-2 step-backwater computer program (USACE, September 1988). Starting water-surface elevations for Cherry Brook were determined using normal depth at the corporate limits.

Water-surface elevations of floods of the selected recurrence intervals for Ten Mile River were computed using the SCS WSP-2 computer program (U.S. Department of Agriculture, SCS, May 1976). Water-surface elevations of floods of the selected recurrence intervals for Moshassuck River were computed using the USACE HEC-2 step-backwater computer program (USACE, November 1977).

For the City of Providence, water-surface elevations of floods of the selected recurrence intervals for Moshassuck River, Providence River, West River, Woonasquatucket River, and Upper Canada Pond Brook were computed using the USACE HEC-2 step-backwater computer program (USACE, November 1977). Water-surface elevations for Pocasset River were computed using the SCS WSP-2 computer program (SCS, May 1976). Starting water-surface elevations for Providence River were based on a review of the Fox Point Hurricane Barrier design memoranda, operation manual, and Providence tide gage records. Starting water-surface elevations for Woonasquatucket River and Moshassuck River were based on the backwater profiles of the Providence River. Starting water-surface elevations for West River and Upper Canada Pond Brook were determined using normal depth calculations. Starting water-surface elevations for Pocasset River were taken from a SCS Flood Hazard Analyses report (U.S. Department of Agriculture, Soil Conservation Service, 1974). Normal depth calculations were used to determine the shallow flooding area along Amtrak from 900 feet north of Charles Street to 50 feet south of Smith Street. A ponding area was determined south of the intersection of Charles Street and Admiral Street.

Water-surface profiles for North Branch Pawtuxet River were developed using the USACE HEC-2 step-backwater computer model (USACE, October 1973). Starting water-surface elevations were determined by use of the slope/area method.

For the Town of Smithfield, cross sections used in the backwater analyses on Woonasquatucket and Stillwater Rivers and Unnamed Tributary were obtained from topographic maps compiled by photogrammetric methods (USACE, 1985). Below-water sections were obtained by field measurements, use of topographic maps, and engineering judgment. Water-surface elevations of floods of the selected recurrence intervals for these rivers were computed using the USACE HEC-2 step-backwater computer program (USACE, April 1984). Starting water-surface elevations for the hydraulic analyses for Woonasquatucket River were taken from the FIS for the Town of North Providence (Federal Insurance Administration, December 15, 1977). The starting water-surface elevations for Stillwater River were taken to be the corresponding elevations of the Stillwater Reservoir, and those for Unnamed Tributary were determined by adopting the water-surface elevations at the confluence of Unnamed Tributary with Stillwater River, since the drainage areas of both systems were similar, and peak flows were assumed to be coincident.

<u>Countywide Analyses</u>

For the March 2, 2009 countywide revision, the USACE computer program HEC-RAS 3.1.3 was used to compute water-surface elevations of floods of the selected recurrence intervals and floodways for each of the detailed study streams. The entire Blackstone River was modeled using the HEC-RAS program for the various communities along the river. The total length of studied stream (including approximately two miles in the Town of Blackstone, Massachusetts) was 17.9 miles.

Information on hydraulic structures such as bridges, culverts, and dams was obtained from previous flood insurance studies, field survey, 2005 Light Detection and Ranging (LiDAR) survey, or "as-built" record drawings obtained from the Rhode Island Department of Transportation (RIDOT) or communities in the study area. Cross sections were generated from the LiDAR topography and field survey using the computer program HecGEO-RAS 4.1.

The starting water-surface elevations for Blackstone River were obtained from the FIS for the City of Pawtucket dated January 3, 1986. As detailed in the 1986 FIS report, hydraulic analyses were performed to consider tidal flooding impacts and estimate flood elevations along the shoreline.

For the short reach where Blackstone River flows into and back out of Rhode Island, through the Town of Blackstone, Massachusetts, a portion of the flow is diverted out of the main stem and flows through the Tupperware Mill Canal. Estimated flows through this canal were obtained from the FIS for the Town of Blackstone, Massachusetts, dated September 1977 (Table 1). These flows were subtracted from the flood discharges of Blackstone River between Saranac Dam and Tupperware Mill Dam to reflect this canal diversion:

| Flood recurrence interval | 10-year | 50-year | 100-year | 500-year |
|---|---|---|---|---|
| Flow through Tupperware Mill Canal (cfs) | 400 | 600 | 700 | 1,000 |

During normal flow conditions, the four tainter gates at the Woonsocket Falls Dam are in a closed position with a typical overflow elevation of 147.3 feet NAVD88. During a flood event and when the river stage rises 2.5 feet above the 147.3-foot elevation, gate regulation will commence. When all gates are fully opened, the dam has a capacity to pass the 1-percent-annual-chance flood event. The 1-percent-annual-chance flood event computed water surface is 146.5 feet NAVD88, which is lower than the normal water surface upstream of the dam when all gates are closed. Based on the Dam and Gates Regulations, the maximum river stage at the dam is 3.0 feet when all gates are closed. Therefore, for the purpose of plotting the base flood elevation, the maximum river stage elevation of 150 feet NAVD88, which is the highest river stage before the tainter gates are opened, has been shown for the 1-percent-annual-chance flood profile.

There were no new riverine hydraulic analyses performed for the September 18, 2013 countywide revision.

For the October 2, 2015 countywide analysis, hydraulic analyses were conducted for Centerdale Brook, Cranberry Brook, Dry Brook, East Branch West River, Furnace Hill Brook, Lincoln Downs Brook, Meshanticut Brook, Moshassuck River, North Branch Pawtuxet River, Pawtuxet River, Pocasset River, Sevenmile River, Simmons Brook, Ten Mile River, Upper Canada Pond Brook, West River, West River Diversion, and Woonasquatucket River/Providence River. The U.S. Army Corps of Engineers computer programs HEC-RAS 4.1.0 and HEC-GeoRAS 10.0 for ArcGIS 10.1 were used to model stream profiles with 10-, 2-, 1-, and 0.2-percent annual exceedance probabilities for the four rivers. Cross-section data and structure elevations for these rivers were obtained from field surveys in March and April of 2012 and from cross sections obtained from prior FIS models.

Field data collected by USGS staff for these four models include elevation data and underwater depths (referenced to the elevation of the water surface at the time of the survey) collected with a total station theodolite. Underwater and channel bank field survey data were merged with LiDAR data describing the elevations of the overbanks. LiDAR data were collected and processed by Photo Science Inc., under contract with the USGS. LiDAR was collected in the winter and spring of 2011 and processed and published in 2012. It was collected to a vertical accuracy of 30 cm with a 95% confidence interval.

**Centerdale and Cranberry Brooks**

The computer program HEC-RAS 4.1.0 was used to model stream profiles with 10-, 2-, 1-, and 0.2-percent AEPs for 0.7 mile of Centerdale Brook. The starting water-surface elevations for the 10-, 2-, 1-, and 0.2-percent AEP flow profiles at the mouth of Centerdale Brook were taken from water-surface elevations on the Woonasquatucket River model. The Centerdale Brook tributary enters Woonasquatucket River just upstream of Allendale Pond Dam.

The computer program HEC-RAS 4.1.0 was used to model stream profiles with 10-, 2-, 1-, and 0.2-percent AEPs for 0.4 mile of Cranberry Brook. Cranberry Brook starts at Intervale Drive, south of the school, crosses over Humbert Brook on Laurel Street, and extends to the confluence with Woonsquatucket River, 12 feet from where Humbert

Brook enters Woonsquatucket River. Although the culverts on Humbert and Cranberry Brooks cross and parallel each other, it seems that they do not mix, but stay separate from each other throughout. It is impossible to know this for certain without detailed plans of the culverts. The starting water surface elevations for the 10-, 2-, 1-, and 0.2-percent AEP flow profiles at the mouth of Cranberry Brook were taken from water-surface elevations on the Woonasquatucket River model. Cranberry Brook enters Woonasquatucket River just upstream of the Lyman Mill Dam.

**Dry Brook**

Dry Brook starts at the confluence with Pocasset River and ends about 3.0 miles upstream about midway between Jillison Reservoir and Oak Swamp Reservoir.

The starting water-surface elevations for the 10-, 2-, 1-, and 0.2-percent AEP flow profiles on Dry Brook were taken from water-surface elevations for those same AEPs on Pocasset River in this location.

**East Branch West River**

The modeled portion of East Branch West River runs from the confluence with West River to a point 0.6 mile upstream. Downstream boundary conditions for East Branch West River were determined to be the backwater conditions from West River in this location.

**Furnace Hill Brook**

Cross section data and structure elevations for 2.6 miles of Furnace Hill Brook were obtained from field surveys in May and October of 2012.

The starting water surface elevations for the 10-, 2-, 1-, and 0.2-percent AEP flow profiles for the downstream end of Furnace Hill Brook were based on the water-surface elevation of Meshanticut Brook in that location.

**Lincoln Downs Brook**

The modeled portion of Lincoln Downs Brook runs from the confluence with West River to a point 1.2 mile upstream. Downstream boundary conditions for Lincoln Downs Brook were determined to be the backwater conditions from West River in this location.

**Meshanticut Brook**

The modeled section of Meshanticut Brook flows through the City of Cranston in Providence County. There is a short diversion channel, which was also modeled, around I-295 near Wilbur Avenue in the City of Cranston.

Cross section data and structure elevations for 4.5 miles of Meshanticut Brook were obtained from field surveys in May and October of 2012.

The starting water-surface elevations for the 10-, 2-, 1-, and 0.2-percent AEP flow profiles for the downstream end of Meshanticut Brook were estimated from normal-depth slope calculations. Normal-depth slope was set at 0.0081 based on the slope at the lower end of the surveyed reach of the river.

**Moshassuck River**

A HEC-RAS model was developed for a 10.1-mile reach of the Moshassuck River from the confluence with the Woonasquatucket River to near its headwaters.

The Moshassuck River is affected by backwater conditions from Providence River, which is tidal, but the stage can be controlled by the Fox Point Hurricane Barrier that separates the Providence River from Narragansett Bay during storm surges. Large-capacity pumps can move riverine water over the barrier when the tide gates are closed to maintain a water level generally below 8.67 feet NAVD88; barrier operators try to keep the water level below 8.87 feet NAVD88, as this is the level at which low-lying streets in the area begin to flood (Paul Marinelli, U.S. Army Corps of Engineers, written commun., July 5, 2011). For purposes of this model, the starting water-surface elevation was specified as the maximum reported elevation of 9.29 feet NAVD88 in the Providence River during the 2010 flood (Larry Davis, U.S. Army Corps of Engineers, written commun., July 5, 2011).

Flood data used for calibration of the models included 18 high-water marks collected along Moshassuck River following the March and April 2010 flood (Zarriello and Bent, 2011). The 2010 peak flow at USGS streamgage Moshassuck River at Providence, RI (01114000) was estimated to have about a 1-percent AEP (Zarriello and others, 2012).

**North Branch Pawtuxet River**

North Branch Pawtuxet River begins at the outlet of Scituate Reservoir in the south-central portion of Providence County and flows generally east-southeast to the confluence with South Branch Pawtuxet River, where it forms Pawtuxet River. The upstream study limit is the downstream side of the dam at the Scituate Reservoir, and the downstream limit is at North Branch Pawtuxet River's confluence with South Branch Pawtuxet River. This river reach is approximately 6.9 miles in length.

The starting water-surface elevations for the flood profiles for North Branch Pawtuxet River were taken from the results at the upstream end of the step-backwater developed for Pawtuxet River. The model was calibrated with high-water marks collected during the April 2010 flood event (Zarriello and Bent, 2011).

**Pawtuxet River**

The Pawtuxet River begins at the confluence of North Branch Pawtuxet and South Branch Pawtuxet Rivers in the Town of West Warwick and flows generally east-northeast to the tidal waters of Providence River. Over the course of the reach, the river flows through the Town of West Warwick and the City of Warwick and becomes the boundary between the Cities of Warwick and Cranston. This river reach is approximately 11.2 miles in length.

The Pawtuxet River is affected by backwater conditions from Providence River. A starting water-surface elevation equal to the 10-year tidal flood of 6.82 feet NAVD88 was used in this study.

**Pocasset River**

The Pocasset River model starts at the confluence with Pawtuxet River in the City of Cranston and ends about 11.8 miles upstream near the center of the Town of Johnston. The Pocasset River model has one section of split flow that is roughly 0.5 mile long and which starts just upstream of St. Ann's Cemetery.

The hydraulic model was obtained from the Natural Resources Conservation Service (NRCS) (Kevin Farmer, NRCS, written commun., 2011) and is documented in Bachand

and others (2007) and Schmidt and others (2007). The hydraulic model was updated with LiDAR data, with limited field surveys, and with flood flows published in Zarriello and others (2012).

The starting water-surface elevations for the 10-, 2-, 1-, and 0.2-percent AEP flow profiles on Pocasset River were estimated from normal-depth slope calculations set at 0.001.

**Sevenmile River**
The computer program HEC-RAS 4.1.0 (U.S. Army Corps of Engineers, 2010) was used to model stream profiles with 10-, 2-, 1-, and 0.2-percent AEPs for Sevenmile River. The n-values were determined by field observations and by using USGS Water-Supply Papers 2339 and 2441 (USGS, 1989; USGS, 1998).

The starting water-surface elevations for the 10-, 2-, 1-, and 0.2-percent AEP flow profiles near the confluence with Ten Mile River were estimated from normal-depth slope calculations. Normal-depth slope was set at 0.0009 based on the slope at the lower end of the surveyed reach of the Sevenmile River.

The hydraulic model for the Sevenmile River was calibrated for the March and April 2010 event using high-water marks documented at Read Street in the City of Attleboro, Massachusetts (Zarriello and Bent, 2011).

**Simmons Brook**
Simmons Brook starts at the confluence with Pocasset River and ends about 3.6 miles upstream at Simmons Upper Reservoir.

The starting water-surface elevations for the 10-, 2-, 1-, and 0.2-percent AEP flow profiles on Simmons Brook were taken from water-surface elevations for those same AEPs on Pocasset River in this location.

**Ten Mile River**
The computer program HEC-RAS 4.1.0 (U.S. Army Corps of Engineers, 2010) was used to model stream profiles with 10-, 2-, 1-, and 0.2-percent AEPs for Ten Mile River. The n-values were determined by aerial photo inspection and by using USGS Water-Supply Papers 2339 and 2441 (USGS, 1989; USGS, 1998).

The starting water-surface elevations for the 10-, 2-, 1-, and 0.2-percent AEP flow profiles at the confluence with Seekonk River were estimated from normal-depth slope calculations. Normal-depth slope was set at 0.0005 based on the slope at the lower end of the reach of Ten Mile River. The downstream reach was set to a water-surface elevation of 15.0 feet due to backwater from Seekonk River for mapping purposes. The model was calibrated with high-water marks for Ten Mile River collected during the April 2010 flood event (Zarriello and Bent, 2011).

**Upper Canada Pond Brook**
The modeled portion of Upper Canada Pond Brook runs from the confluence with West River to about 2.0 miles upstream. Upper Canada Pond Brook was divided into an upper and a lower section, which were modeled separately. The break between the two models occurs at State Route 15. Downstream boundary conditions for the lower section of Upper Canada Pond Brook were the water-surface elevations from West River in this

location. Boundary conditions for the upper section were taken as the water-surface elevations from the lower section.

**West River and West River Diversion**

The modeled portion of West River runs from the confluence with Moshassuck River to a point 4.3 miles upstream at the outlet of Wenscott Reservoir. A diversion channel is a conduit for high-water overflow from the West River down a railroad right-of-way. Prior to the installation of a diversion conduit in the lower part of the overflow channel in the early 1980s, the overflow channel drained into Woonasquatucket River; the diversion conduit redirects the flow back into Moshassuck River about 1,400 feet above the confluence with Woonasquatucket River. For convenience, and because the overflow is from West River, the characteristics of the diversion channel are included in this section.

Downstream boundary conditions for West River were determined to be the backwater conditions from Moshassuck River in this location. Backwater from Moshassuck River largely determines the overflow through the diversion channel.

**Woonasquatucket River/Providence River**

The Woonasquatucket River model begins at the Fox Point Hurricane Barrier in the City of Providence and ends about 15 miles upstream, about 0.3 mile upstream of State Route 5 and 104 (Farnum Pike) in the Town of Smithfield. The river is bordered by the Towns of Johnston, North Providence, and Smithfield and the City of Providence. From the Fox Point Hurricane Barrier to the confluence with Moshassuck River, the river is known as the Providence River, but it was considered part of the Woonasquatucket River for the purposes of this study.

The Woonasquatucket River is tidal, but the stage can be controlled by the Fox Point Hurricane Barrier, which separates Providence River from Narragansett Bay during storm surges. Under normal conditions, Providence River flows through three large gates into Narragansett Bay about 0.87 mile below the confluence. Five large-capacity pumps (combined capacity of 7,000 cfs) can move riverine flow over the barrier when the tide gates are closed to maintain a water level generally below 8.67 feet NAVD88. Operators try to keep the water level on the river side of the barrier lower than 8.87 feet NAVD88, which is the level at which low-lying streets in the area begin to flood (Paul Marinelli, U.S. Army Corps of Engineers,, written commun., July 5, 2011). For purposes of this model, the starting water-surface elevation was specified to be the maximum reported elevation of 9.29 feet NAVD88 in Providence River during the 2010 flood (Larry Davis, U.S. Army Corps of Engineers, written commun., July 5, 2011).

Flood data used for calibration of the model included 45 high-water marks along Woonasquatucket River obtained following the March and April 2010 flood (Zarriello and Bent, 2011). The 2010 peak flow at USGS streamgage Woonasquatucket River at Centerdale, RI (01114500) was estimated to have about a 2-percent AEP.

Roughness factors (Manning’s “n” values) used in the hydraulic computations were determined from field observations, guided by U.S. Geological Water Supply Publications. Table 6, “Manning’s “n” values,” shows the channel and overbank “n” values for the streams studied by detailed methods.

TABLE 6 – MANNING'S "n" VALUES

| Flooding Source | Channel "n" | Overbanks |
|---|---|---|
| Assapumpset Brook | 0.025-0.050 | 0.035-0.100 |
| Blackstone River | 0.030-0.040 | 0.040-0.120 |
| Branch River | 0.025-0.050 | 0.030-0.075 |
| Centerdale Brook[1] | 0.04-0.05 | 0.07-0.08 |
| Chepachet River | 0.025-0.055 | 0.050-0.075 |
| Cherry Brook | 0.045-0.060 | 0.025-0.085 |
| Clear River | 0.025-0.050 | 0.030-0.075 |
| Cranberry Brook[1] | 0.04-0.05 | 0.07-0.08 |
| Crookfall Brook | 0.020-0.040 | 0.060-0.080 |
| Dry Brook[1] | 0.040-0.048 | 0.08-0.10 |
| East Branch West River[1] | 0.030-0.048 | 0.09-0.12 |
| Furnace Hill Brook[1] | 0.040-0.075 | 0.040-0.100 |
| Furnace Hill Tributary | 0.030-0.040 | 0.070-0.090 |
| Lincoln Downs Brook[1] | 0.028-0.045 | 0.090-0.094 |
| Meshanticut Brook[1] | 0.032-0.070 | 0.04-0.10 |
| Mill River | 0.025-0.050 | 0.050-0.110 |
| Moshassuck River[1] | 0.030-0.048 | 0.06-0.12 |
| North Branch Pawtuxet River[1] | 0.04-0.06 | 0.035-0.090 |
| Pascoag River | 0.025-0.050 | 0.030-0.075 |
| Pawtucket River[1] | 0.035-0.045 | 0.04-0.10 |
| Peters River | 0.025-0.050 | 0.050-0.110 |
| Pocasset River[1] | 0.030-0.055 | 0.07-0.12 |
| Providence River[1] | * | * |
| Runnins River | 0.025-0.050 | 0.050-0.110 |
| Sevenmile River[1] | 0.03-0.04 | 0.04-0.10 |
| Simmons Brook[1] | 0.030-0.055 | 0.07-0.12 |
| South Branch Assapumpset Brook | 0.025-0.050 | 0.035-0.100 |
| Stillwater River | 0.030-0.040 | 0.060-0.070 |
| Ten Mile River[1] | 0.025-0.055 | 0.030-0.085 |
| Unnamed Tributary | 0.030-0.040 | 0.060-0.070 |
| Upper Canada Pond Brook[1] | 0.03-0.05 | 0.070-0.094 |
| West River[1] | 0.025-0.044 | 0.07-0.13 |
| West River Diversion[1] | 0.025-0.044 | 0.07-0.13 |
| Willett Pond Brook | 0.025-0.050 | 0.050-0.110 |
| Woonasquatucket River[1] | 0.030-0.042 | 0.030-0.085 |

[1]October 2, 2015 study
*See Woonasquatucket River

## 3.3 Coastal Hydrologic Analyses

The stillwater elevation (SWEL) is the elevation of the water due to the effects of the astronomic tides and storm surge on the water surface. Hydrologic analyses carried out to establish the peak discharge-frequency relationships for Bullock Cove, Narragansett Bay, Providence River, and Seekonk River flooding sources affecting the Cities of Cranston, East Providence, Pawtucket, and Providence serve as a basis of coastal hydraulic analyses using detailed methods in accordance with Appendix D, "Guidance for Coastal Flooding Analyses and Mapping," of the April 2003 FEMA *Guidelines and Specifications for Flood Hazard Mapping Partners* (FEMA 2003).

For areas subject to coastal flood effects, the 10-, 2-, 1-, and 0.2-percent-annual-chance stillwater elevations were taken directly from a detailed storm-surge study documented in *Updating Tidal Profiles for the New England Coastline*, prepared by FEMA (FEMA 2008). This storm-surge study was completed in December 2008. SWELs were linearly interpolated to all coastal transects throughout Providence County. Table 7, "Summary of Stillwater Elevations," contains the stillwater elevations determined from the stillwater curves in Figure C8 of the *Updating Tidal Profiles for the New England Coastline* report (FEMA 2008).

TABLE 7 – SUMMARY OF STILLWATER ELEVATIONS

| FLOODING SOURCE AND LOCATION | ELEVATION[2] (feet NAVD88[1]) | | | |
|---|---|---|---|---|
| | 10-PERCENT | 2-PERCENT | 1-PERCENT | 0.2-PERCENT |
| PROVIDENCE RIVER | | | | |
| Western shoreline from Myrtle Avenue to Shore Road | 6.8-6.9 | 9.8-9.9 | 12.4-12.7 | 18.4 |
| Eastern shoreline from Ocean Avenue to Fields Point Drive | 6.9 | 9.9 | 11.9-12.5 | 18.4-18.9 |
| Northeastern and southeastern shorelines from Squantum Woods State Park to Metacomet Country Club at Lyon Avenue | 7.0 | 10.0-10.1 | 12.0-12.2 | 19.0 |
| Southern shoreline from Henderson Street to India Point Park (Fox Point Hurricane Barrier) | 7.0 | 10.1 | 12.1-12.4 | 19.0 |
| Southeastern shoreline from Sea View Avenue to Carousel Drive | 6.8 | 9.8 | 12.5-12.8 | 18.4 |

[1]North American Vertical Datum of 1988
[2]Includes wave setup

TABLE 7 – SUMMARY OF STILLWATER ELEVATIONS - continued

| FLOODING SOURCE AND LOCATION | ELEVATION[2] (feet NAVD88[1]) 10-PERCENT | 2-PERCENT | 1-PERCENT | 0.2-PERCENT |
|---|---|---|---|---|
| SEEKONK RIVER | | | | |
| From Interstate 195 to Blackstone Park at Orchard Avenue | 7.0 | 10.1 | 12.0-12.2 | 19.0 |
| From Lincoln Avenue to Beverage Hill Avenue | 7.0 | 10.1 | 12.1-12.7 | 19.0 |

[1]North American Vertical Datum of 1988
[2]Includes wave setup

Transects (profiles) were located for coastal hydrologic and hydraulic analyses perpendicular to the average shoreline along areas subject to coastal flooding and extending inland to a point where wave action ceased in accordance with the Users Manual for Wave Height Analysis (FEMA 1981). Transects were placed with consideration of topographic and structural changes of the land surface, as well as the cultural characteristics of the land so that they would closely represent local conditions. A total of 34 transects sites were chosen to capture the variability in coast orientation, large-scale vegetation, and development.

Coastal transect topography data was obtained from LiDAR data. Aero-Metric, Inc. performed the LiDAR acquisition. Vertical accuracy is 0.49 foot at a 95-percent confidence interval as required for 2-foot contours. Bathymetric data was obtained from the National Oceanographic and Atmospheric Administration (NOAA) National Ocean Service (NOS) Hydrographic Survey Data (HSD) (FEMA 2007). The sounding datum of mean low low water (MLLW) was converted to vertical datum NAVD88.

## 3.4 Coastal Hydraulic Analyses

Wave height is the distance from the wave trough to the wave crest. The height of a wave is dependent upon wind speed, wind duration, water depth, and length of fetch. Offshore (deep water) and near-shore (shallow water) wave heights and wave periods were calculated for restricted and unrestricted fetch settings following the methodology described in the February 2007 FEMA *Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update* (FEMA 2007) for each coastal transect.

An analysis of historic hurricane events was performed to determine a wind scenario for the study. A wind scenario that is consistent with the stillwater elevation was sought. The stillwater elevation for the 1938 hurricane is very close to the estimated 1-percent-annual-chance SWEL. Therefore, wind speed was based on wind speed records for the 1938 hurricane and adjusted upward to 40 meters per second for the Spectral Wave (STWAVE) model. Wind speed data were obtained from the HURDAT database maintained by the National Hurricane Center (NHC) (NHC 2011). The dataset consists of storm parameters recorded at 6-hour intervals for hurricanes and tropical storms; the record extends back to 1851.

In performing the coastal analyses, near-shore waves were required as inputs to wave runup and overland wave propagation calculations. Wave momentum (radiation stress) was considered as a contribution to elevated water levels (wave setup). The Steady State (STWAVE) model was used to generate and transform waves to the shore for the study. STWAVE is a finite-difference model that calculates wave spectra on a rectangular grid. The model outputs zero-moment wave height ($H_{mo}$), peak wave period ($T_p$), and mean wave direction at all grid points and two-dimensional spectra at selected grid points. STWAVE includes an option to input spatially variable wind and storm-surge fields. Storm surge significantly alters wave transformation and generation for the hurricane simulations in shallow-flooded areas. The starting wave-condition data was derived from the STWAVE model of Narragansett Bay. The data contained the significant wave height ($H_s$) and significant wave period ($T_s$) for the 1-percent-annual-chance storm.

Wave setup was assumed to be an important factor in determining total water level, since the coastline has historically experienced flooding damage above the predicted storm-surge elevations. Wave setup is based upon wave breaking characteristics and profile slope. As stated in the *Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update* (FEMA 2007), "Wave setup can be a significant contributor to the total water level landward of the +/- MSL shoreline and should be included in the determination of coastal Base Flood Elevations (BFEs)." Wave setup values were calculated to the entire open-coast shoreline in each community. Wave setup for each coastal transect was calculated by the Direct Integration Method (DIM) developed by Goda (2000) as described in the FEMA *Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update* (FEMA 2007). For those coastal transects where a structure was located, the wave setup against the coastal structure was also calculated. For profiles with vertical structures or revetments, a failed structure analysis was performed and a new profile of the failed structure was generated and analyzed, in accordance with *Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update* (FEMA 2007).

Erosion analysis using FEMA's Coastal Hazard Analysis Modeling Program (CHAMP) Version 2.0 was performed for profiles with erodible dunes and without coastal structures, such as vertical walls or revetments. The dune subject to erosion is a sandy feature with potentially light vegetation. Any thickly vegetated, rocky, silty, or clayey dune features or bluffs are assumed not to be subject to erosion. Predicted post-storm erosion profiles were used for analysis of wave heights associated with coastal storm-surge flooding, where appropriate.

Wave height was computed using CHAMP version 2.0 which includes the wave-height analysis (WHAFIS) model. WHAFIS is capable of calculating the effects of open fetches and obstructions on the growth and attenuation of wave heights (FEMA 1981). A primary input to the WHAFIS model was the ground profile consisting of station (distance in feet) and elevation (in feet above NAVD88 datum) pairs that represent the bare-earth ground elevation along the transect, accompanied by the SWEL. For each of the 34 transects, detailed ground profiles were extracted from the high-resolution terrain. Along each transect, overland wave propagation was computed, considering the combined effects of changes in ground elevation, vegetation, and physical features. Wave heights were calculated to the nearest 0.1 foot, and wave-crest elevations were determined at whole-foot increments. The calculations were carried inland along the transect until the wave-crest elevation was permanently less than 0.5 foot above the total water elevation or the coastal flooding met another flood source (i.e. riverine) with an equal water-surface elevation.

Areas of the coastline subject to significant wave attack are referred to as coastal high-hazard zones. The USACE has established the 3-foot breaking wave as the criterion for identifying the limit of coastal high-hazard zones (USACE 1975). The 3-foot wave has been determined as the minimum-size wave capable of causing major damage to conventional wood-frame or brick-veneer structures. This criterion has been adopted by FEMA for the determination of V zones.

It has been shown in laboratory tests and observed in post-storm damage assessments that wave heights as low as 1.5 feet can cause damage to and failure of typical Zone AE construction. Therefore, for advisory purposes only, a Limit of Moderate Wave Action (LiMWA) boundary has been added in coastal areas subject to moderate wave action. The LiMWA represents the approximate landward limit of the 1.5-foot breaking wave and was delineated for all areas subject to significant wave attack in accordance with *Procedure Memorandum No. 50 – Policy and Procedures for Identifying and Mapping Areas Subject to Wave Heights Greater than 1.5 feet as an Informational Layer on Flood Insurance Rate Maps (FIRMs)* (FEMA 2008).

The effects of wave hazards in AE zones (or shoreline in areas where VE zones are not identified) and the limit of the LiMWA boundary are similar to, but less severe than, those in Zone VE where 3-foot breaking waves are projected during a 1-percent-annual-chance flooding event.

In areas where wave-runup elevations dominate over wave heights, such as areas with steeply sloped beaches, bluffs, and/or shore-parallel flood protection structures, there is no evidence to date of significant damage to residential structures by runup depths less than 3 feet. However, to simplify representation, the LiMWA was continued immediately landward of the VE/AE boundary in areas where wave runup elevations dominate. Similarly, in areas where the Zone VE designation is based on the presence of a primary frontal dune (PFD) or wave overtopping, the LiMWA was also delineated immediately landward of the Zone VE/AE boundary.

Wave runup is the uprush of water caused by the interaction of waves with the area of shoreline where the stillwater hits the land or other barrier intercepting the stillwater level. The wave-runup elevation is the vertical height above the stillwater level ultimately attained by the extremity of the uprushing water. Wave runup at a shore barrier can provide flood hazards above and beyond those from stillwater inundation. Guidance in the February 2007 FEMA *Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update* (FEMA 2007) suggests using the 2-percent wave runup value, the value exceeded by 2 percent of the runup events. The 2-percent wave runup value is particularly important for steep slopes and vertical structures. Wave runup was calculated for each coastal transect using methods from the *Shore Protection Manual* (SPM) (USACE 1984) for vertical structures, Technical Advisory Committee for Water Retaining Structures (TAW) method for structures with a slope steeper than 1:8, and FEMA Wave Runup Model RUNUP 2.0 for slopes less than 1:8. Both the SPM vertical structure runup and RUNUP 2.0 methods provide mean runup values. The mean runup values from these two methods were multiplied by 2.2 to obtain the 2-percent runup height, as described in the February 2007

*Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update* to Appendix D, *Guidance for Coastal Flooding Analysis and Mapping* (FEMA 2007).

When the runup is greater than or equal to 3 feet above the maximum ground elevation, the BFE was determined to be 3 feet above the ground-crest elevation, in accordance with guidance in Appendix D. Computed runup was not adjusted if less than 3 feet above the ground crest.

When runup overtops a barrier, such as a partially eroded bluff or a structure, the floodwater percolates into the bed and/or runs along the back slope until it reaches another flooding source or a ponding area. Standardized procedures for the treatment of shallow flooding and ponding were applied as described in Appendix D of the *Guidance for Coastal Flooding Analysis and Mapping* (FEMA 2003).

Where uncertified coastal structures such as vertical walls and revetments were present, additional analysis for wave setup and wave runup was performed on profiles assuming the structure will partially fail during the base flood. The post-failure slopes applied for this analysis were 1:3 for sloped revetments and 1:1.5 for vertical walls, which are within the range suggested by the February 2007 *Atlantic Ocean and Gulf of Mexico Coastal Guidelines Update* to Appendix D (FEMA 2007).

In accordance with 44 CFR Section 59.1 of the NFIP, the effect of the PFD on coastal high-hazard area (V Zone) mapping was evaluated for the Cities of Cranston, East Providence, Pawtucket, and Providence. Identification of the PFD was based upon a FEMA-approved numerical approach for analyzing the dune's dimensional characteristics. This approach utilized LiDAR data for the study areas and assessed change in back slope to determine the landward toe of the PFD. In areas where the PFD defines the landward limit of the V Zone, the V Zone extends to the landward toe of the dune. No PFDs were identified in the study area.

Because wave-height calculations are based on such parameters as the size and density of vegetation, natural barriers such as sand dunes, buildings, and other man-made structures, detailed information on the physical and cultural features of the study area were obtained from aerial photography. LiDAR data of the shorelines of the Cities of Cranston, East Providence, Pawtucket, and Providence was used for the topographic data.

Figure 3 represents a sample transect which illustrates the relationship between the stillwater elevation, the wave-crest elevation, the ground-elevation profile, and the location of the A/V zone boundary. Actual wave conditions may not include all the situations illustrated in Figure 3.

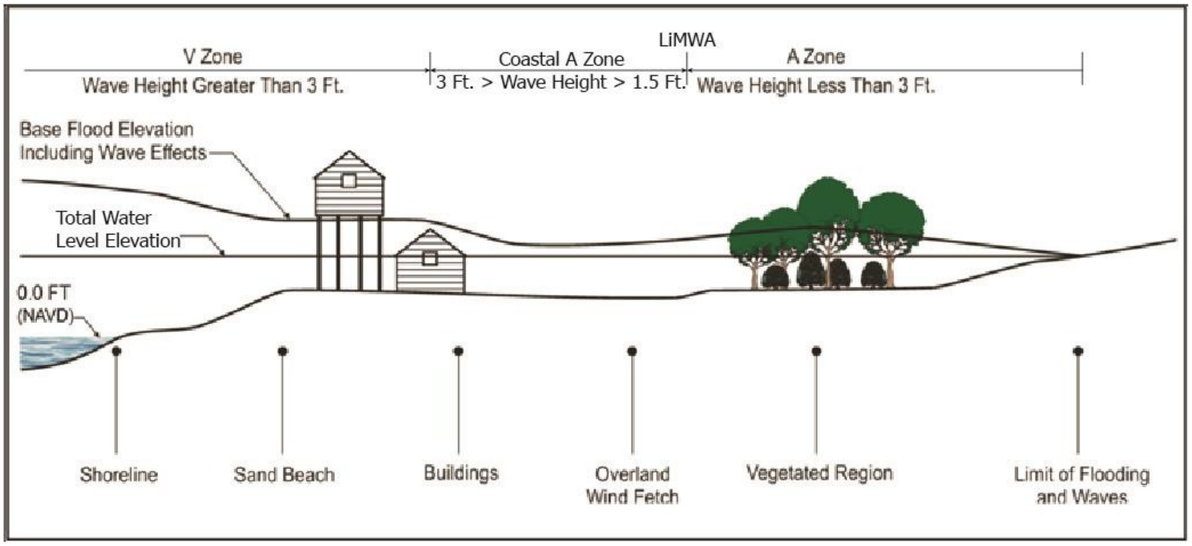


**Figure 3 – TRANSECT SCHEMATIC**

After analyzing computed wave heights along each transect, wave elevations were interpolated between transects. Various source data were used in the interpolation, including the topographic work maps, aerial photographs, and engineering judgment. Controlling features affecting the elevations are identified and considered in relation to their positions at a particular transect and their variation between transects.

Along each transect, wave-envelope elevations were computed considering the combined effects of changes in ground elevation, vegetation, and physical features. Between transects, elevations were interpolated using the previously cited topographic maps, land-use data, land-cover data, and engineering judgment to determine the areal extent of flooding. The results of the calculations are accurate until local topography, vegetation, or cultural development within the community undergoes any major changes.

Table 8 provides a description of the transect locations, the 1-percent-annual-chance stillwater elevations, and the maximum 1-percent-annual-chance wave-crest elevations. Figure 4, “Transect Location Map,” illustrates the location of the transects for the county.

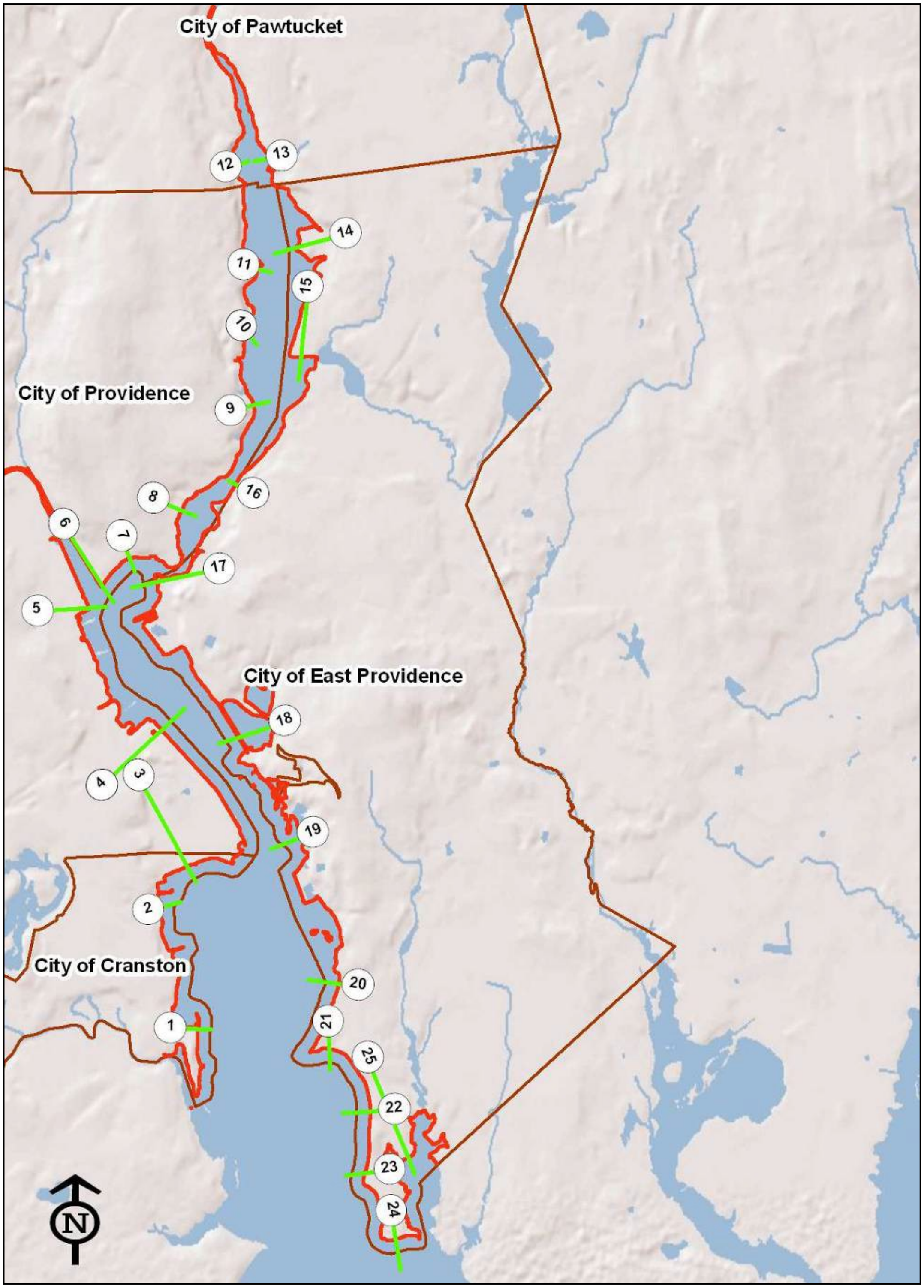


**Figure 4 – TRANSECT LOCATION MAP**

TABLE 8 –TRANSECT DESCRIPTIONS

| TRANSECT | LOCATION | ELEVATION (feet NAVD88[1]) 1-PERCENT-ANNUAL-CHANCE STILLWATER[3] | MAXIMUM 1-PERCENT-ANNUAL-CHANCE WAVE CREST[2] |
|---|---|---|---|
| 1 | Located where Ocean Avenue dead ends at Providence River, north of Pawtuxet Neck | 11.7 | 13.1 |
| 2 | Located 250 feet north of the intersection of Norwood Ave and Bay Street | 11.8 | 12.5 |
| 3 | Located 1,300 feet southeast of the intersection of Harborside Boulevard and Shipyard Street, west of Fields Point | 11.8 | 15.5 |
| 4 | Extends southwest from Providence river to the intersection of Ernest Street and Allens Avenue | 11.9 | 17.8 |
| 5 | Located across parking lot at the end of Henderson Street, extends from Providence River west | 12.0 | 12.5 |
| 6 | Located 650 feet southeast of the intersection of India Street and I-195, extends to the northwest to Williams Street | 12.0 | 15.2 |
| 7 | Extends northwest from the Seekonk River at India Point Park to the intersection of George M Cohen Boulevard and Ann Street | 12.0 | 14.8 |
| 8 | Located 650 feet east of the intersection of Fremont Street and Gano Street, extends northwest across I-195 | 12.0 | 12.4 |
| 9 | Located 1,100 feet northeast of the intersection of E Orchard Avenue and Parkside Road | 12.0 | 12.6 |

[1]North American Vertical Datum of 1988
[2]Because of map scale limitations, the maximum wave elevation may not be shown on the FIRM.
[3]Including stillwater elevation and effects of wave setup

TABLE 8 –TRANSECT DESCRIPTIONS - continued

| TRANSECT | LOCATION | ELEVATION (feet NAVD88[1]) 1-PERCENT-ANNUAL-CHANCE STILLWATER[3] | ELEVATION (feet NAVD88[1]) MAXIMUM 1-PERCENT-ANNUAL-CHANCE WAVE CREST[2] |
|---|---|---|---|
| 10 | Located 1,500 feet southeast from the intersection of Butler Drive and Ray Drive, extends northwest from the Seekonk River south of Goose Point | 12.0 | 13.9 |
| 11 | Located within the southeastern portion of the Swan Point Cemetery, extends from the Seekonk River, south of Swan Point west | 12.0 | 14.0 |
| 12 | Located within the Riverside Cemetery, extends from the Seekonk River west | 12.0 | 13.4 |
| 13 | Located 500 feet southwest of the intersection of School Street and Beverage Hill Avenue, extends from the Seekonk River east | 12.0 | 14.8 |
| 14 | Extends northeast from the Seekonk River through the water treatment plant facilities | 12.0 | 13.8 |
| 15 | Located west of Omega Pond, extends from Seekonk River north | 12.0 | 12.8 |
| 16 | Located along Seekonk River south of Waterman Avenue, extends southeast from Seekonk River | 12.0 | * |
| 17 | Located at the confluence of Seekonk River and Providence River at Bold Point, extends northeast to the intersection of Mauran Avenue and Veterans Memorial Parkway | 12.0 | 13.0 |
| 18 | Extends from Providence River, crosses Watchemoket Cove, to the intersection of Broadview Road and Hilltop Road | 12.0 | 13.6 |

[1]North American Vertical Datum of 1988
[2]Because of map scale limitations, the maximum wave elevation may not be shown on the FIRM.
[3]Including stillwater elevation and effects of wave setup
*Data not available

TABLE 8 –TRANSECT DESCRIPTIONS - continued

| TRANSECT | LOCATION | ELEVATION (feet NAVD88[1]) 1-PERCENT-ANNUAL-CHANCE STILLWATER[3] | MAXIMUM 1-PERCENT-ANNUAL-CHANCE WAVE CREST[2] |
|---|---|---|---|
| 19 | Located 250 feet southwest of the intersection of sunnyside Avenue and Eater View Avenue, extends from the Providence River northeast | 11.8 | 17.1 |
| 20 | Located 300 feet west of the intersection of Jackson Avenue and Grant Avenue, extends from Providence River east | 11.7 | 14.9 |
| 21 | Located 500 feet south of the intersection of Shore Road and Borden Street, extends north across Sabin Point | 11.7 | 16.4 |
| 22 | Located 300 feet southwest of the intersection of Beacon Avenue and Harding Avenue, extends east from Providence River | 11.6 | 16.7 |
| 23 | Located 750 feet west of the intersection of Mystic Avenue and Bullocks Point Ave, extends east from Providence River to Bullock Cove | 11.6 | 17.5 |
| 24 | Located 200 feet south of the intersection of Sea View Avenue and Bullocks Point Avenue, extends north up Bullocks Point Avenue | 11.6 | 18.4 |
| 25 | Located 900 feet south of the intersection of Anchor Way and Carousel Drive, extends from Bullock Cove north | 11.6 | 17.3 |

[1]North American Vertical Datum of 1988
[2]Because of map scale limitations, the maximum wave elevation may not be shown on the FIRM.
[3]Including stillwater elevation and effects of wave setup

The results of the coastal analysis using detailed methods are summarized in Table 9, “Transect Data,” which provides the flood hazard zone and base flood elevations for each coastal transect, along with the 10-, 2-, 1- and 0.2-percent- annual-chance flood stillwater elevations from the Long Island Sound flooding source, including effects of wave setup where applicable. Historic flood damage information was also used in the determination of flood prone areas along the Providence shoreline.

TABLE 9 – TRANSECT DATA

| FLOODING SOURCE and TRANSECT NUMBER | STILLWATER ELEVATIONS (feet NAVD88[1]) 10-PERCENT-ANNUAL-CHANCE | 2-PERCENT-ANNUAL-CHANCE | 1-PERCENT-ANNUAL-CHANCE[3] | 0.2-PERCENT-ANNUAL-CHANCE | ZONE | BASE FLOOD ELEVATION[2] (feet NAVD88[1]) |
|---|---|---|---|---|---|---|
| PROVIDENCE RIVER | | | | | | |
| Transect 1 | 6.9 | 9.9 | 11.9 | 18.4 | VE | 16 |
| | | | | | VE | 13 |
| Transect 2 | 6.9 | 9.9 | 11.9 | 18.7 | VE | 12 |
| | | | | | AE | 12 |
| Transect 3 | 6.9 | 9.9 | 12.5 | 18.9 | VE | 17 |
| | | | | | AE | 17 |
| Transect 4 | 7.0 | 10.1 | 12.0 | 19.0 | AE | 12 |
| | | | | | VE | 12 |
| Transect 5 | 7.0 | 10.1 | 12.1 | 19.0 | AE | 12 |
| Transect 6 | 7.0 | 10.1 | 12.3 | 19.0 | VE | 14 |
| SEEKONK RIVER | | | | | | |
| Transect 7 | 7.0 | 10.1 | 12.4 | 19.0 | VE | 15 |
| | | | | | VE | 14 |
| | | | | | VE | 12 |
| Transect 8 | 7.0 | 10.1 | 12.1 | 19.0 | VE | 13 |
| Transect 9 | 7.0 | 10.1 | 12.2 | 19.0 | VE | 14 |
| Transect 10 | 7.0 | 10.1 | 12.4 | 19.0 | VE | 15 |
| Transect 11 | 7.0 | 10.1 | 12.5 | 19.0 | VE | 17 |
| Transect 12 | 7.0 | 10.1 | 12.4 | 19.0 | VE | 14 |
| Transect 13 | 7.0 | 10.1 | 12.7 | 19.0 | VE | 19 |

[1]North American Vertical Datum of 1988
[2]Because of map scale limitations, base flood elevations shown on the FIRM represent average elevations for the zones depicted.
[3]Including stillwater elevation and effects of wave setup

TABLE 9 – TRANSECT DATA - continued

| FLOODING SOURCE and TRANSECT NUMBER | STILLWATER ELEVATIONS (feet NAVD88[1]) 10-PERCENT-ANNUAL-CHANCE | 2-PERCENT-ANNUAL-CHANCE | 1-PERCENT-ANNUAL-CHANCE[3] | 0.2-PERCENT-ANNUAL-CHANCE | ZONE | BASE FLOOD ELEVATION[2] (feet NAVD88[1]) |
|---|---|---|---|---|---|---|
| SEEKONK RIVER - continued | | | | | | |
| Transect 14 | 7.0 | 10.1 | 12.3 | 19.0 | VE | 14 |
| | | | | | VE | 13 |
| | | | | | AE | 13 |
| Transect 15 | 7.0 | 10.1 | 12.1 | 19.0 | VE | 13 |
| | | | | | AE | 13 |
| Transect 16 | 7.0 | 10.1 | 12.0 | 19.0 | AE | 12 |
| Transect 17 | 7.0 | 10.1 | 12.2 | 19.0 | VE | 14 |
| | | | | | VE | 13 |
| | | | | | AE | 12 |
| PROVIDENCE RIVER | | | | | | |
| Transect 18 | 7.0 | 10.0 | 12.2 | 19.0 | VE | 14 |
| Transect 19 | 6.9 | 9.9 | 13.0 | 18.9 | VE | 26 |
| Transect 20 | 6.9 | 9.9 | 12.5 | 18.4 | VE | 20 |
| Transect 21 | 6.9 | 9.9 | 12.4 | 18.4 | VE | 16 |
| | | | | | VE | 15 |
| Transect 22 | 6.8 | 9.8 | 12.7 | 18.4 | VE | 24 |
| Transect 23 | 6.8 | 9.8 | 12.5 | 18.4 | VE | 18 |
| Transect 24 | 6.8 | 9.8 | 12.5 | 18.4 | VE | 16 |
| | | | | | VE | 14 |
| BULLOCK COVE | | | | | | |
| Transect 25 | 6.8 | 9.8 | 12.8 | 18.4 | VE | 17 |
| | | | | | AE | 13 |

[1]North American Vertical Datum of 1988
[2]Because of map scale limitations, base flood elevations shown on the FIRM represent average elevations for the zones depicted.
[3]Including stillwater elevation and effects of wave setup

### 3.5 Vertical Datum

All FIS reports and FIRMs are referenced to a specific vertical datum. The vertical datum provides a starting point against which flood, ground, and structure elevations can be referenced and compared. Until recently, the standard vertical datum used for newly created or revised FIS reports and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the completion of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are now prepared using NAVD88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to the NAVD88. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. Ground, structure, and flood elevations may be compared and/or referenced to NGVD29 by applying a standard conversion factor. **The conversion factor from NGVD29 to NAVD88 is -0.8 foot, and from NAVD88 to NGVD29 is +0.8 foot.**

For information regarding conversion between the NGVD29 and NAVD88, visit the National Geodetic Survey website at 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

Qualifying bench marks within a given jurisdiction that are cataloged by the National Geodetic Survey (NGS) and entered into the National Spatial Reference System (NSRS) as First or Second Order Vertical and have a vertical stability classification of A, B, or C are shown and labeled on the FIRM with their 6-character NSRS Permanent Identifier.

Bench marks cataloged by the NGS and entered into the NSRS vary widely in vertical stability classification. NSRS vertical stability classifications are as follows:

Stability A: Monuments of the most reliable nature, expected to hold position/elevation well (e.g., mounted in bedrock)

Stability B: Monuments which generally hold their position/elevation well (e.g., concrete bridge abutment)

Stability C: Monuments which may be affected by surface ground movements (e.g., concrete monument below frost line)

Stability D: Mark of questionable or unknown vertical stability (e.g., concrete monument above frost line, or steel witness post)

In addition to NSRS bench marks, the FIRM may also show vertical control monuments established by a local jurisdiction; these monuments will be shown on the FIRM with the appropriate designations. Local monuments will only be placed on the FIRM if the community has requested that they be included, and if the monuments meet the aforementioned NSRS inclusion criteria.

Temporary vertical monuments are often established during the preparation of a flood hazard analysis for the purpose of establishing local vertical control. Although these monuments are not shown on the FIRM, they may be found in the Technical Support Data Notebook associated with the FIS report and FIRM for this county. Interested individuals may contact FEMA to access these data.

The BFEs shown on the FIRM represent whole-foot rounded values. For example, a BFE of 102.4 will appear as 102 on the FIRM and 102.6 will appear as 103. Therefore, users that wish to convert the elevations in this FIS to NGVD29 should apply the stated conversion factor to elevations shown on the Flood Profiles and supporting data tables in the FIS report, which are shown at a minimum to the nearest 0.1 foot.

To obtain current elevation, description, and/or location information for benchmarks shown on this map, please contact the Information Services Branch of the NGS at (301) 713-3242, or visit their website at www.ngs.noaa.gov.

## 4.0 FLOODPLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound floodplain management programs. To assist in this endeavor, each FIS report provides1-percent-annual-chance floodplain data, which may include a combination of the following: 10-, 2-, 1-, and 0.2-percent-annual-chance flood elevations; delineations of the 1- and 0.2-percent-annual-chance floodplains; and a 1-percent-annual-chance floodway. This information is presented on the FIRM and in many components of the FIS report, including Flood Profiles, Floodway Data tables, and Summary of Stillwater Elevation tables. Users should reference the data presented in the FIS report as well as additional information that may be available at the local community map repository before making flood elevation and/or floodplain boundary determinations.

### 4.1 Floodplain Boundaries

In order to provide a national standard without regional discrimination, the 1-percent-annual-chance flood has been adopted by FEMA as the base flood for floodplain management purposes. The 0.2-percent-annual-chance flood is employed to indicate additional areas of flood risk in the community.

Precountywide Analyses

For unrevised streams in Providence County, data were taken from previously printed FISs for each individual community and are compiled below.

For each stream studied in detail, the boundaries of the 1- and 0.2-percent-annual-chance floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated, using topographic maps at a scale of 1:24,000 with a contour interval of 10 feet (USGS, 1970); at a scale of 1:24,000 with a contour interval of 6 meters (U.S. Department of the Interior, 1986); at a scale of 1:24,000 with a contour interval of 20 feet (U.S. Department of the Interior, 1958); at a scale of 1:24,000 with a contour interval of 10 feet (USGS, 1955); at a scale of 1:4,800 with a contour interval of 5 feet (Geod Aerial Mapping, Inc., 1979); at a scale of 1:4,800 with a contour interval of 5 feet (Geod Aerial Mapping, Inc., 1978); at a scale of 1:4,800 with a contour interval of 5 feet and 1 foot (USACE, April 1985; Garofalo & Associates, Inc., December 7, 1990); at a scale of 1:4,800 with a contour interval of 5 feet (Geod Aerial Mapping, Inc., 1979); at a scale of 1:4,800 with a contour interval of 5 feet (USGS, 1985); at a scale of 1:2,400 with a contour interval of 10 feet (USGS, 1970); and at a scale of 1:2,400 with a contour interval of 5 feet (Aero Service Corporation, 1963).

For the City of Central Falls, the boundaries were interpolated between cross sections, using topographic maps compiled from strip aerial photographs at a scale of 1:4,800 with a contour interval of 5 feet (Geod Aerial Mapping, Inc., 1979).

In the Pawtucket FIS, the boundaries were interpolated between cross sections, using topographic maps (Geod Aerial Mapping, Inc., 1979; American Air Surveys, Inc.). In tidal areas without wave action, the 1- and 0.2-percent-annual-chance boundaries were delineated using the topographic maps referenced above. For tidal areas with wave action, the flood boundaries were delineated using the elevations determined at each transect; between transects, the boundaries were interpolated using engineering judgment, land-cover data, and the topographic maps referenced above.

For the City of Providence, for tidal areas with wave action, the flood boundaries were delineated using the elevations determined at each transect; between the transects, the boundaries were interpolated using engineering judgment, land-cover data, topographic maps at a scale of 1:25,000 with a contour interval of 3 meters, and topographic maps at a scale of 1:960 with a contour interval of 2 feet (USGS, 1987; City of Providence, 1966.). For the FIS dated June 6, 2000, the floodplain boundaries were interpolated using aerial photographs and topographic maps (USGS, 1987; Geod Surveying and Aerial Mapping, 1982).

For flooding sources studied by approximate methods, the boundaries of the 1-percent-annual-chance floodplain were delineated using the Flood Hazard Boundary Maps (FHBM) for the Town of Burrillville (U.S. Department of Housing and Urban Development, 1977), City of Cranston (U.S. Department of Urban and Housing Development, 1976), Town of Glocester (U.S. Department of Urban and Housing Development, 1977), and City of Woonsocket (U.S. Department of Urban and Housing Development, 1976); the previously printed FIRM for the Town of Johnston (U.S. Department of Urban and Housing Development, 1978) and City of Providence (U.S. Department of Urban and Housing Development, 1976); topographic maps at a scale of 1:24,000 with a contour interval of 5 feet (USGS, 1975); topographic maps at a scale of 1:25,000 with a contour interval of 10 feet (USGS, 1970, 1974, 1975, 1979); topographic maps at a scale of 1:24,000 with a contour interval of 10 feet (USGS, 1955, 1970, 1975); aerial photographs and topographic maps for the City of Providence (Geod Surveying and Aerial Mapping, 1982; USGS, 1987); and the COE study (USACE, 1977).

March 2, 2009 Countywide Analysis

The Blackstone River boundaries between cross sections were determined using GIS-based automated modeling techniques based on LiDAR-derived datasets, including a gridded DEM, TIN file, and 2-foot contour interval.

September 18, 2013 Countywide Analysis

Strategic Alliance for Risk Reduction (STARR) performed coastal flood-hazard analysis for the study area that included the collection of storm-surge (coastal hydrology) data and conducting overland wave-height analysis (coastal hydraulics). For storm-surge or stillwater elevations, the STARR team used the “Tidal Flood Profiles New England Coastline,” prepared by New England Division, U.S. Army Corps of Engineers, dated September 1988. STARR has reviewed the FEMA HQ report titled, “Updating Tidal Profiles for New England Coastline,” dated December 3, 2008, for the 10-, 2-, 1-, and 0.2-percent-annual-chance flood events. The 1988 profiles also reflect high-water information for multiple areas resulting from the hurricanes of 1938 and February 1978 extratropical events.

The overland wave-height analysis was performed using CHAMP. Results of the overland wave-height analysis were transferred to topographic work maps. There were no PFDs located in Providence County.

After the wave models were reviewed, the model outputs were imported into ArcMap and zone-point shapefiles were generated. The zone-point shapefiles delineate the change in BFEs along the transect and can be used to map the BFE changes. The BFEs were separated by drawing gutter lines which connect the zone-point breaks between transects.

STARR delineated the 1- and 0.2-percent-annual-chance floodplain boundaries for Providence County using standard GIS utilities. The STARR team manually drew the floodplain boundaries on the 2-foot topographic contours derived from the terrain model. Aerial imagery and land use data assisted in the development of these features.

Zone VE (high wave velocity action area) was assigned to areas where the wave height is at least 3 feet. Since the wave crest is 70 percent of the controlling wave height above the stillwater-plus-setup surface, the wave crest in Zone VE is at least 2.1 feet higher than the stillwater-plus-setup elevation. Zone AE was assigned to areas where the total wave height is less than 3 feet and the wave crest is less than 2 feet above the stillwater-plus-setup elevation. Any zone width that is less than 20 percent of the FIRM scale was merged into the adjacent higher elevation zone. In the case of Providence County, the FIRM scales are 1 inch equals 500 feet, so zone widths of less than 100 feet were usually merged to the adjacent higher zone.

In March 2007, FEMA developed the guidance on the identification and mapping of the LiMWA. For Providence County, this mapping was done by identifying the LiMWA location(s) along each transect using the WHAFIS output and connecting those points between transects using gutter lines. In areas where runup elevations dominate over WHAFIS wave height, such as areas with steeply sloping beaches or high bluffs, there is no need to delineate the LiMWA. To retain continuous LiMWA lines in runup areas, the LiMWA was placed immediately landward of the mapped VE/AE Zone boundary and coincident with the 1-percent-annual-chance floodplain boundary in areas without an AE zone.

October 2, 2015 Countywide Analysis

For the October 2, 2015 countywide analysis, floodplain boundaries were delineated using the water-surface elevations determined at each cross section or interpolated between cross sections. The topographic data used was a LiDAR digital elevation model (DEM) with a two-meter resolution. The 1- and 0.2-percent-annual-chance floodplains were shown everywhere their respective water-surface elevations were higher than the LiDAR ground-surface elevation. This floodplain mapping was performed for the study's revised streams (Centerdale Brook, Cranberry Brook, Dry Brook, East Branch West River, Furnace Hill Brook, Lincoln Downs Brook, Meshanticut Brook, North Branch Pawtuxet River, Pawtuxet River, Pocasset River, Sevenmile River, Simmons Brook, Ten Mile River, Upper Canada Pond Brook, West River, West River Diversion, and Woonasquatucket River), and certain nearby detailed- and approximate-study streams (those falling on the same panels as the revised streams) were also redelineated by this method. The water-surface elevations for the redelineated reaches were taken from effective FIS reports (detailed-study streams) or estimated by overlaying the effective floodplain boundary on the LiDAR DEM (approximate-study streams). All panels with the October 2, 2015 effective date, then, have been entirely mapped using a consistent, high-resolution topography.

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM. On this map, the 1-percent-annual-chance floodplain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AO, AH, V, and VE), and the 0.2-percent-annual-chance floodplain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 1- and 0.2-percent-annual-chance floodplain boundaries are close together, only the 1-percent-annual-chance floodplain boundary has been shown. 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.

For the streams studied by approximate methods, only the 1-percent-annual-chance floodplain boundary is shown on the FIRM.

### 4.2 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 this aspect of floodplain management. Under this concept, the area of the 1-percent-annual-chance floodplain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream, plus any adjacent floodplain areas, that must be kept free of encroachment so that the base flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1 foot, provided that hazardous velocities are not produced. The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

The floodways presented in this FIS for the unrevised streams were computed for certain stream segments on the basis of equal conveyance reduction from each side of the floodplain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections (Table 10). The computed floodways are shown on the FIRM (Exhibit 2). In cases where the floodway and 1-percent-annual-chance floodplain boundaries are either close together or collinear, only the floodway boundary is shown.

Precountywide Analyses

No floodways were delineated for Centerdale Brook, Cranberry Brook, East Branch West River, Lincoln Downs Brook, and Turner Reservoir (the latter by agreement reached at an intermediate CCO meeting held in October 1979).

Countywide Analyses

For the March 2, 2009 countywide analysis, the floodway for the Blackstone River was revised and adjusted based on the effective regulatory floodway width. In some areas, the regulatory floodway width was increased or decreased to maintain the regulatory surcharge value of one foot. Where no effective regulatory floodway existed for the restudied stream segments, the floodway presented in this study was computed on the basis of equal conveyance reduction from each side of the floodplains using the HEC-RAS model version 3.1.3.

For the September 18, 2013 countywide revision, no new floodway analysis was performed.

For the October 2, 2015 countywide revision, floodway analysis was performed using new detailed hydraulic models for the reaches of Centerdale Brook, Dry Brook, East Branch West River, Furnace Hill Brook, Lincoln Downs Brook, Meshanticut Brook (including diversion channel), North Branch Pawtuxet River, Pawtuxet River, Pocasset River (including diversion channel), Sevenmile River, Simmons Brook, Ten Mile River, Upper Canada Pond Brook, West River, West River Diversion, and Woonasquatucket River described in Table 3. No floodway was computed or drawn for Cranberry Brook or the upper portion of Upper Canada Pond Brook because all flows were entirely contained in underground channels. By request of the Rhode Island State NFIP coordinator, floodways were not shown on the FIRM in dam ponds or reservoirs, even if the floodways were computed. On all new detailed-study reaches, areas specified in the Precountywide Analyses section that were specially designated as regulatory floodway by community request were overwritten with technically defined floodways. Unless otherwise specified, values in the Floodway Data Table (Table 10) for all new detailed-study reaches are updated values from the October 2, 2015 study.

Encroachment into areas subject to inundation by floodwaters having hazardous velocities aggravates the risk of flood damage and heightens potential flood hazards by further increasing velocities. A listing of stream velocities at selected cross sections is provided in Table 10, “Floodway Data.” To reduce the risk of property damage in areas where the stream velocities are high, the community may wish to restrict development in areas outside the floodway.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "Without Floodway" elevations are presented in Table 10 for certain downstream cross sections of applicable flooding sources. These elevations are lower than the regulatory flood elevations in that area, which must take into account the 1-percent-annual-chance flooding due to backwater from other sources.

The area between the floodway and 1-percent-annual-chance floodplain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the floodplain that could be completely obstructed without increasing the water-surface elevation (WSEL) of the base 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 5, "Floodway Schematic."

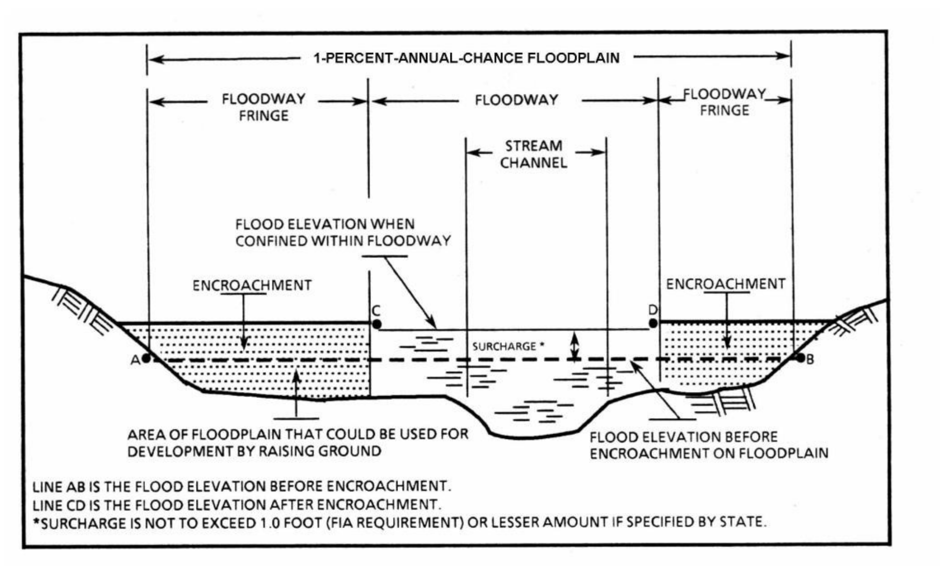


**Figure 5 – FLOODWAY SCHEMATIC**

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 150 | 30 | 189 | 2.55 | 81.4 | 81.4 | 82.4 | 1.0 |
| B | 230 | 83 | 170 | 2.83 | 84.4 | 84.4 | 85.4 | 1.0 |
| C | 555 | 100 | 165 | 2.92 | 88.2 | 88.2 | 89.2 | 1.0 |
| D | 765 | 35 | 188 | 2.56 | 93.0 | 93.0 | 94.0 | 1.0 |
| E | 924 | 33 | 113 | 4.26 | 96.1 | 96.1 | 97.1 | 1.0 |
| F | 1,034 | 23 | 142 | 2.84 | 97.1 | 97.1 | 98.1 | 1.0 |
| G | 1,085 | 22 | 62 | 6.46 | 98.0 | 98.0 | 98.5 | 0.5 |
| H | 1,320 | 12 | 97 | 4.13 | 99.9 | 99.9 | 100.9 | 1.0 |
| I | 1,416 | 38 | 51 | 7.90 | 100.8 | 100.8 | 101.3 | 0.5 |
| J | 1,563 | 155 | 167 | 2.40 | 102.2 | 102.2 | 103.2 | 1.0 |
| K | 1,753 | 14 | 106 | 3.78 | 103.2 | 103.2 | 103.7 | 0.5 |
| L | 2,042 | 27 | 46 | 8.63 | 117.8 | 117.8 | 118.3 | 0.5 |
| M | 2,627 | 29 | 63 | 6.30 | 133.4 | 133.4 | 133.9 | 0.5 |
| N | 2,672 | 412 | 65 | 5.7 | 136.6 | 136.6 | 137.1 | 0.5 |
| O | 2,756 | 25 | 1,867 | 0.27 | 137.5 | 137.5 | 138.0 | 0.5 |
| P | 4,700 | 344 | 109 | 4.26 | 148.4 | 148.4 | 149.4 | 1.0 |
| Q | 5,150 | 30 | 1,444 | 0.20 | 159.2 | 159.2 | 159.7 | 0.5 |

[1]FEET ABOVE CONFLUENCE WITH WOONASQUATUCKET RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

ASSAPUMPSET BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 364 | 191 | 3568 | 6.4 | 32.9 | 32.9 | 33.8 | 0.9 |
| B | 1148 | 181 | 3179 | 7.2 | 33.5 | 33.5 | 34.5 | 0.9 |
| C | 1659 | 161 | 2830 | 8.0 | 34.3 | 34.3 | 35.1 | 0.8 |
| D | 2465 | 154 | 2435 | 9.3 | 35.2 | 35.2 | 35.9 | 0.8 |
| E | 3306 | 157 | 2670 | 8.5 | 36.9 | 36.9 | 37.5 | 0.7 |
| F | 4105 | 117 | 2245 | 10.1 | 38.6 | 38.6 | 39.6 | 1.0 |
| G | 4506 | 229 | 2548 | 8.8 | 41.9 | 41.9 | 42.4 | 0.5 |
| H | 4669 | 241 | 3192 | 7.1 | 42.8 | 42.8 | 43.2 | 0.4 |
| I | 5207 | 186 | 2616 | 8.6 | 44.6 | 44.6 | 44.9 | 0.3 |
| J | 6452 | 218 | 3613 | 6.2 | 46.7 | 46.7 | 47.2 | 0.4 |
| K | 7018 | 199 | 2983 | 7.5 | 47.5 | 47.5 | 47.7 | 0.2 |
| L | 9947 | 330 | 3591 | 6.3 | 51.8 | 51.8 | 52.5 | 0.8 |
| M | 10451 | 213 | 3493 | 6.4 | 53.3 | 53.3 | 54.1 | 0.9 |
| N | 10668 | 257 | 4641 | 4.6 | 59.0 | 59.0 | 59.1 | 0.0 |
| O | 11059 | 179 | 2341 | 9.2 | 59.4 | 59.4 | 59.4 | 0.1 |
| P | 12449 | 778 | 9237 | 2.3 | 61.7 | 61.7 | 61.9 | 0.2 |
| Q | 16067 | 734 | 8481 | 2.5 | 61.9 | 61.9 | 62.8 | 0.9 |
| R | 16610 | 475 | 5749 | 3.7 | 62.3 | 62.3 | 63.1 | 0.7 |
| S | 19467 | 825 | 7349 | 2.9 | 62.9 | 62.9 | 63.8 | 0.9 |
| T | 20170 | 439 | 4677 | 4.6 | 63.9 | 63.9 | 64.7 | 0.9 |
| U | 21253 | 535 | 7061 | 4.6 | 65.4 | 65.4 | 66.3 | 0.8 |
| V | 22237 | 542 | 5454 | 3.9 | 67.6 | 67.6 | 67.9 | 0.3 |
| W | 23114 | 1302 | 10553 | 2.0 | 68.5 | 68.5 | 68.7 | 0.2 |
| X | 25456 | 323 | 3705 | 5.8 | 69.2 | 69.2 | 69.4 | 0.2 |
| Y | 26322 | 407 | 4181 | 5.1 | 70.4 | 70.4 | 70.5 | 0.0 |
| Z | 30814 | 620 | 5741 | 3.9 | 74.0 | 74.0 | 74.5 | 0.6 |
| AA | 31335 | 704 | 5967 | 3.9 | 74.3 | 74.3 | 75.2 | 1.0 |

[1]FEET ABOVE MAIN STREET

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

BLACKSTONE RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| AB | 33278 | 462 | 4760 | 4.6 | 76.0 | 76.0 | 76.7 | 0.7 |
| AC | 35202 | 248 | 3454 | 6.2 | 77.4 | 77.4 | 78.3 | 0.9 |
| AD | 35481 | 155 | 2688 | 8.0 | 77.7 | 77.7 | 78.7 | 0.9 |
| AE | 35720 | 201 | 2816 | 7.6 | 78.2 | 78.2 | 79.1 | 0.9 |
| AF | 36205 | 230 | 3713 | 5.7 | 79.1 | 79.1 | 79.9 | 0.8 |
| AG | 36848 | 323 | 5027 | 4.2 | 82.1 | 82.1 | 83.0 | 0.9 |
| AH | 37698 | 287 | 4090 | 5.2 | 82.4 | 82.4 | 83.3 | 0.9 |
| AI | 38310 | 309 | 4449 | 4.8 | 83.0 | 83.0 | 83.9 | 0.8 |
| AJ | 40153 | 245 | 3780 | 5.6 | 84.5 | 84.5 | 85.3 | 0.9 |
| AK | 42617 | 316 | 3548 | 6.0 | 86.3 | 86.3 | 87.3 | 1.0 |
| AL | 43136 | 177 | 2599 | 8.2 | 87.5 | 87.5 | 88.3 | 0.8 |
| AM | 43319 | 146 | 2480 | 8.6 | 87.8 | 87.8 | 88.5 | 0.7 |
| AN | 44368 | 302 | 5486 | 3.9 | 95.5 | 95.5 | 96.3 | 0.8 |
| AO | 46154 | 161 | 2757 | 7.7 | 95.7 | 95.7 | 96.5 | 0.8 |
| AP | 47130 | 219 | 3691 | 5.7 | 96.8 | 96.8 | 97.7 | 0.9 |
| AQ | 48430 | 165 | 3055 | 6.9 | 97.3 | 97.3 | 98.2 | 0.9 |
| AR | 49072 | 205 | 3929 | 5.4 | 97.9 | 97.9 | 98.9 | 1.0 |
| AS | 49996 | 142 | 2552 | 8.3 | 98.0 | 98.0 | 99.0 | 1.0 |
| AT | 51051 | 163 | 2450 | 8.6 | 98.9 | 98.9 | 99.9 | 1.0 |
| AU | 51496 | 309 | 5787 | 3.7 | 100.5 | 100.5 | 101.4 | 0.9 |
| AV | 52546 | 189 | 2578 | 8.2 | 101.0 | 101.0 | 102.0 | 1.0 |
| AW | 52981 | 185 | 3537 | 5.9 | 107.7 | 107.7 | 107.8 | 0.1 |
| AX | 53526 | 462 | 9948 | 2.1 | 113.6 | 113.6 | 114.3 | 0.7 |
| AY | 55097 | 286 | 4447 | 4.7 | 113.6 | 113.6 | 114.2 | 0.6 |
| AZ | 56209 | 238 | 3826 | 5.5 | 114.2 | 114.2 | 114.8 | 0.7 |
| BA | 57466 | 204 | 3761 | 5.6 | 114.8 | 114.8 | 115.7 | 0.9 |
| BB | 58004 | 470 | 5075 | 4.6 | 115.0 | 115.0 | 115.9 | 0.9 |

[1]FEET ABOVE MAIN STREET

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

BLACKSTONE RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| BC | 58376 | 230 | 3605 | 5.8 | 115.7 | 115.7 | 116.3 | 0.7 |
| BD | 59009 | 261 | 4596 | 4.6 | 116.1 | 116.1 | 116.8 | 0.7 |
| BE | 60233 | 162 | 2936 | 7.2 | 116.3 | 116.3 | 116.9 | 0.6 |
| BF | 60668 | 221 | 3804 | 5.5 | 116.7 | 116.7 | 117.4 | 0.7 |
| BG | 61395 | 182 | 3303 | 6.4 | 116.8 | 116.8 | 117.7 | 0.9 |
| BH | 61838 | 409 | 7913 | 2.7 | 117.3 | 117.3 | 118.3 | 1.0 |
| BI | 64080 | 188 | 3294 | 6.4 | 117.8 | 117.8 | 118.8 | 1.0 |
| BJ | 65707 | 166 | 2896 | 7.3 | 118.7 | 118.7 | 119.6 | 0.9 |
| BK | 66258 | 183 | 3446 | 6.1 | 119.3 | 119.3 | 120.2 | 0.9 |
| BL | 67268 | 155 | 2797 | 7.5 | 119.9 | 119.9 | 120.7 | 0.8 |
| BM | 67869 | 126 | 2081 | 10.1 | 119.9 | 119.9 | 120.6 | 0.8 |
| BN | 68211 | 212 | 3059 | 6.9 | 121.4 | 121.4 | 122.1 | 0.7 |
| BO | 68545 | 150 | 2818 | 7.5 | 121.8 | 121.8 | 122.4 | 0.6 |
| BP | 69473 | 224 | 2309 | 9.1 | 122.0 | 122.0 | 122.7 | 0.7 |
| BQ | 69838 | 109 | 1974 | 10.6 | 123.7 | 123.7 | 124.0 | 0.3 |
| BR | 70335 | 111 | 1832 | 11.5 | 124.2 | 124.2 | 124.6 | 0.4 |
| BS | 70696 | 103 | 1651 | 12.7 | 124.7 | 124.7 | 125.1 | 0.4 |
| BT | 71225 | 186 | 3458 | 6.1 | 127.8 | 127.8 | 128.4 | 0.6 |
| BU | 72276 | 212 | 2895 | 7.3 | 128.9 | 128.9 | 128.9 | 0.0 |
| BV | 72746 | 126 | 2406 | 8.7 | 130.4 | 130.4 | 130.7 | 0.2 |
| BW | 73373 | 101 | 1924 | 10.9 | 131.2 | 131.2 | 131.6 | 0.4 |
| BX | 73800 | 134 | 2447 | 8.6 | 132.8 | 132.8 | 132.8 | 0.1 |
| BY | 74353 | 125 | 2194 | 9.6 | 133.4 | 133.4 | 133.6 | 0.2 |
| BZ | 75228 | 404 | 8121 | 2.6 | 135.3 | 135.3 | 135.7 | 0.3 |
| CA | 76001 | 236 | 5865 | 3.2 | 150.0[2] | 141.1 | 141.1 | 0.0 |
| CB | 76417 | 108 | 1480 | 12.6 | 150.0[2] | 146.0 | 146.0 | 0.0 |
| CC | 76608 | 151 | 2133 | 8.8 | 150.0[2] | 148.1 | 148.1 | 0.0 |

[1]FEET ABOVE MAIN STREET

[2]ELEVATION COMPUTED WITH CONSIDERATION OF WOONSOCKET FALLS DAM OPERATION PROCEDURES

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

BLACKSTONE RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| CD | 77376 | 167 | 2742 | 6.8 | 150.0[2] | 149.2 | 149.2 | 0.0 |
| CE | 78376 | 184 | 2676 | 7.0 | 150.3 | 150.3 | 150.3 | 0.0 |
| CF | 78955 | 161 | 2055 | 9.1 | 150.6 | 150.6 | 150.6 | 0.0 |
| CG | 79139 | 177 | 2349 | 8.0 | 151.2 | 151.2 | 151.2 | 0.0 |
| CH | 79549 | 150 | 2018 | 9.3 | 151.4 | 151.4 | 151.4 | 0.0 |
| CI | 80008 | 141 | 1992 | 9.4 | 152.1 | 152.1 | 152.1 | 0.0 |
| CJ | 80146 | 130 | 1838 | 10.2 | 153.3 | 153.3 | 153.4 | 0.0 |
| CK | 80459 | 150 | 2330 | 8.0 | 154.8 | 154.8 | 154.9 | 0.1 |
| CL | 80962 | 166 | 2731 | 6.9 | 155.5 | 155.5 | 155.6 | 0.1 |
| CM | 82275 | 163 | 2797 | 6.7 | 156.4 | 156.4 | 156.5 | 0.1 |
| CN | 83257 | 158 | 2631 | 7.1 | 157.2 | 157.2 | 157.3 | 0.2 |
| CO | 83651 | 146 | 2334 | 8.0 | 157.3 | 157.3 | 157.5 | 0.2 |
| CP | 84401 | 117 | 1722 | 10.9 | 157.5 | 157.5 | 157.8 | 0.3 |
| CQ | 84785 | 137 | 3009 | 6.2 | 159.1 | 159.1 | 159.4 | 0.3 |
| CR | 85996 | 134 | 1826 | 10.2 | 159.3 | 159.3 | 159.7 | 0.5 |
| CS | 86924 | 107 | 1551 | 11.8 | 162.8 | 162.8 | 163.3 | 0.5 |
| CT | 87438 | 97 | 1200 | 15.3 | 163.1 | 163.1 | 164.0 | 0.9 |
| CU | 87861 | 177 | 2243 | 9.3 | 168.3 | 168.3 | 168.7 | 0.4 |
| CV | 88001 | 124 | 1868 | 9.8 | 168.7 | 168.7 | 169.7 | 1.0 |
| CW | 88193 | 140 | 2728 | 8.1 | 171.2 | 171.2 | 171.6 | 0.4 |
| CX | 88795 | 456 | 5296 | 3.5 | 173.3 | 173.3 | 173.6 | 0.3 |
| CY | 89478 | 299 | 4262 | 4.3 | 173.8 | 173.8 | 174.0 | 0.2 |
| CZ | 90739 | 149 | 2436 | 7.2 | 174.0 | 174.0 | 174.4 | 0.4 |
| DA | 91112 | 152 | 2543 | 6.9 | 174.3 | 174.3 | 174.7 | 0.4 |
| DB | 91550 | 304 | 3372 | 5.3 | 174.8 | 174.8 | 175.2 | 0.4 |
| DC | 92518 | 254 | 3929 | 3.6 | 175.5 | 175.5 | 176.2 | 0.7 |
| DD | 93642 | 82 | 1042 | 13.5 | 176.2 | 176.2 | 177.0 | 0.8 |

[1]FEET ABOVE MAIN STREET
[2]ELEVATION COMPUTED WITH CONSIDERATION OF WOONSOCKET FALLS DAM OPERATION PROCEDURES

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

BLACKSTONE RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 26,000 | 46 | 549 | 11.49 | 253.9 | 253.9 | 254.4 | 0.5 |
| B | 26,283 | 445 | 2,596 | 2.43 | 255.4 | 255.4 | 256.4 | 1.0 |
| C | 29,053 | 386 | 1,666 | 3.77 | 256.1 | 256.1 | 257.1 | 1.0 |
| D | 29,756 | 96 | 694 | 9.02 | 259.2 | 259.2 | 260.2 | 1.0 |
| E | 30,332 | 193 | 1,845 | 3.40 | 267.2 | 267.2 | 268.2 | 1.0 |
| F | 31,132 | 76 | 970 | 6.45 | 268.3 | 268.3 | 269.3 | 1.0 |
| G | 31,237 | 147 | 1,187 | 5.27 | 268.6 | 268.6 | 269.6 | 1.0 |
| H | 31,322 | 103 | 578 | 10.82 | 272.3 | 272.3 | 272.8 | 0.5 |
| I | 31,522 | 138 | 1,682 | 3.72 | 274.4 | 274.4 | 275.4 | 1.0 |
| J | 33,092 | 125 | 1,297 | 4.81 | 275.4 | 275.4 | 276.4 | 1.0 |
| K | 33,517 | 87 | 817 | 7.64 | 276.2 | 276.2 | 276.7 | 0.5 |
| L | 33,542 | 97 | 533 | 11.71 | 282.9 | 282.9 | 283.4 | 0.5 |
| M | 33,942 | 186 | 2,256 | 2.77 | 285.5 | 285.5 | 286.5 | 1.0 |
| N | 34,442 | 108 | 876 | 7.08 | 289.2 | 289.2 | 290.2 | 1.0 |
| O | 37,652 | 101 | 1,037 | 5.96 | 293.5 | 293.5 | 294.5 | 1.0 |
| P | 38,752 | 119 | 910 | 6.79 | 298.3 | 298.3 | 298.8 | 0.5 |
| Q | 39,156 | 94 | 985 | 5.89 | 299.0 | 299.0 | 300.0 | 1.0 |
| R | 39,275 | 120 | 1,250 | 4.65 | 300.4 | 300.4 | 300.9 | 0.5 |
| S | 41,582 | 221 | 1,924 | 3.02 | 301.5 | 301.5 | 302.5 | 1.0 |
| T | 45,232 | 145 | 1,443 | 4.00 | 304.0 | 304.0 | 304.5 | 0.5 |
| U | 45,827 | 181 | 666 | 8.51 | 307.0 | 307.0 | 307.5 | 0.5 |
| V | 46,007 | 394 | 3,243 | 1.75 | 308.5 | 308.5 | 309.0 | 0.5 |
| W | 48,062 | 469 | 3,355 | 1.68 | 308.7 | 308.7 | 309.7 | 1.0 |
| X | 48,122 | 99 | 760 | 7.42 | 308.7 | 308.7 | 309.2 | 0.5 |

[1]FEET ABOVE MOUTH

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

BRANCH RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A[2] | 73 | 97 | 118 | 0.7 | 94.1 | 94.1 | 95.1 | 1.0 |
| B[2] | 1291 | 4 | 23 | 2.8 | 122.9 | 122.9 | 122.9 | 0.0 |
| C | 1537 | 12 | 34 | 1.9 | 125.7 | 125.7 | 125.7 | 0.0 |
| D[2] | 2030 | 4 | 36 | 1.8 | 131.0 | 131.0 | 131.6 | 0.6 |
| E | 2140 | 30 | 130 | 0.5 | 131.5 | 131.5 | 132.0 | 0.5 |
| F | 2235 | 34 | 100 | 0.4 | 131.5 | 131.5 | 132.0 | 0.5 |
| G[2] | 2424 | 16 | 25 | 1.7 | 132.9 | 132.9 | 133.2 | 0.3 |
| H[2] | 2856 | 4 | 18 | 2.4 | 134.2 | 134.2 | 134.4 | 0.2 |
| I[2] | 3405 | 4 | 21 | 2.0 | 135.8 | 135.8 | 136.1 | 0.3 |
| J[2] | 3730 | 4 | 27 | 1.6 | 138.1 | 138.1 | 138.3 | 0.2 |
| K[2] | 3914 | 50 | 159 | 0.3 | 138.6 | 138.6 | 139.0 | 0.4 |

[1]FEET ABOVE CONFLUENCE WITH WOONASQUATUCKET RIVER
[2]FLOODWAY CONTAINED IN UNDERGROUND CHANNEL AND NOT SHOWN ON FIRM

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

CENTERDALE BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 1,300[1] | 522 | 1,874 | 0.84 | 309.4 | 309.4 | 310.4 | 1.0 |
| B | 2,515[1] | 60 | 299 | 4.96 | 312.2 | 312.2 | 313.2 | 1.0 |
| C | 2,795[1] | 70 | 171 | 8.63 | 317.5 | 317.5 | 318.0 | 0.5 |
| D | 2,945[1] | 194 | 776 | 1.91 | 318.2 | 318.2 | 318.7 | 0.5 |
| E | 3,245[1] | 102 | 369 | 4.00 | 319.5 | 319.5 | 320.0 | 0.5 |
| F | 3,790[1] | 46 | 201 | 7.31 | 323.6 | 323.6 | 324.1 | 0.5 |
| G | 4,140[1] | 80 | 223 | 6.59 | 337.4 | 337.4 | 337.9 | 0.5 |
| H | 4,290[1] | 237 | 2,182 | 0.67 | 338.4 | 338.4 | 338.9 | 0.5 |
| I | 4,880[1] | 237 | 2,182 | 0.67 | 338.4 | 338.4 | 338.9 | 0.5 |
| J | 5,545[1] | 134 | 682 | 2.14 | 338.9 | 338.9 | 339.4 | 0.5 |
| K | 5,895[1] | 76 | 310 | 4.63 | 339.2 | 339.2 | 339.7 | 0.5 |
| L | 5,290[2] | 134 | 600 | 1.91 | 357.1 | 357.1 | 358.1 | 1.0 |
| M | 6,425[2] | 117 | 406 | 2.08 | 358.3 | 358.3 | 359.3 | 1.0 |
| N | 6,840[2] | 96 | 326 | 2.59 | 359.1 | 359.1 | 360.1 | 1.0 |
| O | 7,780[2] | 127 | 334 | 2.53 | 361.4 | 361.4 | 362.4 | 1.0 |
| P | 8,100[2] | 28 | 115 | 7.35 | 367.4 | 367.4 | 367.9 | 0.5 |
| Q | 8,170[2] | 37 | 145 | 5.83 | 368.7 | 368.7 | 369.2 | 0.5 |
| R | 8,350[2] | 65 | 166 | 5.07 | 372.1 | 372.1 | 372.6 | 0.5 |
| S | 8,460[2] | 43 | 163 | 5.17 | 373.1 | 373.1 | 373.6 | 0.5 |
| T | 8,975[2] | 54 | 133 | 6.34 | 390.2 | 390.2 | 390.7 | 0.5 |
| U | 9,045[2] | 48 | 127 | 6.64 | 394.9 | 394.9 | 395.4 | 0.5 |
| V | 9,625[2] | 79 | 170 | 4.97 | 405.6 | 405.6 | 406.1 | 0.5 |
| W | 9,750[2] | 64 | 147 | 5.74 | 414.3 | 414.3 | 414.8 | 0.5 |
| X | 9,840[2] | 305 | 910 | 0.97 | 415.1 | 415.1 | 415.6 | 0.5 |
| Y | 10,940[2] | 305 | 941 | 0.93 | 415.2 | 415.2 | 415.7 | 0.5 |

[1]FEET ABOVE MOUTH
[2]FEET ABOVE BURRILLVILLE/GLOCESTER CORPORATE LIMITS

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

CHEPACHET RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 520 | 100 | 964 | 0.21 | 217.9 | 217.9 | 218.9 | 1.0 |
| B | 1,795 | 106 | 879 | 0.20 | 220.1 | 220.1 | 221.1 | 1.0 |
| C | 2,565 | 82 | 586 | 2.45 | 221.6 | 221.6 | 222.6 | 1.0 |
| D | 4,690 | 219 | 1,329 | 1.06 | 222.4 | 222.4 | 223.4 | 1.0 |
| E | 6,415 | 304 | 2,684 | 0.49 | 227.3 | 227.3 | 228.3 | 1.0 |
| F | 8,580 | 199 | 1,597 | 0.71 | 228.0 | 228.0 | 229.0 | 1.0 |
| G | 11,940 | 1,188 | 6,059 | 0.03 | 228.1 | 228.1 | 229.1 | 1.0 |
| H | 12,890 | 230 | 1,018 | 0.18 | 228.9 | 228.9 | 229.9 | 1.0 |

[1]FEET ABOVE NORTH SMITHFIELD CORPORATE LIMIT

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

CHERRY BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 900 | 332 | 2,177 | 1.84 | 309.6 | 309.6 | 310.6 | 1.0 |
| B | 1,264 | 78 | 681 | 5.88 | 309.7 | 309.7 | 310.7 | 1.0 |
| C | 1,500 | 159 | 1,306 | 3.06 | 312.8 | 312.8 | 313.8 | 1.0 |
| D | 1,770 | 429 | 1,827 | 2.19 | 313.2 | 313.2 | 314.2 | 1.0 |
| E | 2,690 | 130 | 1,238 | 3.22 | 313.6 | 313.6 | 314.6 | 1.0 |
| F | 2,940 | 184 | 1,643 | 2.42 | 314.6 | 314.6 | 315.6 | 1.0 |
| G | 5,740 | 209 | 1,448 | 2.72 | 316.3 | 316.3 | 317.3 | 1.0 |
| H | 7,290 | 147 | 1,145 | 3.44 | 317.4 | 317.4 | 318.4 | 1.0 |
| I | 9,060 | 108 | 860 | 4.43 | 319.6 | 319.6 | 320.1 | 0.5 |
| J | 10,470 | 107 | 915 | 4.14 | 321.0 | 321.0 | 322.0 | 1.0 |
| K | 11,588 | 83 | 866 | 4.37 | 321.9 | 321.9 | 322.4 | 0.5 |
| L | 11,770 | 131 | 458 | 8.25 | 334.3 | 334.3 | 334.8 | 0.5 |
| M | 12,070 | 581 | 5,799 | 0.68 | 335.7 | 335.7 | 336.2 | 0.5 |
| N | 13,940 | 85 | 606 | 6.42 | 336.4 | 336.4 | 337.4 | 1.0 |
| O | 14,110 | 65 | 697 | 5.57 | 337.0 | 337.0 | 337.5 | 0.5 |
| P | 15,990 | 45 | 352 | 4.50 | 340.2 | 340.2 | 341.2 | 1.0 |
| Q | 16,335 | 93 | 509 | 3.11 | 342.4 | 342.4 | 343.4 | 1.0 |
| R | 16,795 | 244 | 1,499 | 1.06 | 344.4 | 344.4 | 345.4 | 1.0 |
| S | 17,555 | 40 | 325 | 4.75 | 345.4 | 345.4 | 346.4 | 1.0 |
| T | 17,905 | 36 | 143 | 10.79 | 351.3 | 351.3 | 351.8 | 0.5 |
| U | 18,800 | 36 | 206 | 7.21 | 360.8 | 360.8 | 361.8 | 1.0 |
| V | 18,950 | 75 | 473 | 3.14 | 365.3 | 365.3 | 365.8 | 0.5 |
| W | 21,485 | 472 | 2,715 | 0.45 | 365.5 | 365.5 | 366.5 | 1.0 |
| X | 22,910 | 472 | 2,715 | 0.37 | 365.5 | 365.5 | 366.5 | 1.0 |
| Y | 23,210 | 70 | 270 | 3.68 | 367.9 | 367.9 | 368.4 | 0.5 |
| Z | 23,560 | 101 | 219 | 4.53 | 374.2 | 374.2 | 374.7 | 0.5 |
| AA | 24,060 | 152 | 527 | 1.88 | 375.1 | 375.1 | 375.6 | 0.5 |

[1]FEET ABOVE MOUTH

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

CLEAR RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| AB | 24,400 | 51 | 130 | 7.62 | 380.2 | 380.2 | 380.7 | 0.5 |
| AC | 24,500 | 47 | 276 | 3.59 | 391.7 | 391.7 | 392.7 | 1.0 |
| AD | 24,635 | 67 | 501 | 1.98 | 394.2 | 394.2 | 395.2 | 1.0 |
| AE | 25,410 | 46 | 170 | 5.47 | 400.9 | 400.9 | 401.4 | 0.5 |
| AF | 25,780 | 42 | 111 | 8.37 | 411.6 | 411.6 | 412.1 | 0.5 |
| AG | 26,380 | 90 | 208 | 4.45 | 421.9 | 421.9 | 422.4 | 0.5 |
| AH | 26,880 | 240 | 765 | 1.21 | 422.5 | 422.5 | 423.0 | 0.5 |
| AI | 27,500 | 53 | 275 | 3.34 | 423.8 | 423.8 | 424.3 | 0.5 |
| AJ | 27,984 | 74 | 426 | 1.99 | 426.1 | 426.1 | 427.1 | 1.0 |
| AK | 30,180 | 41 | 143 | 6.17 | 440.6 | 440.6 | 441.1 | 0.5 |

[1]FEET ABOVE MOUTH

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

CLEAR RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 0 | 57 | 205 | 4.6 | 114.8 | 106.9[2] | 107.9 | 1.0 |
| B | 180 | 40 | 219 | 4.3 | 115.9 | 112.4[2] | 112.4 | 0.0 |
| C | 475 | 60 | 269 | 3.5 | 121.1 | 121.1 | 121.1 | 0.0 |
| D | 1,035 | 430 | 8,516 | 0.1 | 173.3 | 173.3 | 173.3 | 0.0 |
| E | 2,715 | 23 | 86 | 11.0 | 173.4 | 173.4 | 173.4 | 0.0 |
| F | 3,295 | 6 | 58 | 16.3 | 191.3 | 191.3 | 191.3 | 0.0 |
| G | 3,385 | 115 | 1,721 | 0.5 | 197.2 | 197.2 | 197.2 | 0.0 |
| H | 3,620 | 230 | 2,938 | 0.3 | 197.2 | 197.2 | 197.2 | 0.0 |
| I | 4,890 | 23 | 231 | 2.9 | 197.2 | 197.2 | 197.2 | 0.0 |
| J | 6,240 | 25 | 77 | 8.8 | 200.7 | 200.7 | 201.1 | 0.4 |
| K | 7,280 | 62 | 635 | 1.1 | 208.8 | 208.8 | 209.6 | 0.8 |
| L | 8,390 | 25 | 125 | 5.4 | 208.8 | 208.8 | 209.6 | 0.8 |
| M | 9,720 | 17 | 62 | 10.9 | 219.6 | 219.6 | 219.7 | 0.1 |
| N | 11,330 | 30 | 84 | 8.0 | 265.1 | 265.1 | 265.1 | 0.0 |
| O | 12,015 | 24 | 69 | 9.7 | 278.6 | 278.6 | 278.6 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH BLACKSTONE RIVER

[2]ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM BLACKSTONE RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

CROOKFALL BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 132 | 19 | 134 | 1.2 | 99.7 | 99.7 | 99.7 | 0.0 |
| B | 523 | 44 | 60 | 2.7 | 101.4 | 101.4 | 101.6 | 0.2 |
| C | 870 | 27 | 76 | 2.1 | 102.9 | 102.9 | 103.0 | 0.1 |
| D | 1275 | 26 | 55 | 2.7 | 106.6 | 106.6 | 106.6 | 0.0 |
| E | 1563 | 13 | 21 | 7.3 | 120.3 | 120.3 | 120.3 | 0.0 |
| F | 2090 | 14 | 15 | 5.3 | 137.4 | 137.4 | 137.4 | 0.0 |
| G | 2336 | 11 | 13 | 6.2 | 147.3 | 147.3 | 147.3 | 0.0 |
| H | 2782 | 93 | 87 | 0.9 | 162.6 | 162.6 | 162.6 | 0.0 |
| I | 3234 | 46 | 21 | 3.8 | 174.2 | 174.2 | 174.2 | 0.0 |
| J | 3810 | 20 | 16 | 5.1 | 186.8 | 186.8 | 186.8 | 0.0 |
| K | 4107 | * | * | * | 214.0 | 214.0 | * | * |
| L | 4754 | * | * | * | 214.4 | 214.4 | * | * |
| M | 5188 | 18 | 26 | 3.1 | 217.0 | 217.0 | 217.1 | 0.1 |
| N | 5695 | 12 | 16 | 5.0 | 229.7 | 229.7 | 229.7 | 0.0 |
| O | 6203 | 30 | 70 | 1.1 | 233.8 | 233.8 | 234.1 | 0.3 |
| P | 7005 | 87 | 182 | 0.4 | 243.9 | 243.9 | 243.9 | 0.0 |
| Q | 7530 | 24 | 66 | 1.2 | 243.9 | 243.9 | 244.2 | 0.3 |
| R | 7888 | 29 | 18 | 4.4 | 246.3 | 246.3 | 246.4 | 0.1 |
| S | 8220 | 40 | 68 | 1.2 | 246.7 | 246.7 | 247.6 | 0.9 |
| T | 8726 | 20 | 43 | 1.9 | 247.0 | 247.0 | 247.9 | 0.9 |
| U | 9112 | 38 | 47 | 1.7 | 251.2 | 251.2 | 251.2 | 0.0 |
| V | 9476 | 68 | 75 | 1.1 | 251.5 | 251.5 | 251.8 | 0.3 |
| W | 10084 | 15 | 25 | 3.2 | 260.5 | 260.5 | 261.0 | 0.5 |
| X | 10453 | 85 | 258 | 0.3 | 281.9 | 281.9 | 281.9 | 0.0 |
| Y | 10956 | * | * | * | 286.8 | 286.8 | * | * |
| Z | 11407 | * | * | * | 286.8 | 286.8 | * | * |
| AA | 12114 | * | * | * | 286.8 | 286.8 | * | * |

[1]FEET ABOVE CONFLUENCE WITH POCASSET RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

DRY BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| AB | 12767 | * | * | * | 286.8 | 286.8 | * | * |
| AC | 13288 | 16 | 28 | 2.9 | 288.8 | 288.8 | 289.6 | 0.8 |
| AD | 14122 | 10 | 13 | 6.4 | 308.6 | 308.6 | 309.0 | 0.4 |
| AE | 14923 | 46 | 24 | 3.4 | 329.3 | 329.3 | 329.5 | 0.2 |
| AF | 15793 | 68 | 46 | 1.7 | 356.6 | 356.6 | 356.7 | 0.1 |

[1]FEET ABOVE CONFLUENCE WITH POCASSET RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

DRY BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 120 | 22 | 70 | 1.7 | 134.7 | 134.7 | 134.7 | 0.0 |
| B | 275 | 25 | 62 | 1.9 | 134.8 | 134.8 | 134.8 | 0.0 |
| C | 483 | 15 | 19 | 6.4 | 135.3 | 135.3 | 135.3 | 0.0 |
| D | 822 | 10 | 18 | 6.7 | 139.9 | 139.9 | 139.9 | 0.0 |
| E[2] | 1057 | 13 | 31 | 3.9 | 144 | 144 | 144 | 0.0 |
| F[2] | 1198 | 10 | 17 | 6.9 | 144.9 | 144.9 | 144.9 | 0.0 |
| G[2] | 1402 | 11 | 25 | 4.9 | 148.5 | 148.5 | 148.6 | 0.1 |
| H[2] | 1591 | 20 | 56 | 2.1 | 153.8 | 153.8 | 153.8 | 0.0 |
| I[2] | 1872 | 19 | 48 | 2.5 | 157.9 | 157.9 | 157.9 | 0.0 |
| J | 2225 | 29 | 42 | 2.8 | 158.3 | 158.3 | 158.4 | 0.1 |
| K[2] | 2577 | 9 | 17 | 7.3 | 161.3 | 161.3 | 161.3 | 0.0 |
| L[2] | 2740 | 11 | 24 | 5.1 | 163.2 | 163.2 | 163.2 | 0.0 |
| M | 2873 | 9 | 16 | 7.5 | 165.1 | 165.1 | 165.1 | 0.0 |
| N | 3425 | 42 | 27 | 4.5 | 177.7 | 177.7 | 177.7 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH WEST RIVER

[2]FLOODWAY CONTAINED IN UNDERGROUND CHANNEL AND NOT SHOWN ON FIRM

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

EAST BRANCH WEST RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 459 | 304 | 1259 | 0.7 | 54.5 | 54.5 | 55.5 | 1.0 |
| B | 821 | 35 | 280 | 3.2 | 56.4 | 56.4 | 56.8 | 0.4 |
| C | 1129 | 48 | 127 | 4.4 | 57.3 | 57.3 | 57.8 | 0.5 |
| D | 1364 | 46 | 76 | 7.4 | 62.7 | 62.7 | 62.7 | 0.0 |
| E | 1499 | 38 | 95 | 5.9 | 69.2 | 69.2 | 69.2 | 0.0 |
| F | 1683 | 27 | 63 | 8.8 | 87.0 | 87.0 | 87.0 | 0.0 |
| G | 1944 | 49 | 117 | 4.8 | 94.1 | 94.1 | 94.1 | 0.0 |
| H | 2355 | 70 | 92 | 6.1 | 104.4 | 104.4 | 104.4 | 0.0 |
| I | 3054 | 40 | 95 | 5.9 | 117.4 | 117.4 | 117.4 | 0.0 |
| J | 3865 | 37 | 96 | 5.8 | 127.3 | 127.3 | 127.3 | 0.0 |
| K | 4435 | 46 | 102 | 5.5 | 136.0 | 136.0 | 136.4 | 0.4 |
| L | 5155 | 47 | 131 | 4.3 | 142.5 | 142.5 | 142.9 | 0.4 |
| M | 5370 | 26 | 56 | 8.3 | 144.1 | 144.1 | 144.1 | 0.0 |
| N | 5592 | 14 | 70 | 6.6 | 149.0 | 149.0 | 149.0 | 0.0 |
| O | 5850 | 47 | 82 | 5.6 | 152.6 | 152.6 | 152.6 | 0.0 |
| P | 6342 | 26 | 60 | 7.8 | 164.5 | 164.5 | 164.5 | 0.0 |
| Q | 7126 | 32 | 76 | 6.1 | 187.1 | 187.1 | 187.1 | 0.0 |
| R | 7692 | 44 | 84 | 5.5 | 198.2 | 198.2 | 198.2 | 0.0 |
| S | 8395 | 30 | 58 | 8.0 | 224.6 | 224.6 | 224.6 | 0.0 |
| T | 8994 | 30 | 58 | 7.9 | 242.4 | 242.4 | 242.8 | 0.4 |
| U | 9373 | 50 | 108 | 4.3 | 260.3 | 260.3 | 260.4 | 0.1 |
| V | 9620 | 42 | 95 | 4.9 | 263.3 | 263.3 | 263.3 | 0.0 |
| W | 10114 | 44 | 67 | 6.9 | 275.1 | 275.1 | 275.1 | 0.0 |
| X | 10450 | 24 | 92 | 5.0 | 282.2 | 282.2 | 282.3 | 0.1 |
| Y | 10509 | 49 | 118 | 3.9 | 283.9 | 283.9 | 283.9 | 0.0 |
| Z | 10790 | 43 | 117 | 3.9 | 286.9 | 286.9 | 286.9 | 0.0 |
| AA | 11055 | 52 | 98 | 4.7 | 290.7 | 290.7 | 290.7 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH MESHANTICUT BROOK

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

FURNACE HILL BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| AB | 11572 | 37 | 93 | 5.0 | 298.1 | 298.1 | 298.1 | 0.0 |
| AC | 12265 | 37 | 84 | 5.5 | 306.4 | 306.4 | 306.4 | 0.0 |
| AD | 12676 | 48 | 111 | 4.2 | 310.8 | 310.8 | 310.8 | 0.0 |
| AE | 13008 | 38 | 97 | 4.8 | 313.6 | 313.6 | 313.6 | 0.0 |
| AF | 13086 | 87 | 138 | 3.4 | 316.6 | 316.6 | 316.6 | 0.0 |
| AG | 13696 | 73 | 120 | 3.8 | 318.4 | 318.4 | 318.4 | 0.0 |
| AH | 13891 | 278 | 524 | 0.9 | 321.3 | 321.3 | 321.3 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH MESHANTICUT BROOK

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

FURNACE HILL BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 50 | 17 | 42 | 3.9 | 145.9 | 141.8[2] | 142.8 | 1.0 |
| B | 270 | 20 | 25 | 6.4 | 151.5 | 151.5 | 151.5 | 0.0 |
| C | 402 | 75 | 195 | 0.8 | 155.9 | 155.9 | 155.9 | 0.0 |
| D | 530 | 29 | 28 | 5.7 | 157.7 | 157.7 | 157.7 | 0.0 |
| E | 1,000 | 19 | 25 | 6.5 | 170.4 | 170.4 | 170.4 | 0.0 |
| F | 1,690 | 15 | 23 | 7.0 | 188.4 | 188.4 | 188.4 | 0.0 |
| G | 2,670 | 13 | 19 | 6.9 | 222.0 | 222.0 | 222.0 | 0.0 |
| H | 3,700 | 11 | 19 | 6.9 | 246.4 | 246.4 | 246.5 | 0.1 |

[1]FEET ABOVE CONFLUENCE WITH FURNACE HILL BROOK

[2]ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM FURNACE HILL BROOK

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

FURNACE HILL BROOK TRIBUTARY

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 160 | 23 | 110 | 2.7 | 91.8 | 91.8 | 92.8 | 1.0 |
| B | 336 | 27 | 195 | 1.5 | 97.2 | 97.2 | 98.2 | 1.0 |
| C | 755 | 19 | 38 | 8.0 | 102.1 | 102.1 | 102.1 | 0.0 |
| D | 964 | 18 | 56 | 5.3 | 104.2 | 104.2 | 104.2 | 0.0 |
| E | 1282 | 18 | 36 | 8.4 | 107.7 | 107.7 | 107.7 | 0.0 |
| F | 1550 | 26 | 159 | 1.9 | 116.6 | 116.6 | 117.6 | 1.0 |
| G | 1806 | 19 | 38 | 8.0 | 124.8 | 124.8 | 124.8 | 0.0 |
| H | 1998 | 40 | 376 | 0.8 | 136.1 | 136.1 | 136.7 | 0.6 |
| I | 2368 | 49 | 59 | 5.0 | 136.5 | 136.5 | 136.7 | 0.2 |
| J | 2508 | 26 | 192 | 1.6 | 147.7 | 147.7 | 148.5 | 0.8 |
| K | 2852 | 19 | 59 | 5.1 | 147.4 | 147.4 | 148.4 | 1.0 |
| L | 3549 | 53 | 300 | 1.0 | 164.6 | 164.6 | 165.5 | 0.9 |
| M | 3957 | 15 | 71 | 4.2 | 167.2 | 167.2 | 167.9 | 0.7 |
| N | 4490 | 16 | 36 | 8.4 | 173.2 | 173.2 | 173.2 | 0.0 |
| O | 4615 | 53 | 374 | 0.8 | 179.5 | 179.5 | 180.4 | 0.9 |
| P | 4711 | 40 | 323 | 0.9 | 182.6 | 182.6 | 183.2 | 0.6 |
| Q | 5064 | 47 | 260 | 1.2 | 182.6 | 182.6 | 183.3 | 0.7 |

[1]FEET ABOVE CONFLUENCE WITH WEST RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

LINCOLN DOWNS BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| I[2] | 2966 | 85 | 691 | 3.0 | 37.5 | 37.5 | 38.0 | 0.5 |
| J | 3643 | 72 | 555 | 3.8 | 37.7 | 37.7 | 38.7 | 1.0 |
| K | 4040 | 113 | 976 | 2.2 | 40.2 | 40.2 | 41.1 | 0.9 |
| L | 4587 | 115 | 1077 | 2.0 | 40.4 | 40.4 | 41.3 | 0.9 |
| M | 4999 | 200 | 1903 | 1.1 | 40.4 | 40.4 | 41.4 | 1.0 |
| N | 5301 | 333 | 2961 | 0.7 | 40.7 | 40.7 | 41.6 | 0.9 |
| O | 5540 | 159 | 1122 | 1.9 | 40.7 | 40.7 | 41.6 | 0.9 |
| P | 6265 | 266 | 2178 | 1.0 | 40.9 | 40.9 | 41.8 | 0.9 |
| Q | 6560 | 275 | 2119 | 1.0 | 40.9 | 40.9 | 41.9 | 1.0 |
| R | 7269 | 500 | 3415 | 0.4 | 41.0 | 41.0 | 42.0 | 1.0 |
| S | 7749 | 404 | 2453 | 0.6 | 41.0 | 41.0 | 42.0 | 1.0 |
| T | 8093 | 568 | 2137 | 0.7 | 41.1 | 41.1 | 42.0 | 0.9 |
| U | 8331 | 47 | 397 | 3.6 | 43.7 | 43.7 | 44.5 | 0.8 |
| V | 8583 | 207 | 1765 | 0.8 | 46.9 | 46.9 | 47.9 | 1.0 |
| W | 9053 | 78 | 756 | 1.9 | 47.0 | 47.0 | 47.9 | 0.9 |
| X | 9439 | 107 | 908 | 1.6 | 47.0 | 47.0 | 48.0 | 1.0 |
| Y | 9677 | 64 | 636 | 2.2 | 47.8 | 47.8 | 48.7 | 0.9 |
| Z | 9977 | 93 | 877 | 1.6 | 47.9 | 47.9 | 48.9 | 1.0 |
| AA | 10647 | 231 | 1468 | 0.9 | 48.1 | 48.1 | 49.0 | 0.9 |
| AB | 10937 | 60 | 376 | 3.4 | 48.1 | 48.1 | 49.0 | 0.9 |
| AC | 11356 | 125 | 1004 | 1.3 | 50.9 | 50.9 | 51.8 | 0.9 |
| AD | 11964 | 95 | 625 | 2.1 | 51.0 | 51.0 | 51.9 | 0.9 |
| AE | 12248 | 483 | 2647 | 0.5 | 54.5 | 54.5 | 55.5 | 1.0 |
| AF | 13060 | 496 | 2805 | 0.2 | 54.5 | 54.5 | 55.5 | 1.0 |
| AG | 13354 | 115 | 1284 | 0.4 | 54.5 | 54.5 | 55.5 | 1.0 |
| AH | 14712 | 217 | 2444 | 0.2 | 54.6 | 54.6 | 55.5 | 0.9 |
| AI | 15668 | 784 | 9848 | 0.1 | 57.4 | 57.4 | 58.4 | 1.0 |

[1]FEET ABOVE CONFLUENCE WITH PAWTUXET RIVER

[2]CROSS SECTIONS A-H IN FLOODWAY DATA TABLE FOR KENT COUNTY, RHODE ISLAND

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

MESHANTICUT BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| AJ | 16412 | 485 | 5906 | 0.1 | 57.4 | 57.4 | 58.4 | 1.0 |
| AK | 16937 | 481 | 5362 | 0.1 | 57.4 | 57.4 | 58.4 | 1.0 |
| AL | 17305 | 123 | 812 | 0.6 | 57.4 | 57.4 | 58.4 | 1.0 |
| AM | 17409 | 99 | 746 | 0.7 | 57.4 | 57.4 | 58.4 | 1.0 |
| AN | 19017 | * | * | * | 64.1 | 64.1 | * | * |
| AO | 19151 | * | * | * | 69.6 | 69.6 | * | * |
| AP | 19409 | 42 | 337 | 1.6 | 69.6 | 69.6 | 69.6 | 0.0 |
| AQ | 19699 | 48 | 284 | 1.8 | 69.6 | 69.6 | 69.6 | 0.0 |
| AR | 20103 | 22 | 191 | 2.7 | 69.6 | 69.6 | 69.8 | 0.2 |
| AS | 20536 | 275 | 5029 | 0.1 | 82.3 | 82.3 | 82.8 | 0.5 |
| AT | 21181 | 46 | 599 | 0.9 | 82.3 | 82.3 | 82.8 | 0.5 |
| AU | 21778 | 66 | 436 | 1.2 | 82.3 | 82.3 | 82.9 | 0.6 |
| AV | 22218 | 29 | 66 | 7.9 | 87.9 | 87.9 | 87.9 | 0.0 |
| AW | 22513 | 40 | 93 | 5.6 | 94.7 | 94.7 | 95.0 | 0.3 |
| AX | 22749 | 59 | 296 | 1.8 | 100.7 | 100.7 | 101.5 | 0.8 |
| AY | 22813 | 52 | 188 | 2.8 | 100.7 | 100.7 | 101.5 | 0.8 |
| AZ | 23841 | 32 | 106 | 4.9 | 116.2 | 116.2 | 116.4 | 0.2 |
| BA | 24024 | 25 | 76 | 6.8 | 117.6 | 117.6 | 117.8 | 0.2 |
| BB | 24157 | 48 | 400 | 1.3 | 123.2 | 123.2 | 124.2 | 1.0 |

[1]FEET ABOVE CONFLUENCE WITH PAWTUXET RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

MESHANTICUT BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 916 | 94 | 247 | 0.0 | 41.2 | 41.2 | 42.1 | 0.9 |
| B | 1296 | 38 | 64 | 0.0 | 50.2 | 50.2 | 50.2 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH MESHANTICUT BROOK

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

MESHANTICUT BROOK DIVERSION

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 1,200 | 119 | 1,553 | 2.7 | 129.2 | 129.2 | 129.2 | 0.0 |
| B | 2,050 | 101 | 882 | 4.8 | 129.3 | 129.3 | 129.3 | 0.0 |
| C | 2,925 | 78 | 347 | 12.1 | 132.3 | 132.3 | 132.3 | 0.0 |
| D | 3,026 | 100 | 664 | 6.3 | 138.5 | 138.5 | 138.5 | 0.0 |
| E | 3,755 | 78 | 403 | 10.4 | 139.7 | 139.7 | 139.8 | 0.1 |
| F | 4,015 | 133 | 418 | 10.0 | 141.5 | 141.5 | 141.6 | 0.1 |
| G | 4,065 | 113 | 740 | 4.5 | 143.9 | 143.9 | 143.9 | 0.0 |
| H | 4,525 | 152 | 1,482 | 2.1 | 170.0 | 170.0 | 170.0 | 0.0 |
| I | 4,575 | 990 | 17,307 | 0.2 | 170.1 | 170.1 | 170.1 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH BLACKSTONE RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

MILL RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 391 | 63 | 338 | 7.0 | 4.6 | 0.4[2] | 0.4 | 0.0 |
| B | 825 | 46 | 217 | 10.8 | 4.6 | 1.8[2] | 1.8 | 0.0 |
| C | 953 | 45 | 287 | 8.2 | 4.6 | 3.6[2] | 3.6 | 0.0 |
| D | 1309 | 44 | 280 | 8.4 | 5.4 | 5.4 | 5.4 | 0.0 |
| E | 1562 | 44 | 326 | 7.2 | 6.7 | 6.7 | 6.7 | 0.0 |
| F | 1907 | 32 | 279 | 8.4 | 7.6 | 7.6 | 7.6 | 0.0 |
| G | 2099 | 32 | 262 | 9.0 | 8.6 | 8.6 | 8.6 | 0.0 |
| H | 2239 | 32 | 281 | 8.4 | 9.3 | 9.3 | 9.3 | 0.0 |
| I | 2499 | 34 | 280 | 8.4 | 10.4 | 10.4 | 10.4 | 0.0 |
| J | 2769 | 38 | 346 | 6.8 | 12.1 | 12.1 | 12.1 | 0.0 |
| K | 2902 | 45 | 198 | 11.9 | 14.1 | 14.1 | 14.1 | 0.0 |
| L | 2950 | 33 | 253 | 9.3 | 17.2 | 17.2 | 17.7 | 0.5 |
| M | 3109 | 30 | 339 | 6.1 | 18.9 | 18.9 | 19.3 | 0.4 |
| N | 3290 | 24 | 291 | 7.1 | 20.7 | 20.7 | 21.1 | 0.4 |
| O | 3434 | 34 | 371 | 5.6 | 21.8 | 21.8 | 22.2 | 0.4 |
| P | 3818 | 25 | 502 | 6.3 | 24.3 | 24.3 | 24.3 | 0.0 |
| Q | 4032 | 41 | 461 | 4.5 | 25.2 | 25.2 | 25.2 | 0.0 |
| R | 4570 | 58 | 684 | 3.0 | 25.7 | 25.7 | 25.8 | 0.1 |
| S | 5371 | 40 | 402 | 5.2 | 25.9 | 25.9 | 26.1 | 0.2 |
| T | 5638 | 53 | 425 | 4.9 | 26.5 | 26.5 | 26.7 | 0.2 |
| U | 6348 | 53 | 377 | 5.5 | 26.9 | 26.9 | 27.5 | 0.6 |
| V | 9788 | 39 | 327 | 3.6 | 31.5 | 31.5 | 31.9 | 0.4 |
| W | 10279 | 18 | 223 | 5.3 | 31.8 | 31.8 | 32.5 | 0.7 |
| X | 10731 | 47 | 424 | 2.8 | 32.8 | 32.8 | 33.5 | 0.7 |
| Y | 11264 | 54 | 469 | 2.5 | 32.9 | 32.9 | 33.7 | 0.8 |
| Z | 11592 | 33 | 320 | 3.7 | 33.3 | 33.3 | 34.0 | 0.7 |
| AA | 11957 | 26 | 259 | 4.6 | 33.4 | 33.4 | 34.1 | 0.7 |

[1]FEET ABOVE CONFLUENCE WITH WOONASQUATUCKET RIVER
[2]ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM PROVIDENCE RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

MOSHASSUCK RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| AB | 12368 | 51 | 304 | 3.9 | 33.7 | 33.7 | 34.6 | 0.9 |
| AC | 12587 | 24 | 194 | 6.1 | 33.8 | 33.8 | 34.6 | 0.8 |
| AD | 12802 | 40 | 291 | 4.1 | 34.6 | 34.6 | 35.3 | 0.7 |
| AE | 13129 | 40 | 298 | 4.0 | 34.8 | 34.8 | 35.5 | 0.7 |
| AF | 13575 | 74 | 521 | 2.3 | 35.4 | 35.4 | 36.0 | 0.6 |
| AG | 14117 | 67 | 441 | 2.7 | 35.6 | 35.6 | 36.2 | 0.6 |
| AH | 14796 | 33 | 230 | 5.1 | 35.8 | 35.8 | 36.4 | 0.6 |
| AI | 15517 | 108 | 638 | 1.9 | 39.2 | 39.2 | 39.3 | 0.1 |
| AJ | 15971 | 169 | 939 | 1.1 | 39.3 | 39.3 | 39.4 | 0.1 |
| AK | 16348 | 162 | 1136 | 0.9 | 39.3 | 39.3 | 39.5 | 0.2 |
| AL | 16875 | 133 | 723 | 1.4 | 39.3 | 39.3 | 39.5 | 0.2 |
| AM | 17158 | 199 | 913 | 1.1 | 39.4 | 39.4 | 39.6 | 0.2 |
| AN | 17501 | 59 | 263 | 3.8 | 39.4 | 39.4 | 39.5 | 0.1 |
| AO | 17610 | 54 | 390 | 2.6 | 40.8 | 40.8 | 41.4 | 0.6 |
| AP | 17905 | 88 | 544 | 1.8 | 40.9 | 40.9 | 41.5 | 0.6 |
| AQ | 18371 | 72 | 467 | 2.1 | 42.1 | 42.1 | 43.0 | 0.9 |
| AR | 18662 | 47 | 506 | 2.0 | 44.0 | 44.0 | 44.5 | 0.5 |
| AS | 18795 | 61 | 561 | 1.5 | 44.0 | 44.0 | 45.0 | 1.0 |
| AT | 19178 | 40 | 392 | 2.1 | 44.1 | 44.1 | 45.0 | 0.9 |
| AU | 19640 | 213 | 2093 | 0.4 | 44.2 | 44.2 | 45.1 | 0.9 |
| AV | 20146 | 347 | 2373 | 0.4 | 44.2 | 44.2 | 45.1 | 0.9 |
| AW | 21062 | 113 | 337 | 2.5 | 44.3 | 44.3 | 45.2 | 0.9 |
| AX | 21175 | 65 | 365 | 2.3 | 46.5 | 46.5 | 47.2 | 0.7 |
| AY | 21505 | 41 | 194 | 4.3 | 47.0 | 47.0 | 47.6 | 0.6 |
| AZ | 21801 | 39 | 203 | 4.1 | 47.6 | 47.6 | 48.0 | 0.4 |
| BA | 21876 | 33 | 200 | 4.2 | 47.8 | 47.8 | 48.1 | 0.3 |
| BB | 22483 | 38 | 192 | 4.4 | 48.8 | 48.8 | 49.0 | 0.2 |

[1]FEET ABOVE CONFLUENCE WITH WOONASQUATUCKET RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

MOSHASSUCK RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| BC | 22847 | 54 | 202 | 4.2 | 49.5 | 49.5 | 49.6 | 0.1 |
| BD | 23497 | 44 | 245 | 3.4 | 50.6 | 50.6 | 50.7 | 0.1 |
| BE | 24272 | 101 | 482 | 1.7 | 51.0 | 51.0 | 51.4 | 0.4 |
| BF | 25121 | 35 | 217 | 3.5 | 51.5 | 51.5 | 51.9 | 0.4 |
| BG | 25296 | 44 | 295 | 2.6 | 52.6 | 52.6 | 53.4 | 0.8 |
| BH | 25740 | 47 | 335 | 2.3 | 52.8 | 52.8 | 53.5 | 0.7 |
| BI | 26281 | 66 | 383 | 2.0 | 53.0 | 53.0 | 53.7 | 0.7 |
| BJ | 26450 | 30 | 270 | 2.8 | 53.6 | 53.6 | 54.2 | 0.6 |
| BK | 27114 | 28 | 206 | 3.7 | 53.9 | 53.9 | 54.5 | 0.6 |
| BL | 27547 | 39 | 203 | 3.7 | 54.2 | 54.2 | 54.9 | 0.7 |
| BM | 27898 | 251 | 1910 | 0.4 | 61.9 | 61.9 | 61.9 | 0.0 |
| BN | 28114 | 304 | 1965 | 0.4 | 62.0 | 62.0 | 62.0 | 0.0 |
| BO | 28564 | * | * | * | 62.0 | 62.0 | * | * |
| BP | 29156 | * | * | * | 62.0 | 62.0 | * | * |
| BQ | 29751 | * | * | * | 62.1 | 62.1 | * | * |
| BR | 29867 | 64 | 304 | 2.5 | 64.2 | 64.2 | 64.2 | 0.0 |
| BS | 30013 | 176 | 973 | 0.8 | 64.3 | 64.3 | 64.3 | 0.0 |
| BT | 30142 | 379 | 4461 | 0.2 | 75.9 | 75.9 | 75.9 | 0.0 |
| BU | 30973 | * | * | * | 75.9 | 75.9 | * | * |
| BV | 31974 | * | * | * | 75.9 | 75.9 | * | * |
| BW | 32540 | * | * | * | 75.9 | 75.9 | * | * |
| BX | 33189 | * | * | * | 75.9 | 75.9 | * | * |
| BY | 33535 | * | * | * | 75.9 | 75.9 | * | * |
| BZ | 33680 | * | * | * | 76.1 | 76.1 | * | * |
| CA | 34375 | 202 | 321 | 1.4 | 76.2 | 76.2 | 76.2 | 0.0 |
| CB | 35038 | 17 | 58 | 7.6 | 79.4 | 79.4 | 79.7 | 0.3 |
| CC | 35137 | 64 | 231 | 1.9 | 81.4 | 81.4 | 81.4 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH WOONASQUATUCKET RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

MOSHASSUCK RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| CD | 35269 | 75 | 231 | 1.9 | 87.7 | 87.7 | 87.8 | 0.1 |
| CE | 35567 | 101 | 305 | 1.4 | 87.9 | 87.9 | 88.0 | 0.1 |
| CF | 35778 | 72 | 278 | 1.6 | 89.7 | 89.7 | 89.7 | 0.0 |
| CG | 35958 | 111 | 254 | 1.7 | 97.6 | 97.6 | 97.6 | 0.0 |
| CH | 36233 | 60 | 138 | 3.2 | 98.1 | 98.1 | 98.2 | 0.1 |
| CI | 36856 | 40 | 97 | 4.6 | 99.4 | 99.4 | 100.1 | 0.7 |
| CJ | 36968 | 61 | 380 | 1.2 | 104.8 | 104.8 | 104.9 | 0.1 |
| CK | 37372 | 147 | 372 | 1.2 | 104.8 | 104.8 | 105.0 | 0.2 |
| CL | 37440 | 179 | 763 | 0.6 | 107.1 | 107.1 | 107.1 | 0.0 |
| CM | 37587 | 67 | 249 | 1.8 | 107.1 | 107.1 | 107.1 | 0.0 |
| CN | 37830 | 54 | 209 | 2.1 | 107.9 | 107.9 | 107.9 | 0.0 |
| CO | 37971 | 194 | 717 | 0.6 | 113.2 | 113.2 | 113.2 | 0.0 |
| CP | 38568 | 116 | 287 | 1.5 | 113.2 | 113.2 | 113.2 | 0.0 |
| CQ | 39050 | 68 | 119 | 3.7 | 113.5 | 113.5 | 113.6 | 0.1 |
| CR | 39542 | 50 | 122 | 3.6 | 114.6 | 114.6 | 114.8 | 0.2 |
| CS | 39921 | 54 | 105 | 4.2 | 115.2 | 115.2 | 115.6 | 0.4 |
| CT | 40119 | 27 | 68 | 6.5 | 116.2 | 116.2 | 116.2 | 0.0 |
| CU | 40878 | 65 | 170 | 2.6 | 117.1 | 117.1 | 118.1 | 1.0 |
| CV | 41314 | 23 | 60 | 7.3 | 119.4 | 119.4 | 119.7 | 0.3 |
| CW | 41906 | 47 | 65 | 6.8 | 126.1 | 126.1 | 126.1 | 0.0 |
| CX | 42100 | 34 | 75 | 5.9 | 127.7 | 127.7 | 127.9 | 0.2 |
| CY | 42236 | 34 | 73 | 6.1 | 128.3 | 128.3 | 128.6 | 0.3 |
| CZ | 42461 | 34 | 108 | 3.0 | 129.0 | 129.0 | 129.4 | 0.4 |
| DA | 42791 | 47 | 106 | 3.0 | 129.2 | 129.2 | 129.9 | 0.7 |
| DB | 43064 | 237 | 1237 | 0.3 | 139.5 | 139.5 | 139.5 | 0.0 |
| DC | 43598 | 263 | 1033 | 0.3 | 139.5 | 139.5 | 139.5 | 0.0 |
| DD | 43855 | 47 | 152 | 2.1 | 139.5 | 139.5 | 139.5 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH WOONASQUATUCKET RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

MOSHASSUCK RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| DE | 44387 | 29 | 45 | 7.1 | 141.4 | 141.4 | 141.4 | 0.0 |
| DF | 44703 | 34 | 68 | 4.7 | 144.0 | 144.0 | 144.2 | 0.2 |
| DG | 45111 | 77 | 359 | 0.9 | 148.7 | 148.7 | 148.7 | 0.0 |
| DH | 45191 | 112 | 483 | 0.7 | 148.7 | 148.7 | 148.7 | 0.0 |
| DI | 45399 | 17 | 114 | 2.8 | 155.7 | 155.7 | 156.2 | 0.5 |
| DJ | 46111 | 23 | 49 | 6.6 | 159.1 | 159.1 | 159.7 | 0.6 |
| DK | 46436 | 34 | 94 | 3.4 | 161.1 | 161.1 | 161.8 | 0.7 |
| DL | 46702 | 17 | 43 | 7.5 | 162.6 | 162.6 | 163.0 | 0.4 |
| DM | 47084 | 25 | 43 | 7.4 | 166.6 | 166.6 | 166.6 | 0.0 |
| DN | 47161 | 47 | 196 | 0.7 | 170.5 | 170.5 | 170.7 | 0.2 |
| DO | 47607 | 43 | 213 | 0.6 | 170.5 | 170.5 | 170.7 | 0.2 |
| DP | 48125 | 174 | 548 | 0.2 | 170.5 | 170.5 | 170.9 | 0.4 |
| DQ | 49148 | 32 | 60 | 2.2 | 171.4 | 171.4 | 171.5 | 0.1 |
| DR | 50160 | 81 | 381 | 0.2 | 177.9 | 177.9 | 177.9 | 0.0 |
| DS | 50824 | 135 | 463 | 0.2 | 177.9 | 177.9 | 177.9 | 0.0 |
| DT | 51270 | 34 | 19 | 4.2 | 178.8 | 178.8 | 178.8 | 0.0 |
| DU | 51712 | 155 | 735 | 0.1 | 183.9 | 183.9 | 184.7 | 0.8 |
| DV | 51842 | 12 | 37 | 2.2 | 183.9 | 183.9 | 184.7 | 0.8 |
| DW | 52065 | 22 | 17 | 4.6 | 192.4 | 192.4 | 192.4 | 0.0 |
| DX | 52754 | 18 | 15 | 5.3 | 203.1 | 203.1 | 203.1 | 0.0 |
| DY | 53145 | 22 | 19 | 4.3 | 208.4 | 208.4 | 208.5 | 0.1 |

[1]FEET ABOVE CONFLUENCE WITH WOONASQUATUCKET RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

MOSHASSUCK RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| X[2] | 14770 | 164 | 1770 | 2.3 | 145.3 | 145.3 | 145.6 | 0.3 |
| Y | 15040 | 164 | 1781 | 2.3 | 145.3 | 145.3 | 145.7 | 0.4 |
| Z | 16360 | 194 | 916 | 4.5 | 147.7 | 147.7 | 147.9 | 0.2 |
| AA | 17045 | 95 | 554 | 7.4 | 150.6 | 150.6 | 150.6 | 0.0 |
| AB | 17190 | 154 | 850 | 4.8 | 152.8 | 152.8 | 152.8 | 0.0 |
| AC | 17950 | 116 | 502 | 8.2 | 155.8 | 155.8 | 155.8 | 0.0 |
| AD | 18605 | 116 | 713 | 5.7 | 159.5 | 159.5 | 159.6 | 0.1 |
| AE | 18780 | 93 | 457 | 9.0 | 160.0 | 160.0 | 160.1 | 0.1 |
| AF | 19267 | 104 | 463 | 8.8 | 162.6 | 162.6 | 162.6 | 0.0 |
| AG | 19573 | 111 | 611 | 6.7 | 166.0 | 166.0 | 166.0 | 0.0 |
| AH | 20700 | 87 | 513 | 8.0 | 172.6 | 172.6 | 172.7 | 0.1 |
| AI | 22150 | 95 | 557 | 7.3 | 182.2 | 182.2 | 182.5 | 0.3 |
| AJ | 23580 | 60 | 507 | 8.1 | 189.5 | 189.5 | 190.0 | 0.5 |
| AK | 23860 | 98 | 793 | 5.2 | 191.3 | 191.3 | 191.9 | 0.6 |
| AL | 24120 | 167 | 1274 | 3.2 | 192.1 | 192.1 | 192.6 | 0.5 |
| AM | 24350 | 389 | 3473 | 1.2 | 201.2 | 201.2 | 201.2 | 0.0 |
| AN | 28310 | 176 | 1294 | 3.2 | 201.6 | 201.6 | 201.6 | 0.0 |
| AO | 29620 | 546 | 3191 | 1.3 | 202.0 | 202.0 | 202.2 | 0.2 |
| AP | 31020 | 356 | 1725 | 2.4 | 202.5 | 202.5 | 202.8 | 0.3 |
| AQ | 32270 | 191 | 1158 | 3.5 | 203.5 | 203.5 | 204.4 | 0.9 |
| AR | 33790 | 314 | 2099 | 2.0 | 204.4 | 204.4 | 205.4 | 1.0 |
| AS | 35120 | 237 | 1881 | 2.2 | 204.9 | 204.9 | 205.9 | 1.0 |

[1]FEET ABOVE CONFLUENCE WITH PAWTUXET RIVER
[2]CROSS SECTIONS A-W IN FLOODWAY DATA TABLE FOR KENT COUNTY, RHODE ISLAND

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

NORTH BRANCH PAWTUXET RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 1,090 | 40 | 171 | 1.15 | 366.1 | 366.1 | 366.6 | 0.5 |
| B | 1,260 | 91 | 451 | 0.44 | 366.5 | 366.5 | 367.5 | 1.0 |
| C | 2,610 | 32 | 42 | 4.69 | 388.5 | 388.5 | 389.0 | 0.5 |
| D | 2,710 | 59 | 50 | 3.91 | 401.9 | 401.9 | 402.4 | 0.5 |
| E | 3,300 | 26 | 53 | 3.67 | 405.7 | 405.7 | 406.2 | 0.5 |
| F | 3,560 | 58 | 180 | 1.08 | 407.4 | 407.4 | 407.9 | 0.5 |
| G | 3,700 | 45 | 57 | 3.38 | 413.8 | 413.8 | 414.3 | 0.5 |
| H | 3,800 | 38 | 72 | 2.66 | 414.4 | 414.4 | 414.9 | 0.5 |
| I | 3,895 | 56 | 186 | 1.03 | 416.1 | 416.1 | 416.6 | 0.5 |

[1]FEET ABOVE MOUTH

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

PASCOAG RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 6 | 330 | 1874 | 5.3 | 12.0 | 5.2[2] | 6.2 | 1.0 |
| B | 207 | 152 | 769 | 12.8 | 12.0 | 6.1[2] | 6.1 | 0.0 |
| C | 560 | 153 | 1737 | 5.7 | 12.0 | 11.5[2] | 11.5 | 0.0 |
| D | 1125 | 334 | 2340 | 4.2 | 12.4 | 12.4 | 12.4 | 0.0 |
| E | 1753 | 280 | 2189 | 4.5 | 13.0 | 13.0 | 13.0 | 0.0 |
| F | 2521 | 1529 | 5902 | 1.7 | 14.0 | 14.0 | 14.0 | 0.0 |
| G | 3296 | 1608 | 10309 | 1.0 | 14.2 | 14.2 | 14.3 | 0.1 |
| H | 3994 | 1703 | 11502 | 0.9 | 14.3 | 14.3 | 14.4 | 0.1 |
| I | 5187 | 1699 | 11270 | 0.9 | 14.4 | 14.4 | 14.5 | 0.1 |
| J | 5914 | 907 | 3549 | 2.8 | 14.3 | 14.3 | 14.5 | 0.2 |
| K | 6204 | 155 | 1476 | 6.7 | 14.6 | 14.6 | 15.2 | 0.6 |
| L | 6691 | 319 | 2006 | 4.9 | 15.6 | 15.6 | 15.9 | 0.3 |
| M | 7343 | 233 | 2481 | 4.0 | 16.1 | 16.1 | 16.7 | 0.6 |
| N | 7575 | 402 | 2673 | 3.7 | 16.3 | 16.3 | 16.9 | 0.6 |
| O | 8088 | 354 | 3287 | 3.0 | 16.9 | 16.9 | 17.5 | 0.6 |
| P | 9545 | 838 | 6892 | 1.4 | 17.7 | 17.7 | 18.4 | 0.7 |
| Q | 12185 | 1541 | 9965 | 1.0 | 18.2 | 18.2 | 19.1 | 0.9 |
| R | 12737 | 1563 | 10305 | 1.0 | 18.3 | 18.3 | 19.1 | 0.8 |
| S | 13378 | 1305 | 8929 | 1.1 | 18.4 | 18.4 | 19.2 | 0.8 |
| T | 14345 | 585 | 3358 | 2.9 | 18.6 | 18.6 | 19.4 | 0.8 |
| U | 14809 | 391 | 3083 | 3.2 | 19.8 | 19.8 | 20.6 | 0.8 |
| V | 15827 | 479 | 4841 | 2.0 | 20.3 | 20.3 | 21.1 | 0.8 |
| W | 16149 | 294 | 3898 | 2.5 | 21.1 | 21.1 | 21.8 | 0.7 |
| X | 16858 | 311 | 2792 | 3.5 | 21.1 | 21.1 | 21.9 | 0.8 |
| Y | 17118 | 792 | 7943 | 1.2 | 21.8 | 21.8 | 22.5 | 0.7 |
| Z | 19070 | 1267 | 14131 | 0.7 | 22.0 | 22.0 | 22.7 | 0.7 |
| AA | 23622 | 213 | 2054 | 4.3 | 22.4 | 22.4 | 23.1 | 0.7 |

[1]FEET ABOVE CONFLUENCE WITH PROVIDENCE RIVER
[2]ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM PROVIDENCE RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

PAWTUXET RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| AB | 25331 | 578 | 4356 | 2.0 | 23.6 | 23.6 | 24.3 | 0.7 |
| AC | 25589 | 239 | 2278 | 3.9 | 23.6 | 23.6 | 24.2 | 0.6 |
| AD | 25857 | 129 | 1400 | 6.3 | 23.7 | 23.7 | 24.6 | 0.9 |
| AE | 26121 | 158 | 1723 | 5.1 | 24.5 | 24.5 | 25.4 | 0.9 |
| AF | 27729 | 300 | 3321 | 2.7 | 25.6 | 25.6 | 26.4 | 0.8 |
| AG | 28839 | 176 | 2078 | 4.3 | 25.9 | 25.9 | 26.7 | 0.8 |
| AH | 29329 | 350 | 3467 | 2.5 | 26.2 | 26.2 | 27.1 | 0.9 |
| AI | 30501 | 742 | 7005 | 1.3 | 26.5 | 26.5 | 27.4 | 0.9 |
| AJ | 31385 | 733 | 6585 | 1.3 | 26.7 | 26.7 | 27.6 | 0.9 |
| AK | 32037 | 487 | 4710 | 1.9 | 26.7 | 26.7 | 27.6 | 0.9 |

[1]FEET ABOVE CONFLUENCE WITH PROVIDENCE RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

PAWTUXET RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 1,231 | 34 | 138 | 11.6 | 135.4 | 135.4 | 135.4 | 0.0 |
| B | 2,280 | 61 | 416 | 3.8 | 153.8 | 153.8 | 153.8 | 0.0 |
| C | 3,455 | 21 | 118 | 13.5 | 168.5 | 168.5 | 169.3 | 0.8 |
| D | 3,845 | 31 | 134 | 11.9 | 175.1 | 175.1 | 175.1 | 0.0 |
| E | 4,114 | 75 | 562 | 2.8 | 181.4 | 181.4 | 181.4 | 0.0 |
| F | 5,405 | 80 | 415 | 3.9 | 181.8 | 181.8 | 182.0 | 0.2 |
| G | 5,850 | 57 | 267 | 6.0 | 185.5 | 185.5 | 185.5 | 0.0 |
| H | 6,680 | 38 | 427 | 3.7 | 186.7 | 186.7 | 186.9 | 0.2 |

[1]FEET ABOVE CONFLUENCE WITH BLACKSTONE RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

PETERS RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 79 | 324 | 1156 | 1.3 | 22.2 | 13.7[2] | 14.7 | 1.0 |
| B | 780 | 35 | 276 | 5.5 | 22.2 | 17.4[2] | 18.1 | 0.7 |
| C | 970 | 34 | 289 | 5.3 | 22.2 | 18.3[2] | 19.0 | 0.7 |
| D | 1209 | 48 | 486 | 3.2 | 22.2 | 20.8[2] | 21.7 | 0.9 |
| E | 1454 | 57 | 478 | 3.2 | 22.2 | 21.2[2] | 22.1 | 0.9 |
| F | 1729 | 95 | 889 | 1.7 | 23.1 | 23.1 | 24.1 | 1.0 |
| G | 2128 | 115 | 1080 | 1.4 | 23.2 | 23.2 | 24.2 | 1.0 |
| H | 3109 | 186 | 1554 | 1.0 | 23.3 | 23.3 | 24.3 | 1.0 |
| I | 3850 | 285 | 2290 | 0.7 | 23.4 | 23.4 | 24.3 | 0.9 |
| J | 4478 | 272 | 1479 | 1.0 | 23.4 | 23.4 | 24.4 | 1.0 |
| K | 5103 | 214 | 1297 | 1.2 | 23.6 | 23.6 | 24.5 | 0.9 |
| L | 5681 | 287 | 1562 | 1.0 | 23.6 | 23.6 | 24.6 | 1.0 |
| M | 6469 | 197 | 963 | 1.6 | 24.0 | 24.0 | 25.0 | 1.0 |
| N | 7028 | 159 | 553 | 2.8 | 24.5 | 24.5 | 25.5 | 1.0 |
| O | 7507 | 41 | 268 | 5.7 | 26.3 | 26.3 | 26.9 | 0.6 |
| P | 7679 | 55 | 294 | 5.2 | 27.9 | 27.9 | 28.5 | 0.6 |
| Q | 8006 | 36 | 275 | 5.6 | 29.1 | 29.1 | 29.3 | 0.2 |
| R | 8489 | 145 | 495 | 3.1 | 29.7 | 29.7 | 30.2 | 0.5 |
| S | 9066 | 83 | 587 | 2.6 | 31.0 | 31.0 | 32.0 | 1.0 |
| T | 9724 | 346 | 2026 | 0.8 | 31.3 | 31.3 | 32.3 | 1.0 |
| U | 10501 | 390 | 1833 | 0.8 | 31.4 | 31.4 | 32.4 | 1.0 |
| V | 10970 | 191 | 707 | 2.2 | 31.5 | 31.5 | 32.5 | 1.0 |
| W | 11514 | 396 | 1370 | 1.1 | 32.0 | 32.0 | 32.9 | 0.9 |
| X | 12078 | 195 | 566 | 2.7 | 33.3 | 33.3 | 33.9 | 0.6 |
| Y | 12774 | 210 | 690 | 2.2 | 35.6 | 35.6 | 36.6 | 1.0 |
| Z | 13113 | 159 | 672 | 2.3 | 36.5 | 36.5 | 37.4 | 0.9 |
| AA | 13514 | 43 | 146 | 10.5 | 38.4 | 38.4 | 38.4 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH PAWTUXET RIVER
[2]ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM PAWTUXET RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

POCASSET RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| AB | 13708 | 55 | 247 | 6.2 | 41.5 | 41.5 | 41.5 | 0.0 |
| AC | 13890 | 32 | 202 | 7.6 | 42.0 | 42.0 | 42.0 | 0.0 |
| AD | 14124 | 91 | 527 | 2.9 | 43.6 | 43.6 | 43.7 | 0.1 |
| AE | 14318 | 83 | 423 | 3.6 | 43.7 | 43.7 | 43.7 | 0.0 |
| AF | 14509 | 80 | 552 | 2.8 | 46.2 | 46.2 | 46.4 | 0.2 |
| AG | 15325 | 105 | 656 | 2.3 | 46.3 | 46.3 | 47.3 | 1.0 |
| AH | 15895 | 41 | 224 | 6.8 | 49.0 | 49.0 | 49.1 | 0.1 |
| AI | 16135 | 33 | 234 | 6.5 | 50.6 | 50.6 | 50.9 | 0.3 |
| AJ | 16641 | 78 | 499 | 3.1 | 52.6 | 52.6 | 53.1 | 0.5 |
| AK | 16783 | 28 | 260 | 5.9 | 53.2 | 53.2 | 53.9 | 0.7 |
| AL | 17220 | 29 | 215 | 7.1 | 54.1 | 54.1 | 55.1 | 1.0 |
| AM | 17589 | * | * | * | 68.0 | 68.0 | * | * |
| AN | 18328 | * | * | * | 68.0 | 68.0 | * | * |
| AO | 19159 | * | * | * | 68.0 | 68.0 | * | * |
| AP | 19997 | 149 | 582 | 2.2 | 68.2 | 68.2 | 68.2 | 0.0 |
| AQ | 20657 | 104 | 516 | 2.5 | 68.5 | 68.5 | 68.5 | 0.0 |
| AR | 21197 | 63 | 345 | 3.7 | 68.6 | 68.6 | 68.7 | 0.1 |
| AS | 21338 | 90 | 555 | 2.3 | 70.3 | 70.3 | 70.4 | 0.1 |
| AT | 21839 | 123 | 800 | 1.6 | 70.6 | 70.6 | 70.7 | 0.1 |
| AU | 22350 | 81 | 555 | 2.3 | 70.7 | 70.7 | 71.1 | 0.4 |
| AV | 22822 | 205 | 1327 | 1.0 | 70.8 | 70.8 | 71.3 | 0.5 |
| AW | 23546 | 289 | 1701 | 0.8 | 70.8 | 70.8 | 71.4 | 0.6 |
| AX | 24083 | 289 | 1239 | 1.0 | 70.9 | 70.9 | 71.4 | 0.5 |
| AY | 24524 | 159 | 857 | 1.5 | 70.9 | 70.9 | 71.5 | 0.6 |
| AZ | 25034 | 86 | 468 | 2.7 | 71.1 | 71.1 | 71.6 | 0.5 |
| BA | 26167 | 208 | 1316 | 0.7 | 71.3 | 71.3 | 72.1 | 0.8 |
| BB | 26897 | 84 | 439 | 2.1 | 72.0 | 72.0 | 72.8 | 0.8 |

[1]FEET ABOVE CONFLUENCE WITH PAWTUXET RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

POCASSET RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| BC | 27595 | 176 | 1056 | 0.9 | 73.0 | 73.0 | 73.9 | 0.9 |
| BD | 28463 | 31 | 238 | 5.3 | 74.6 | 74.6 | 75.5 | 0.9 |
| BE | 29640 | 113 | 490 | 2.6 | 76.5 | 76.5 | 77.5 | 1.0 |
| BF | 29821 | 39 | 242 | 5.2 | 79.5 | 79.5 | 79.6 | 0.1 |
| BG | 30225 | 119 | 584 | 2.1 | 80.1 | 80.1 | 80.5 | 0.4 |
| BH | 30945 | 246 | 1485 | 0.8 | 80.4 | 80.4 | 80.9 | 0.5 |
| BI | 31941 | 126 | 701 | 1.8 | 80.6 | 80.6 | 81.1 | 0.5 |
| BJ | 32559 | 231 | 1376 | 0.9 | 81.3 | 81.3 | 81.9 | 0.6 |
| BK | 33346 | 101 | 336 | 3.7 | 81.5 | 81.5 | 82.2 | 0.7 |
| BL | 33480 | 114 | 535 | 2.3 | 86.8 | 86.8 | 86.9 | 0.1 |
| BM | 34018 | 41 | 125 | 10.0 | 88.5 | 88.5 | 88.5 | 0.0 |
| BN | 34367 | 37 | 158 | 7.9 | 92.3 | 92.3 | 92.3 | 0.0 |
| BO | 34654 | 27 | 173 | 7.2 | 95.0 | 95.0 | 95.0 | 0.0 |
| BP | 34813 | 167 | 1366 | 0.9 | 99.4 | 99.4 | 99.4 | 0.0 |
| BQ | 35071 | 166 | 1398 | 0.9 | 99.5 | 99.5 | 99.5 | 0.0 |
| BR | 36164 | 186 | 985 | 1.3 | 99.6 | 99.6 | 99.7 | 0.1 |
| BS | 36699 | 191 | 1171 | 0.5 | 99.7 | 99.7 | 99.9 | 0.2 |
| BT | 37591 | 98 | 337 | 1.8 | 99.7 | 99.7 | 99.9 | 0.2 |
| BU | 38352 | 145 | 266 | 2.3 | 102.1 | 102.1 | 102.2 | 0.1 |
| BV | 38883 | * | * | * | 104.5 | 104.5 | * | * |
| BW | 39191 | * | * | * | 104.5 | 104.5 | * | * |
| BX | 39821 | 41 | 143 | 4.3 | 107.3 | 107.3 | 107.5 | 0.2 |
| BY | 39948 | 81 | 389 | 1.6 | 109.6 | 109.6 | 109.6 | 0.0 |
| BZ | 40641 | 40 | 98 | 6.4 | 112.1 | 112.1 | 112.4 | 0.3 |
| CA | 41005 | 152 | 377 | 1.6 | 113.2 | 113.2 | 113.8 | 0.6 |
| CB | 41405 | 101 | 319 | 1.7 | 114.2 | 114.2 | 115.1 | 0.9 |
| CC | 42102 | 132 | 550 | 1.0 | 120.9 | 120.9 | 120.9 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH PAWTUXET RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

POCASSET RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| CD | 42823 | 21 | 100 | 5.3 | 122.5 | 122.5 | 122.6 | 0.1 |
| CE | 43171 | 38 | 127 | 4.2 | 125.4 | 125.4 | 126.2 | 0.8 |
| CF | 43922 | 63 | 199 | 2.7 | 133.4 | 133.4 | 133.4 | 0.0 |
| CG | 44752 | 325 | 805 | 0.7 | 135.5 | 135.5 | 136.5 | 1.0 |
| CH | 45847 | 152 | 258 | 2.1 | 137.2 | 137.2 | 137.6 | 0.4 |
| CI | 46437 | 65 | 189 | 2.8 | 138.3 | 138.3 | 139.2 | 0.9 |
| CJ | 47059 | * | * | * | 142.9 | 142.9 | * | * |
| CK | 47312 | * | * | * | 151.4 | 151.4 | * | * |
| CL | 47629 | * | * | * | 151.4 | 151.4 | * | * |
| CM | 47923 | 171 | 239 | 1.8 | 151.2 | 151.2 | 151.4 | 0.2 |
| CN | 48284 | 244 | 1273 | 0.3 | 156.0 | 156.0 | 156.9 | 0.9 |
| CO | 48844 | 62 | 338 | 1.2 | 156.0 | 156.0 | 157.0 | 1.0 |
| CP | 49315 | 100 | 270 | 1.6 | 159.6 | 159.6 | 160.6 | 1.0 |
| CQ | 50030 | 52 | 165 | 2.5 | 164.3 | 164.3 | 165.0 | 0.7 |
| CR | 50521 | 40 | 180 | 2.3 | 165.2 | 165.2 | 166.1 | 0.9 |
| CS | 51307 | 67 | 365 | 0.9 | 173.4 | 173.4 | 173.6 | 0.2 |
| CT | 51521 | 18 | 39 | 8.3 | 194.1 | 194.1 | 194.1 | 0.0 |
| CU[2] | 52438 | 50 | 525 | 0.9 | 230.1 | 230.1 | 230.1 | 0.0 |
| CV[3] | 53098 | 200 | 1279 | 0.4 | 230.1 | 230.1 | 230.1 | 0.0 |
| CW[4] | 54415 | 123 | 1126 | 0.4 | 253.4 | 253.4 | 253.4 | 0.0 |
| CX[5] | 54982 | 100 | 914 | 0.4 | 253.4 | 253.4 | 253.4 | 0.0 |
| CY[6] | 56081 | 200 | 417 | 1.2 | 253.4 | 253.4 | 253.5 | 0.1 |

[1]FEET ABOVE CONFLUENCE WITH PAWTUXET RIVER
[2]CROSS SECTION CORRESPONDS TO BW (STATION 48157) IN SUPERSEDED FLOODWAY DATA TABLE
[3]CROSS SECTION CORRESPONDS TO BX (STATION 48837) IN SUPERSEDED FLOODWAY DATA TABLE
*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS
[4]CROSS SECTION CORRESPONDS TO BY (STATION 50037) IN SUPERSEDED FLOODWAY DATA TABLE
[5]CROSS SECTION CORRESPONDS TO BZ (STATION 50602) IN SUPERSEDED FLOODWAY DATA TABLE
[6]CROSS SECTION CORRESPONDS TO CA (STATION 51762) IN SUPERSEDED FLOODWAY DATA TABLE

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

POCASSET RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 1013 | * | * | * | 71.3 | 71.3 | * | * |
| B | 2035 | 48 | 308 | 1.0 | 71.3 | 71.3 | 72.1 | 0.8 |
| C | 2503 | 34 | 265 | 1.2 | 74.0 | 74.0 | 74.8 | 0.8 |
| D | 3362 | 156 | 1122 | 0.3 | 74.0 | 74.0 | 74.9 | 0.9 |
| E | 3758 | * | * | * | 74.0 | 74.0 | * | * |
| F | 4426 | * | * | * | 74.0 | 74.0 | * | * |
| G | 5157 | 36 | 139 | 2.2 | 73.9 | 73.9 | 74.9 | 1.0 |
| H | 5900 | 161 | 929 | 0.3 | 74.6 | 74.6 | 75.5 | 0.9 |

[1]FEET ABOVE CONFLUENCE WITH POCASSET RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

POCASSET RIVER DIVERSION

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 2,750 | 185/165[2] | 741 | 0.7 | 9.2 | 6.1[3] | 6.3 | 0.2 |
| B | 3,575 | 200/160[2] | 953 | 0.5 | 9.2 | 7.0[3] | 7.2 | 0.2 |
| C | 6,570 | 200/140[2] | 609 | 0.8 | 9.2 | 7.4[3] | 8.0 | 0.6 |
| D | 9,570 | 200/120[2] | 370 | 1.2 | 9.4 | 9.4 | 10.1 | 0.7 |
| E | 10,550 | 63/33[2] | 175 | 2.1 | 10.8 | 10.8 | 11.2 | 0.4 |
| F | 10,870 | 71/35[2] | 193 | 1.9 | 11.9 | 11.9 | 12.3 | 0.4 |
| G | 11,825 | 60/30[2] | 152 | 2.5 | 13.1 | 13.1 | 13.4 | 0.3 |

[1]FEET ABOVE MOBILE COMPANY DAM

[2]WIDTH/WIDTH WITHIN COUNTY BOUNDARY

[3]ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM BARRINGTON RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

RUNNINS RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 118 | 196 | 567 | 2.0 | 64.6 | 63.9[2] | 64.8 | 0.9 |
| B | 628 | 164 | 547 | 2.1 | 64.6 | 64.3[2] | 65.3 | 1.0 |
| C | 1512 | 83 | 298 | 3.8 | 65.4 | 65.4 | 66.4 | 1.0 |

[1]FEET ABOVE CONFLUENCE WITH TEN MILE RIVER
[2]ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM TEN MILE RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

SEVENMILE RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 156 | 27 | 185 | 3.1 | 80.3 | 80.3 | 80.7 | 0.4 |
| B | 687 | 25 | 88 | 6.6 | 85.2 | 85.2 | 85.2 | 0.0 |
| C | 978 | 29 | 115 | 5.0 | 89.7 | 89.7 | 89.7 | 0.0 |
| D | 1302 | 30 | 88 | 6.6 | 92.7 | 92.7 | 92.7 | 0.0 |
| E | 1628 | 19 | 92 | 6.3 | 96.2 | 96.2 | 96.9 | 0.7 |
| F | 2170 | 21 | 87 | 6.7 | 107.5 | 107.5 | 107.7 | 0.2 |
| G | 2652 | 29 | 67 | 8.7 | 122.8 | 122.8 | 122.8 | 0.0 |
| H | 3238 | 35 | 137 | 4.2 | 133.9 | 133.9 | 134.0 | 0.1 |
| I | 3655 | 84 | 187 | 2.4 | 144.6 | 144.6 | 144.6 | 0.0 |
| J | 4199 | 45 | 66 | 6.8 | 153.8 | 153.8 | 153.9 | 0.1 |
| K | 4910 | 30 | 81 | 5.6 | 164.3 | 164.3 | 164.3 | 0.0 |
| L | 4991 | 52 | 291 | 1.6 | 170.6 | 170.6 | 170.6 | 0.0 |
| M | 5727 | 25 | 88 | 5.1 | 176.2 | 176.2 | 176.9 | 0.7 |
| N | 6307 | 39 | 99 | 4.5 | 179.6 | 179.6 | 180.5 | 0.9 |
| O | 6872 | 84 | 102 | 4.4 | 188.1 | 188.1 | 188.3 | 0.2 |
| P | 7318 | 50 | 124 | 3.6 | 197.5 | 197.5 | 198.3 | 0.8 |
| Q | 7962 | 36 | 95 | 4.8 | 207.2 | 207.2 | 208.2 | 1.0 |
| R | 8512 | 23 | 52 | 8.7 | 228.1 | 228.1 | 228.1 | 0.0 |
| S | 8741 | 24 | 80 | 5.0 | 232.7 | 232.7 | 232.7 | 0.0 |
| T | 9173 | 45 | 139 | 2.9 | 246.4 | 246.4 | 246.4 | 0.0 |
| U | 9617 | 25 | 50 | 8.0 | 256.5 | 256.5 | 256.5 | 0.0 |
| V | 10122 | 34 | 59 | 6.8 | 268.4 | 268.4 | 268.4 | 0.0 |
| W | 10444 | 64 | 241 | 1.7 | 272.4 | 272.4 | 272.4 | 0.0 |
| X | 10801 | 104 | 173 | 2.3 | 272.6 | 272.6 | 272.6 | 0.0 |
| Y | 11161 | 46 | 70 | 5.7 | 275.5 | 275.5 | 275.6 | 0.1 |
| Z | 11455 | 41 | 159 | 2.5 | 277.7 | 277.7 | 278.2 | 0.5 |
| AA | 12227 | * | * | * | 285.2 | 285.2 | * | * |

[1]FEET ABOVE CONFLUENCE WITH POCASSET RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

SIMMONS BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| AB | 13345 | * | * | * | 285.2 | 285.2 | * | * |
| AC | 14540 | * | * | * | 285.2 | 285.2 | * | * |
| AD | 15506 | * | * | * | 285.3 | 285.3 | * | * |
| AE | 16607 | * | * | * | 294.4 | 294.4 | * | * |
| AF | 18102 | * | * | * | 294.4 | 294.4 | * | * |
| AG | 18921 | * | * | * | 294.5 | 294.5 | * | * |

[1]FEET ABOVE CONFLUENCE WITH POCASSET RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

SIMMONS BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 30 | 13 | 43 | 6.50 | 97.5 | 97.5 | 98.5 | 1.0 |
| B | 372 | 14 | 54 | 5.12 | 109.1 | 109.1 | 110.1 | 1.0 |
| C | 548 | 22 | 40 | 6.96 | 114.0 | 114.0 | 115.0 | 1.0 |
| D | 960 | 27 | 107 | 2.58 | 125.6 | 125.6 | 126.6 | 1.0 |
| E | 1,330 | 30 | 63 | 4.40 | 138.0 | 138.0 | 138.5 | 0.5 |
| F | 1,700 | 12 | 33 | 8.46 | 163.6 | 163.6 | 164.6 | 1.0 |
| G | 2,156 | 162 | 881 | 0.31 | 183.2 | 183.2 | 183.7 | 0.5 |

[1]FEET ABOVE CONFLUENCE WITH ASSAPUMPSET BROOK

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

SOUTH BRANCH ASSAPUMPSET BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 0 | 285 | 539 | 2.0 | 209.8 | 209.8 | 210.8 | 1.0 |
| B | 200 | 29 | 100 | 10.7 | 213.6 | 213.6 | 213.6 | 0.0 |
| C | 285 | 95 | 269 | 4.0 | 220.2 | 220.2 | 220.2 | 0.0 |
| D | 310 | 95 | 231 | 4.6 | 220.2 | 220.2 | 220.2 | 0.0 |
| E | 940 | 42 | 187 | 5.7 | 222.7 | 222.7 | 223.1 | 0.4 |
| F | 1,500 | 33 | 216 | 5.0 | 224.3 | 224.3 | 225.2 | 0.9 |
| G | 1,700 | 150 | 844 | 1.3 | 226.2 | 226.2 | 227.2 | 1.0 |
| H | 2,050 | 155 | 516 | 2.1 | 226.4 | 226.4 | 227.3 | 0.9 |
| I | 2,300 | 112 | 508 | 2.1 | 230.0 | 230.0 | 230.0 | 0.0 |
| J | 2,500 | 111 | 486 | 2.2 | 230.1 | 230.1 | 230.1 | 0.0 |
| K | 3,130 | 96 | 338 | 3.2 | 230.8 | 230.8 | 231.3 | 0.5 |
| L | 3,620 | 170 | 652 | 1.6 | 231.4 | 231.4 | 232.2 | 0.8 |
| M | 4,200 | 95 | 360 | 3.0 | 232.0 | 232.0 | 232.8 | 0.8 |
| N | 5,200 | 164 | 208 | 5.1 | 234.5 | 234.5 | 235.2 | 0.7 |
| O | 5,600 | 100 | 341 | 3.1 | 236.4 | 236.4 | 237.3 | 0.9 |
| P | 5,725 | 140 | 803 | 1.3 | 240.5 | 240.5 | 240.5 | 0.0 |
| Q | 5,780 | 301 | 1,347 | 0.7 | 240.5 | 240.5 | 240.5 | 0.0 |
| R | 6,650 | 47 | 117 | 6.7 | 241.4 | 241.4 | 242.0 | 0.6 |
| S | 7,500 | 93 | 259 | 3.0 | 247.7 | 247.7 | 248.7 | 1.0 |
| T | 7,650 | 77 | 506 | 1.6 | 255.6 | 255.6 | 255.6 | 0.0 |
| U | 8,020 | 55 | 246 | 3.2 | 255.6 | 255.6 | 255.6 | 0.0 |
| V | 8,350 | 37 | 92 | 8.6 | 256.0 | 256.0 | 256.0 | 0.0 |
| W | 8,500 | 38 | 173 | 4.6 | 256.9 | 256.9 | 257.9 | 1.0 |
| X | 8,930 | 76 | 294 | 2.7 | 258.6 | 258.6 | 259.5 | 0.9 |
| Y | 9,025 | 35 | 166 | 4.7 | 259.1 | 259.1 | 259.7 | 0.6 |
| Z | 9,700 | 59 | 192 | 4.1 | 261.5 | 261.5 | 261.6 | 0.1 |
| AA | 10,680 | 80 | 146 | 5.4 | 272.1 | 272.1 | 272.7 | 0.6 |

[1]FEET ABOVE CONFLUENCE WITH STILLWATER RESERVOIR

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

STILLWATER RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| AB | 10,850 | 35 | 87 | 9.0 | 282.1 | 282.1 | 282.1 | 0.0 |
| AC | 11,350 | 154 | 489 | 1.6 | 284.0 | 284.0 | 284.2 | 0.2 |
| AD | 12,400 | 20 | 71 | 11.1 | 314.2 | 314.2 | 314.2 | 0.0 |
| AE | 12,600 | 46 | 306 | 2.6 | 317.0 | 317.0 | 317.1 | 0.1 |
| AF | 14,000 | 265 | 982 | 0.6 | 320.8 | 320.8 | 320.8 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH STILLWATER RESERVOIR

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

STILLWATER RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 3 | * | * | * | 13.0 | 2.1[2] | * | * |
| B | 353 | * | * | * | 13.7 | 13.7 | * | * |
| C | 2418 | * | * | * | 13.7 | 13.7 | * | * |
| D | 2801 | 108 | 816 | 3.6 | 13.9 | 13.9 | 13.9 | 0.0 |
| E | 3155 | 114 | 558 | 5.3 | 14.1 | 14.1 | 14.1 | 0.0 |
| F | 3371 | 134 | 1017 | 2.9 | 15.9 | 15.9 | 15.9 | 0.0 |
| G | 3552 | 258 | 915 | 3.2 | 17.2 | 17.2 | 17.2 | 0.0 |
| H | 5964 | 681 | 2476 | 1.2 | 18.1 | 18.1 | 18.1 | 0.0 |
| I | 6162 | 629 | 2334 | 1.3 | 18.2 | 18.2 | 18.2 | 0.0 |
| J | 6623 | 1199 | 2065 | 1.4 | 19.3 | 19.3 | 19.3 | 0.0 |
| K | 6799 | 1093 | 2566 | 1.2 | 19.3 | 19.3 | 19.3 | 0.0 |
| L | 9723 | 1074 | 3165 | 0.9 | 19.6 | 19.6 | 19.6 | 0.0 |
| M | 10615 | 448 | 1376 | 2.1 | 19.7 | 19.7 | 19.7 | 0.0 |
| N | 11449 | 77 | 265 | 10.6 | 28.4 | 28.4 | 28.4 | 0.0 |
| O | 11591 | 190 | 351 | 8.0 | 37.6 | 37.6 | 37.6 | 0.0 |
| P | 12243 | 424 | 1582 | 1.8 | 39.8 | 39.8 | 39.8 | 0.0 |
| Q | 12478 | 154 | 880 | 3.2 | 40.6 | 40.6 | 40.6 | 0.0 |
| R | 12545 | 592 | 2022 | 1.4 | 40.8 | 40.8 | 40.8 | 0.0 |
| S | 13627 | * | * | * | 40.9 | 40.9 | * | * |
| T | 13897 | * | * | * | 50.6 | 50.6 | * | * |
| U | 17255 | * | * | * | 50.6 | 50.6 | * | * |
| V | 17843 | * | * | * | 51.1 | 51.1 | * | * |
| W | 21614 | 424 | 3626 | 0.8 | 51.1 | 51.1 | 51.1 | 0.0 |
| X | 26132 | 292 | 899 | 3.1 | 51.3 | 51.3 | 51.3 | 0.0 |
| Y | 26325 | 473 | 2637 | 1.1 | 54.8 | 54.8 | 54.8 | 0.0 |
| Z | 28327 | 659 | 3306 | 0.9 | 55.0 | 55.0 | 55.0 | 0.0 |
| AA | 29392 | 204 | 1423 | 2.0 | 55.1 | 55.1 | 55.1 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH SEEKONK RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

[2]ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM SEEKONK RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

TEN MILE RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| AB | 30354 | 59 | 284 | 9.9 | 54.9 | 54.9 | 54.9 | 0.0 |
| AC | 30539 | 166 | 1071 | 2.6 | 58.0 | 58.0 | 58.0 | 0.0 |
| AD | 30835 | 449 | 2510 | 1.1 | 58.5 | 58.5 | 58.5 | 0.0 |
| AE | 33673 | 333 | 2394 | 1.2 | 58.7 | 58.7 | 58.7 | 0.0 |
| AF | 34728 | 334 | 2388 | 1.2 | 58.8 | 58.8 | 58.8 | 0.0 |
| AG | 36761 | 347 | 1790 | 1.6 | 59.0 | 59.0 | 59.0 | 0.0 |
| AH | 37352 | 67 | 256 | 11.0 | 61.5 | 61.5 | 61.5 | 0.0 |
| AI | 37557 | 119 | 874 | 3.2 | 67.7 | 67.7 | 67.7 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH SEEKONK RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

TEN MILE RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 100 | 49 | 234 | 0.4 | 240.6 | 240.6 | 241.6 | 1.0 |
| B | 700 | 7 | 12 | 7.6 | 243.1 | 243.1 | 243.1 | 0.0 |
| C | 950 | 13 | 55 | 1.7 | 248.7 | 248.7 | 248.8 | 0.1 |
| D | 1,140 | 31 | 107 | 0.9 | 248.8 | 248.8 | 248.9 | 0.1 |
| E | 1,150 | 32 | 68 | 1.4 | 254.5 | 254.5 | 255.5 | 1.0 |
| F | 1,460 | 97 | 329 | 0.3 | 254.6 | 254.6 | 255.5 | 0.9 |
| G | 2,010 | 18 | 18 | 5.3 | 255.1 | 255.1 | 255.5 | 0.4 |
| H | 2,300 | 18 | 35 | 2.7 | 262.8 | 262.8 | 262.9 | 0.1 |
| I | 2,950 | 105 | 214 | 0.4 | 263.1 | 263.1 | 263.2 | 0.1 |

[1]FEET ABOVE CONFLUENCE WITH STILLWATER RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

UNNAMED TRIBUTARY

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 350 | 23 | 153 | 1.8 | 37.1 | 37.1 | 38.1 | 1.0 |
| B | 994 | 34 | 129 | 2.2 | 40.3 | 40.3 | 40.7 | 0.4 |
| C | 1249 | 134 | 267 | 1.1 | 40.5 | 40.5 | 40.9 | 0.4 |
| D | 1673 | * | * | * | 57.6 | 57.6 | * | * |
| E | 2581 | * | * | * | 57.6 | 57.6 | * | * |
| F | 3835 | * | * | * | 57.6 | 57.6 | * | * |
| G | 4550 | * | * | * | 57.6 | 57.6 | * | * |
| H | 5020 | 67 | 115 | 1.7 | 57.6 | 57.6 | 57.6 | 0.0 |
| I | 5800 | 20 | 29 | 6.9 | 60.7 | 60.7 | 60.7 | 0.0 |
| J[2] | 6491 | 34 | 53 | 3.8 | 65.2 | 65.2 | 65.3 | 0.1 |

[1]FEET ABOVE CONFLUENCE WITH WEST RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

[2]FLOODWAY NOT COMPUTED AT ANY CROSS SECTIONS ABOVE J BECAUSE ALL FLOODING IS CONTAINED IN UNDERGROUND CHANNEL

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

UPPER CANADA POND BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 301 | 39 | 323 | 3.3 | 28.0 | 28.0 | 28.9 | 0.9 |
| B | 762 | 27 | 172 | 6.2 | 28.0 | 28.0 | 29.0 | 1.0 |
| C | 1284 | 67 | 414 | 2.6 | 31.6 | 31.6 | 32.1 | 0.5 |
| D | 1733 | 272 | 1104 | 1.2 | 32.6 | 32.6 | 33.4 | 0.8 |
| E | 2939 | 114 | 689 | 1.9 | 32.9 | 32.9 | 33.9 | 1.0 |
| F | 3829 | 149 | 665 | 2.0 | 33.8 | 33.8 | 34.4 | 0.6 |
| G | 4483 | 178 | 648 | 2.0 | 34.2 | 34.2 | 34.8 | 0.6 |
| H | 5073 | 72 | 229 | 5.7 | 34.3 | 34.3 | 35.3 | 1.0 |
| I | 5197 | 51 | 309 | 4.2 | 36.1 | 36.1 | 36.6 | 0.5 |
| J | 5665 | 67 | 270 | 4.9 | 37.1 | 37.1 | 37.5 | 0.4 |
| K | 6435 | 40 | 227 | 3.9 | 38.1 | 38.1 | 38.9 | 0.8 |
| L | 7156 | 40 | 238 | 3.7 | 38.7 | 38.7 | 39.7 | 1.0 |
| M | 7714 | 28 | 256 | 3.4 | 41.1 | 41.1 | 41.8 | 0.7 |
| N | 8098 | 28 | 204 | 4.3 | 41.4 | 41.4 | 42.3 | 0.9 |
| O | 8276 | 28 | 166 | 5.3 | 41.8 | 41.8 | 42.7 | 0.9 |
| P | 8386 | 28 | 187 | 4.7 | 45.2 | 45.2 | 45.2 | 0.0 |
| Q | 8974 | 40 | 148 | 5.9 | 46.2 | 46.2 | 46.3 | 0.1 |
| R | 9540 | 36 | 161 | 5.5 | 48.4 | 48.4 | 48.9 | 0.5 |
| S | 9707 | 40 | 125 | 7.0 | 49.6 | 49.6 | 49.8 | 0.2 |
| T | 9940 | 40 | 152 | 5.1 | 51.1 | 51.1 | 51.1 | 0.0 |
| U | 10474 | 53 | 104 | 7.4 | 54.1 | 54.1 | 54.1 | 0.0 |
| V | 10665 | 126 | 238 | 3.2 | 56.0 | 56.0 | 56.0 | 0.0 |
| W | 11068 | 57 | 219 | 3.5 | 56.8 | 56.8 | 56.8 | 0.0 |
| X | 11223 | * | * | * | 65.5 | 65.5 | * | * |
| Y | 12398 | 22 | 114 | 6.8 | 68.9 | 68.9 | 69.8 | 0.9 |
| Z | 12662 | 47 | 228 | 3.4 | 70.9 | 70.9 | 71.2 | 0.3 |
| AA | 13272 | 81 | 218 | 3.5 | 75.5 | 75.5 | 76.4 | 0.9 |

[1]FEET ABOVE CONFLUENCE WITH MOSHASSUCK RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

WEST RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| AB | 13645 | 52 | 98 | 7.8 | 80.3 | 80.3 | 80.3 | 0.0 |
| AC | 13905 | 58 | 114 | 6.8 | 82.6 | 82.6 | 83.0 | 0.4 |
| AD | 14032 | 40 | 170 | 4.5 | 83.7 | 83.7 | 84.7 | 1.0 |
| AE | 14440 | 22 | 104 | 7.4 | 85.9 | 85.9 | 86.6 | 0.7 |
| AF | 14627 | 67 | 253 | 3.0 | 88.4 | 88.4 | 89.5 | 1.1 |
| AG | 15334 | 39 | 104 | 3.6 | 91.8 | 91.8 | 92.8 | 1.0 |
| AH | 15841 | 39 | 55 | 6.9 | 98.8 | 98.8 | 98.8 | 0.0 |
| AI | 16392 | 23 | 52 | 7.3 | 105.6 | 105.6 | 105.8 | 0.2 |
| AJ | 16740 | 34 | 63 | 6.0 | 109.4 | 109.4 | 109.4 | 0.0 |
| AK | 16858 | 31 | 59 | 6.4 | 110.3 | 110.3 | 110.5 | 0.2 |
| AL | 17007 | 32 | 52 | 7.3 | 113.0 | 113.0 | 113.0 | 0.0 |
| AM | 17233 | 22 | 46 | 8.3 | 119.1 | 119.1 | 119.1 | 0.0 |
| AN | 17608 | 95 | 202 | 1.9 | 123.9 | 123.9 | 124.1 | 0.2 |
| AO | 18112 | 101 | 115 | 3.3 | 126.2 | 126.2 | 126.2 | 0.0 |
| AP | 18663 | 30 | 55 | 7.0 | 131.5 | 131.5 | 131.5 | 0.0 |
| AQ | 18792 | 30 | 88 | 3.0 | 133.4 | 133.4 | 133.4 | 0.0 |
| AR | 19259 | 19 | 34 | 7.7 | 142.2 | 142.2 | 142.2 | 0.0 |
| AS | 19742 | 19 | 47 | 5.5 | 146.7 | 146.7 | 146.7 | 0.0 |
| AT | 20299 | 17 | 33 | 7.8 | 157.0 | 157.0 | 157.0 | 0.0 |
| AU | 20368 | 19 | 43 | 6.1 | 158.2 | 158.2 | 158.2 | 0.0 |
| AV | 21037 | 17 | 33 | 7.8 | 166.9 | 166.9 | 166.9 | 0.0 |
| AW | 21144 | 143 | 582 | 0.5 | 170.9 | 170.9 | 171.1 | 0.2 |
| AX | 21512 | 30 | 97 | 2.6 | 170.8 | 170.8 | 171.0 | 0.2 |
| AY | 21932 | 26 | 36 | 6.9 | 172.0 | 172.0 | 172.0 | 0.0 |
| AZ | 22053 | 130 | 661 | 0.4 | 188.1 | 188.1 | 188.1 | 0.0 |
| BA | 22472 | 40 | 97 | 2.6 | 188.1 | 188.1 | 188.1 | 0.0 |
| BB | 22897 | 26 | 37 | 6.8 | 195.5 | 195.5 | 195.5 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH MOSHASSUCK RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

WEST RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 147 | 45 | 46 | 5.7 | 14.0 | 14.0 | 14.4 | 0.4 |
| B | 428 | 71 | 136 | 1.9 | 15.4 | 15.4 | 15.9 | 0.5 |
| C | 688 | 78 | 103 | 2.5 | 16.5 | 16.5 | 16.5 | 0.0 |
| D | 1045 | 91 | 124 | 2.1 | 17.6 | 17.6 | 17.6 | 0.0 |
| E | 1367 | 64 | 81 | 3.2 | 18.8 | 18.8 | 18.8 | 0.0 |
| F | 1682 | 48 | 81 | 3.2 | 20.5 | 20.5 | 20.5 | 0.0 |
| G | 2037 | 64 | 114 | 2.3 | 21.7 | 21.7 | 21.7 | 0.0 |
| H | 2307 | 30 | 39 | 6.6 | 23.1 | 23.1 | 23.1 | 0.0 |
| I | 2681 | 72 | 157 | 1.7 | 24.7 | 24.7 | 24.7 | 0.0 |
| J | 2956 | 64 | 90 | 2.9 | 25.1 | 25.1 | 25.1 | 0.0 |
| K | 3222 | 124 | 146 | 1.8 | 26.0 | 26.0 | 26.0 | 0.0 |
| L | 3636 | 79 | 102 | 2.6 | 27.1 | 27.1 | 27.1 | 0.0 |
| M | 4014 | 88 | 134 | 1.9 | 28.1 | 28.1 | 28.1 | 0.0 |
| N | 4446 | 79 | 79 | 3.3 | 29.6 | 29.6 | 29.6 | 0.0 |
| O | 5088 | 243 | 367 | 0.7 | 31.1 | 31.1 | 31.6 | 0.5 |

[1]FEET ABOVE CONFLUENCE WITH MOSHASSUCK RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

WEST RIVER DIVERSION

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 0 | 46 | 69 | 2.9 | 15.2 | 10.9[2] | 10.9 | 0.0 |
| B | 400 | 26 | 31 | 6.3 | 15.2 | 12.8[2] | 12.8 | 0.0 |
| C | 560 | 12 | 47 | 4.2 | 16.8 | 16.8 | 16.8 | 0.0 |
| D | 940 | 17 | 33 | 6.0 | 18.3 | 18.3 | 18.6 | 0.3 |
| E | 1,150 | 22 | 78 | 2.5 | 20.9 | 20.9 | 21.0 | 0.1 |
| F | 1,210 | 71 | 194 | 1.0 | 21.0 | 21.0 | 21.1 | 0.1 |
| G | 1,370 | 56 | 217 | 0.9 | 22.9 | 22.9 | 23.0 | 0.1 |
| H | 2,435 | 15 | 36 | 5.1 | 23.0 | 23.0 | 23.0 | 0.0 |
| I | 2,628 | 194 | 1,528 | 0.1 | 27.3 | 27.3 | 27.3 | 0.0 |

[1]FEET ABOVE FRANCIS AVENUE (EXTENDED)

[2]ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM PROVIDENCE RIVER

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

WILLETT POND BROOK

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| A | 894 | 584 | 11123 | 0.3 | 12.4 | 4.4[2] | 5.4 | 1.0 |
| B | 1741 | 481 | 7136 | 0.5 | 12.4 | 4.4[2] | 5.4 | 1.0 |
| C | 2849 | 252 | 3623 | 1.0 | 12.4 | 4.4[2] | 5.4 | 1.0 |
| D | 3218 | 183 | 2605 | 1.3 | 12.4 | 4.4[2] | 5.4 | 1.0 |
| E | 3545 | 187 | 2093 | 1.7 | 12.4 | 4.4[2] | 5.4 | 1.0 |
| F | 4174 | 137 | 1622 | 2.1 | 12.4 | 4.5[2] | 5.4 | 0.9 |
| G | 4655 | 110 | 1311 | 2.6 | 12.4 | 4.6[2] | 5.6 | 1.0 |
| H | 5816 | 76 | 856 | 3.0 | 12.4 | 5.0[2] | 5.9 | 0.9 |
| I | 7116 | 92 | 961 | 2.6 | 12.4 | 5.5[2] | 6.3 | 0.8 |
| J | 7911 | 114 | 891 | 2.8 | 12.4 | 5.9[2] | 6.7 | 0.8 |
| K | 9381 | 91 | 743 | 3.4 | 12.4 | 6.6[2] | 7.2 | 0.6 |
| L | 11508 | 101 | 767 | 3.3 | 12.4 | 9.6[2] | 10.1 | 0.5 |
| M | 12667 | 149 | 886 | 2.9 | 12.4 | 10.6[2] | 11.4 | 0.8 |
| N | 13478 | 61 | 527 | 4.6 | 12.4 | 11.7[2] | 12.6 | 0.9 |
| O | 14395 | 50 | 321 | 7.6 | 13.3 | 13.3 | 14.2 | 0.9 |
| P | 14948 | 59 | 460 | 5.3 | 15.5 | 15.5 | 16.0 | 0.5 |
| Q | 15632 | 96 | 605 | 4.0 | 16.1 | 16.1 | 17.1 | 1.0 |
| R | 16159 | 83 | 520 | 4.7 | 20.0 | 20.0 | 20.1 | 0.1 |
| S | 16654 | 53 | 368 | 6.6 | 20.6 | 20.6 | 20.9 | 0.3 |
| T | 17105 | 79 | 392 | 6.2 | 22.1 | 22.1 | 22.2 | 0.1 |
| U | 17762 | 51 | 277 | 8.8 | 23.3 | 23.3 | 23.4 | 0.1 |
| V | 19285 | 73 | 820 | 3.0 | 31.6 | 31.6 | 31.9 | 0.3 |
| W | 20389 | 85 | 533 | 4.6 | 34.3 | 34.3 | 35.0 | 0.7 |
| X | 20783 | 73 | 422 | 5.8 | 35.0 | 35.0 | 35.5 | 0.5 |
| Y | 21437 | 86 | 472 | 5.2 | 37.1 | 37.1 | 37.4 | 0.3 |
| Z | 22248 | 232 | 845 | 2.9 | 40.1 | 40.1 | 40.1 | 0.0 |
| AA | 23556 | 64 | 308 | 7.9 | 43.5 | 43.5 | 43.7 | 0.2 |

[1]FEET ABOVE CONFLUENCE WITH SEEKONK RIVER

[3]ELEVATION COMPUTED WITHOUT CONSIDERATION OF BACKWATER EFFECTS FROM NARRAGANSETT BAY

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

WOONASQUATUCKET RIVER – PROVIDENCE RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| AB | 24022 | 86 | 461 | 5.3 | 46.4 | 46.4 | 46.4 | 0.0 |
| AC | 24353 | 158 | 553 | 4.4 | 47.6 | 47.6 | 47.6 | 0.0 |
| AD | 25691 | 84 | 450 | 5.1 | 50.4 | 50.4 | 50.6 | 0.2 |
| AE | 25800 | 73 | 413 | 5.5 | 50.6 | 50.6 | 50.8 | 0.2 |
| AF | 26698 | 65 | 304 | 7.5 | 52.9 | 52.9 | 53.1 | 0.2 |
| AG | 27150 | 60 | 384 | 6.0 | 54.6 | 54.6 | 55.0 | 0.4 |
| AH | 27473 | 66 | 356 | 6.4 | 55.3 | 55.3 | 55.8 | 0.5 |
| AI | 27947 | 65 | 399 | 5.7 | 56.6 | 56.6 | 57.2 | 0.6 |
| AJ | 28331 | 62 | 342 | 6.7 | 57.7 | 57.7 | 58.0 | 0.3 |
| AK | 28708 | 76 | 460 | 5.0 | 59.0 | 59.0 | 59.2 | 0.2 |
| AL | 29080 | 80 | 386 | 5.9 | 59.7 | 59.7 | 60.0 | 0.3 |
| AM | 29507 | 63 | 392 | 5.8 | 61.9 | 61.9 | 62.1 | 0.2 |
| AN | 30123 | 79 | 435 | 5.3 | 64.1 | 64.1 | 64.2 | 0.1 |
| AO | 30544 | 257 | 2046 | 1.1 | 67.6 | 67.6 | 67.9 | 0.3 |
| AP | 31102 | 155 | 1494 | 1.5 | 67.6 | 67.6 | 68.0 | 0.4 |
| AQ | 31850 | 288 | 2183 | 1.1 | 67.7 | 67.7 | 68.0 | 0.3 |
| AR | 32813 | 334 | 2099 | 1.1 | 68.2 | 68.2 | 68.5 | 0.3 |
| AS | 33555 | 177 | 817 | 2.8 | 68.4 | 68.4 | 68.7 | 0.3 |
| AT | 34296 | * | * | * | 80.4 | 80.4 | * | * |
| AU | 34954 | * | * | * | 80.4 | 80.4 | * | * |
| AV | 35746 | * | * | * | 80.5 | 80.5 | * | * |
| AW | 36204 | * | * | * | 80.5 | 80.5 | * | * |
| AX | 36618 | * | * | * | 80.5 | 80.5 | * | * |
| AY | 36949 | * | * | * | 80.6 | 80.6 | * | * |
| AZ | 37472 | 547 | 1072 | 2.1 | 80.6 | 80.6 | 80.6 | 0.0 |
| BA | 37922 | 196 | 496 | 4.6 | 81.2 | 81.2 | 81.2 | 0.0 |
| BB | 38327 | 51 | 212 | 10.8 | 83.0 | 83.0 | 83.0 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH SEEKONK RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI

**(ALL JURISDICTIONS)**

FLOODWAY DATA

WOONASQUATUCKET RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| BC | 38446 | 89 | 338 | 6.8 | 85.6 | 85.6 | 85.6 | 0.0 |
| BD | 38624 | * | * | * | 96.4 | 96.4 | * | * |
| BE | 39527 | * | * | * | 96.4 | 96.4 | * | * |
| BF | 40547 | 131 | 385 | 5.9 | 96.5 | 96.5 | 96.5 | 0.0 |
| BG | 40966 | 96 | 328 | 7.0 | 97.7 | 97.7 | 97.8 | 0.1 |
| BH | 41384 | 156 | 499 | 4.6 | 98.9 | 98.9 | 99.8 | 0.9 |
| BI | 41974 | 62 | 263 | 7.7 | 100.4 | 100.4 | 100.9 | 0.5 |
| BJ | 42155 | 88 | 539 | 3.7 | 102.2 | 102.2 | 102.7 | 0.5 |
| BK | 42966 | 69 | 414 | 4.9 | 103.2 | 103.2 | 104.0 | 0.8 |
| BL | 43631 | 58 | 345 | 5.8 | 104.7 | 104.7 | 105.2 | 0.5 |
| BM | 44082 | 92 | 592 | 3.4 | 106.9 | 106.9 | 107.2 | 0.3 |
| BN | 44530 | 77 | 425 | 4.7 | 108.0 | 108.0 | 108.3 | 0.3 |
| BO | 45459 | 274 | 2491 | 0.8 | 113.9 | 113.9 | 113.9 | 0.0 |
| BP | 46069 | 579 | 5098 | 0.4 | 113.9 | 113.9 | 113.9 | 0.0 |
| BQ | 46862 | 112 | 831 | 2.3 | 114.0 | 114.0 | 114.0 | 0.0 |
| BR | 47799 | 95 | 539 | 3.6 | 114.1 | 114.1 | 114.1 | 0.0 |
| BS | 48580 | 67 | 324 | 6.0 | 114.8 | 114.8 | 115.1 | 0.3 |
| BT | 48777 | 57 | 479 | 4.1 | 117.4 | 117.4 | 117.7 | 0.3 |
| BU | 49401 | 53 | 456 | 4.3 | 117.5 | 117.5 | 118.1 | 0.6 |
| BV | 49685 | 52 | 365 | 5.3 | 117.6 | 117.6 | 118.3 | 0.7 |
| BW | 49901 | 75 | 688 | 2.8 | 118.9 | 118.9 | 119.5 | 0.6 |
| BX | 50568 | 75 | 526 | 3.7 | 119.0 | 119.0 | 119.8 | 0.8 |
| BY | 51543 | 65 | 351 | 5.5 | 120.8 | 120.8 | 121.5 | 0.7 |
| BZ | 52023 | 62 | 369 | 5.3 | 122.8 | 122.8 | 123.0 | 0.2 |
| CA | 52454 | 82 | 570 | 3.4 | 123.3 | 123.3 | 123.7 | 0.4 |
| CB | 53079 | 55 | 395 | 4.9 | 123.6 | 123.6 | 124.2 | 0.6 |
| CC | 53679 | 61 | 367 | 5.3 | 124.6 | 124.6 | 125.1 | 0.5 |

[1]FEET ABOVE CONFLUENCE WITH SEEKONK RIVER

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

WOONASQUATUCKET RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| CD | 54239 | 83 | 357 | 5.4 | 125.7 | 125.7 | 126.2 | 0.5 |
| CE | 54626 | 73 | 489 | 4.0 | 128.1 | 128.1 | 128.2 | 0.1 |
| CF | 55231 | 57 | 319 | 6.1 | 128.7 | 128.7 | 128.9 | 0.2 |
| CG | 55436 | 63 | 369 | 5.3 | 130.0 | 130.0 | 130.1 | 0.1 |
| CH | 56129 | 94 | 367 | 5.3 | 131.2 | 131.2 | 131.7 | 0.5 |
| CI | 56625 | 84 | 232 | 8.4 | 134.5 | 134.5 | 134.8 | 0.3 |
| CJ | 56921 | 23 | 132 | 13.7 | 142.2 | 142.2 | 142.2 | 0.0 |
| CK | 57526 | * | * | * | 155.1 | 155.1 | * | * |
| CL | 58782 | * | * | * | 155.1 | 155.1 | * | * |
| CM | 60214 | * | * | * | 155.1 | 155.1 | * | * |
| CN | 61897 | 47 | 544 | 3.3 | 155.1 | 155.1 | 155.1 | 0.0 |
| CO | 62682 | * | * | * | 159.4 | 159.4 | * | * |
| CP | 63258 | * | * | * | 175.9 | 175.9 | * | * |
| CQ | 64004 | * | * | * | 176.0 | 176.0 | * | * |
| CR | 64828 | 96 | 269 | 6.7 | 176.8 | 176.8 | 176.9 | 0.1 |
| CS | 65551 | * | * | * | 196.2 | 196.2 | * | * |
| CT | 66387 | * | * | * | 196.2 | 196.2 | * | * |
| CU | 67317 | 99 | 530 | 3.0 | 196.3 | 196.3 | 196.3 | 0.0 |
| CV | 68300 | 91 | 469 | 3.4 | 196.6 | 196.6 | 196.6 | 0.0 |
| CW | 68595 | 178 | 505 | 3.2 | 197.5 | 197.5 | 197.5 | 0.0 |
| CX | 69633 | 55 | 300 | 5.3 | 198.5 | 198.5 | 198.9 | 0.4 |
| CY | 70787 | * | * | * | 209.6 | 209.6 | * | * |
| CZ | 72435 | * | * | * | 209.6 | 209.6 | * | * |
| DA | 73685 | * | * | * | 209.6 | 209.6 | * | * |
| DB | 74798 | * | * | * | 209.6 | 209.6 | * | * |
| DC | 75889 | 35 | 184 | 2.3 | 209.7 | 209.7 | 209.7 | 0.0 |
| DD | 76247 | 30 | 209 | 2.0 | 216.3 | 216.3 | 216.3 | 0.0 |

[1]FEET ABOVE CONFLUENCE WITH SEEKONK RIVER
*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

WOONASQUATUCKET RIVER

| FLOODING SOURCE | | FLOODWAY | | | BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD88) | | | |
|---|---|---|---|---|---|---|---|---|
| CROSS SECTION | DISTANCE[1] | WIDTH (FEET) | SECTION AREA (SQUARE FEET) | MEAN VELOCITY (FEET PER SECOND) | REGULATORY | WITHOUT FLOODWAY | WITH FLOODWAY | INCREASE |
| DE | 76984 | 25 | 62 | 6.8 | 220.0 | 220.0 | 220.0 | 0.0 |
| DF | 77646 | 24 | 56 | 7.6 | 228.6 | 228.6 | 228.6 | 0.0 |
| DG | 78247 | 24 | 58 | 7.2 | 236.8 | 236.8 | 236.8 | 0.0 |
| DH | 78888 | 26 | 58 | 7.2 | 245.5 | 245.5 | 245.5 | 0.0 |
| DI | 79214 | 26 | 56 | 7.5 | 250.4 | 250.4 | 250.4 | 0.0 |
| DJ | 79968 | 41 | 183 | 2.3 | 255.9 | 255.9 | 255.9 | 0.0 |
| DK | 80692 | 45 | 220 | 1.9 | 256.2 | 256.2 | 256.8 | 0.6 |
| DL | 81082 | 45 | 211 | 2.0 | 256.3 | 256.3 | 256.9 | 0.6 |
| DM[2] | 82131 | 150 | 464 | 1.2 | 258.1 | 258.1 | 258.6 | 0.5 |
| DN[3] | 83226 | 355 | 1067 | 0.4 | 258.3 | 258.3 | 259.0 | 0.7 |

[1]FEET ABOVE CONFLUENCE WITH SEEKONK RIVER

[2]CROSS SECTION CORRESPONDS TO DJ (STATION 80130) IN SUPERSEDED FLOODWAY DATA TABLE

[3]CROSS SECTION CORRESPONDS TO DK (STATION 81180) IN SUPERSEDED FLOODWAY DATA TABLE

*FLOODWAY NOT DEFINED FOR DAM PONDS AND RESERVOIRS

TABLE 10

**FEDERAL EMERGENCY MANAGEMENT AGENCY**

PROVIDENCE COUNTY, RI
**(ALL JURISDICTIONS)**

FLOODWAY DATA

WOONASQUATUCKET RIVER

### 4.3 Base Flood Elevations

Areas within the community studied by detailed engineering methods have BFEs established in A and V Zones. These are the elevations of the base (l-percent-annual-chance) flood relative to NAVD88. In coastal areas affected by wave action, BFEs are generally maximal at the normal open shoreline. These elevations generally decrease in a landward direction at a rate dependent on the presence of obstructions capable of dissipating the wave energy. Where possible, changes in BFEs have been shown in 1-foot increments on the FIRMs. However, where the scale did not permit, 2- or 3-foot increments were sometimes used. BFEs shown in the wave action areas represent the average elevation within the zone. Current program regulations generally require that all new construction be elevated such that the first floor, including basement, is above the BFE in A and V Zones.

### 4.4 Velocity Zones

The USACE has established the 3-foot wave as the criterion for identifying coastal high-hazard zones. This was based on a study of wave action effects on structures. This criterion has been adopted by FEMA for the determination of V Zones. Because of the additional hazards associated with high-energy waves, the NFIP regulations require much more stringent floodplain management measures in these areas, such as elevating structures on piles or piers. In addition, insurance rates in V Zones are higher than those in A Zones with similar numerical designations.

The location of the V Zone is determined by the 3-foot wave as discussed previously. The detailed analysis of wave heights performed in this study allowed a much more accurate location of the V Zone to be established. The V Zone generally extends inland to the point where the 1-percent-annual-chance flood depth is insufficient to support a 3-foot wave.

## 5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base (1-percent-annual-chance) flood elevations (BFEs) or depths are shown within this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 1-percent-annual-chance floodplains that are determined in the FIS report by detailed methods. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AH

Zone AH is the flood insurance rate zone that corresponds to the areas of 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between 1 and 3 feet. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AO

Zone AO is the flood insurance rate zone that corresponds to areas of 1-percent-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 detailed hydraulic analyses are shown within this zone.

Zone VE

Zone VE is the flood insurance rate zone that corresponds to the 1-percent-annual-chance coastal floodplains that have additional hazards associated with storm waves. Whole-foot BFEs derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 0.2-percent-annual-chance floodplain, areas within the 0.2-percent-annual-chance floodplain, areas of 1-percent-annual-chance flooding where average depths are less than 1 foot, areas of 1-percent-annual-chance flooding where the contributing drainage area is less than 1 square mile (sq. mi.), and areas protected from the base flood by levees. No BFEs or depths are shown within this zone.

## 6.0 FLOOD INSURANCE RATE MAP

The FIRM is designed for flood insurance and floodplain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 1-percent-annual-chance floodplains that were studied by detailed methods, shows selected whole-foot BFEs or average depths. Insurance agents use zones and BFEs in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For floodplain management applications, the map shows by tints, screens, and symbols, the 1- and 0.2-percent-annual-chance floodplains, floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

The countywide FIRM presents flooding information for the entire geographic area of Bristol County. Previously, FIRMs were prepared for each incorporated community and the unincorporated areas of the County identified as flood-prone. This countywide FIRM also includes flood-hazard information that was presented separately on Flood Boundary and Floodway Maps (FBFMs), where applicable. Historical data relating to the maps prepared for each community are presented in Table 11, "Community Map History."

| COMMUNITY NAME | INITIAL IDENTIFICATION | FLOOD HAZARD BOUNDARY MAP REVISION DATE(S) | FLOOD INSURANCE RATE MAP EFFECTIVE DATE | FLOOD INSURANCE RATE MAP REVISION DATE(S) |
|---|---|---|---|---|
| Burrillville, Town of | September 13, 1974 | August 2, 1977 | July 2, 1979 | None |
| Central Falls, City of | May 27, 1971 | None | May 27, 1971 | July 1, 1974<br>August 22, 1975<br>January 6, 1982 |
| Cranston, City of | August 28, 1971 | None | August 28, 1971 | July 1, 1974<br>May 21, 1976<br>November 1, 1984 |
| Cumberland, Town of | January 3, 1975 | None | December 16, 1980 | February 16, 1990<br>June 16, 1992 |
| East Providence, City of | June 5, 1970 | None | May 18, 1973 | July 1, 1974<br>November 14, 1975<br>March 16, 1979<br>June 1, 1983 |
| Foster, Town of | September 13, 1974 | September 10, 1976 | December 4, 1985 | None |
| Glocester, Town of | October 18, 1974 | April 8, 1977 | August 15, 1979 | March 3, 1992 |
| Johnston, Town of | November 22, 1977 | None | September 1, 1978 | November 17, 1993 |

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

**PROVIDENCE COUNTY, RI**
**(ALL JURISDICTIONS)**

**COMMUNITY MAP HISTORY**

| COMMUNITY NAME | INITIAL IDENTIFICATION | FLOOD HAZARD BOUNDARY MAP REVISION DATE(S) | FLOOD INSURANCE RATE MAP EFFECTIVE DATE | FLOOD INSURANCE RATE MAP REVISION DATE(S) |
|---|---|---|---|---|
| Lincoln, Town of | November 30, 1973 | None | November 30, 1973 | July 1, 1974<br>October 10, 1975<br>August 2, 1982 |
| North Providence, Town of | April 13, 1973 | None | December 15, 1977 | September 30, 1993<br>December 6, 1999 |
| North Smithfield, Town of | June 14, 1974 | August 27, 1976 | August 1, 1978 | December 3, 1993 |
| Pawtucket, City of | July 16, 1971 | None | July 16, 1971 | July 1, 1974<br>June 11, 1976<br>April 1, 1982<br>January 3, 1986 |
| Providence, City of | December 15, 1970 | None | December 15, 1970 | July 1, 1974<br>November 28, 1975<br>April 16, 1976<br>July 23, 1976<br>April 15, 1986<br>June 6, 2000 |
| Scituate, Town of | September 6, 1974 | October 1, 1976 | January 2, 1981 | None |
| Smithfield, Town of | August 9, 1974 | None | March 1, 1977 | March 4, 1991 |

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

**PROVIDENCE COUNTY, RI**
**(ALL JURISDICTIONS)**

**COMMUNITY MAP HISTORY**

| COMMUNITY NAME | INITIAL IDENTIFICATION | FLOOD HAZARD BOUNDARY MAP REVISION DATE(S) | FLOOD INSURANCE RATE MAP EFFECTIVE DATE | FLOOD INSURANCE RATE MAP REVISION DATE(S) |
|---|---|---|---|---|
| Woonsocket, City of | October 13, 1971 | None | October 13, 1971 | July 1, 1974<br>January 16, 1976<br>January 6, 1982 |

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

**PROVIDENCE COUNTY, RI (ALL JURISDICTIONS)**

**COMMUNITY MAP HISTORY**

## 7.0 OTHER STUDIES

Information pertaining to revised and unrevised flood hazards for each jurisdiction within Providence County has been compiled in this FIS. Therefore, this FIS supersedes all previously printed FIS reports, FIRMs, and/or FHBMs for all of the incorporated jurisdictions within Providence County.

This is a multi-volume FIS. Each volume may be revised separately, in which case it supersedes the previously printed volume. Users should refer to the Table of Contents in Volume 1 for the current effective date of each volume; volumes bearing these dates contain the most up-to-date flood hazard data.

FISs have been prepared for adjacent communities and are in agreement with this FIS. These include reports prepared for Kent County, Rhode Island, including the Town of Coventry (FEMA, 2001), City of Warwick (FEMA, 1991), and Town of West Warwick (FEMA, 1986); Bristol County, Rhode Island (FEMA, 1996); Worcester County, Massachusetts, including the Town of Blackstone (FEMA, 1977), Town of Douglas (FEMA, 1981), City of Millville (FEMA, 1982), and Town of Uxbridge (FEMA, 1982); Norfolk County, Massachusetts, including the Town of Bellingham (FEMA, 1982), Town of Plainville (FEMA, 1981), and Town of Wrentham (FEMA, 1982); Bristol County, Massachusetts, including the City of Attleboro (FEMA, 1978), Town of North Attleborough (FEMA, 1979), and Town of Seekonk (FEMA, 1979); and Windham County, Connecticut, including the Town of Killingly (FEMA, 1984), City of Putnam (FEMA, 1988), Town of Sterling (FEMA, 1984), and Town of Thompson (FEMA, 1984).

At the time of this revision, Bristol and Norfolk Counties, Massachusetts, and Kent County, Rhode Island, were undergoing revisions. They will all be in agreement with this countywide FIS.

This FIS report either supersedes or is compatible with all previous studies published on flooding sources studied in this report and should be considered authoritative for the purposes of the NFIP.

## 8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting FEMA Region I, 99 High Street, 6th Floor, Boston, MA 02110.

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