

FLOOD INSURANCE STUDY

VOLUME 1 OF 3



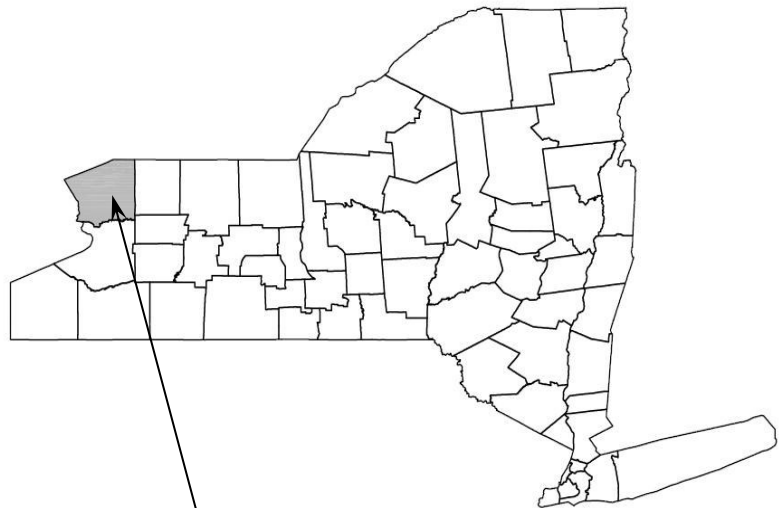
NIAGARA COUNTY, NEW YORK (ALL JURISDICTIONS)

COMMUNITY NAME

BARKER, VILLAGE OF
 CAMBRIA, TOWN OF
 HARTLAND, TOWN OF
 LEWISTON, TOWN OF
 LEWISTON, VILLAGE OF¹
 LOCKPORT, CITY OF
 LOCKPORT, TOWN OF
 MIDDLEPORT, VILLAGE OF
 NEWFANE, TOWN OF
 NIAGARA FALLS, CITY OF
 NIAGARA, TOWN OF
 NORTH TONAWANDA, CITY OF
 PENDLETON, TOWN OF
 PORTER, TOWN OF
 ROYALTON, TOWN OF
 SOMERSET, TOWN OF
 WHEATFIELD, TOWN OF
 WILSON, TOWN OF
 WILSON, VILLAGE OF
 YOUNGSTOWN, VILLAGE OF

COMMUNITY NUMBER

360498
 360499
 360500
 360502
 360501
 360503
 361013
 360505
 360504
 360506
 360507
 360508
 360509
 360510
 360511
 360512
 360513
 360514
 360978
 360515



Niagara County

¹ NON-FLOODPRONE COMMUNITY

PRELIMINARY
 SEPTEMBER 30, 2008



Federal Emergency Management Agency

FLOOD INSURANCE STUDY NUMBER
 36063CV001A

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 communities within Niagara County 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:

<u>Old Zone</u>	<u>New Zone</u>
A1 through A30	AE
V1 through V30	VE
B	X
C	X

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

Initial Countywide FIS Effective Date:

Revised Countywide FIS Date:

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FLOOD INSURANCE STUDY
NIAGARA COUNTY, NEW YORK (ALL JURISDICTIONS)

1.0 INTRODUCTION

1.1 Purpose of Study

This countywide Flood Insurance Study (FIS) investigates the existence and severity of flood hazards in, or revises and updates previous FISs/Flood Insurance Rate Maps (FIRMs) for the geographic area of Niagara County, New York, including: the cities of Lockport, Niagara Falls and North Tonawanda; the towns of Cambria, Hartland, Lewiston, Lockport, Newfane, Niagara, Pendleton, Porter, Royalton, Somerset, Wheatfield and Wilson; and the villages of Barker, Lewiston, Middleport, Wilson and Youngstown (hereinafter referred to collectively as Niagara County).

This FIS aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This FIS has developed flood risk data for various areas of the county that will be used to establish actuarial flood insurance rates. This information will also be used by Niagara County to update existing floodplain regulations as part of the Regular Phase of the National Flood Insurance Program (NFIP), and will also be used by local and regional planners to further promote sound land use and floodplain development. Minimum floodplain management requirements for participation in the 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 are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

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

- Barker, Village of: the hydrologic and hydraulic analyses for the FIS dated November 1, 1983 were prepared by Parsons, Brinckerhoff, Quade & Douglas, under subcontract to Goodkind & O’Dea, Inc. for the Federal Emergency Management Agency (FEMA) during the FIS for the Town of Somerset, New York. The work was completed in April 1976.
- Cambria, Town of: the hydrologic and hydraulic analyses for the FIS dated March 30, 1983 were prepared by De Leuw, Cather & Company of New York, Inc., for FEMA under Contract No. EMW-C-0060. The work was completed in November 1981.
- Lewiston, Town of: the hydrologic and hydraulic analyses for the FIS dated December 1979 represent a revision of the original analyses performed by Goodkind & O’Dea, Inc. under Contract No. H-3831. The updated analyses were prepared by Parsons, Brinckerhoff, Quade & Douglas, under subcontract to Goodkind & O’Dea, Inc. The work was completed in December 1978.
- Lockport, City of: the hydrologic and hydraulic analyses for the FIS dated August 4, 1980 were prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O’Dea, Inc. for the Federal Insurance Administration (FIA) under Contract No. H-3831. The work was completed in May 1979.
- Lockport, Town of: the hydrologic and hydraulic analyses for the FIS revised October 4, 2002, which included Eighteenmile Creek, Eighteenmile Creek East Tributary, Eighteenmile Creek West Tributary, Eighteenmile Creek East Branch, Gulf Branch and Gulf Tributary were prepared by Leonard Jackson Associates for FEMA under Contract No. 96-CO-0186. The work was completed in April 1999. The hydrologic and hydraulic analyses for Tonawanda Creek were prepared by Pratt & Huth for FEMA, in order to resolve a second appeal for the Town of Clarence, New York. The work was completed in August 1994. The hydrologic and hydraulic analyses for Donner Creek were prepared by Dewberry & Davis, LLC, and were based on a 1995 hydrologic analysis by the U.S. Army Corps of Engineers (USACE), Buffalo District.

Middleport, Village of: the hydrologic and hydraulic analyses for the FIS report dated February 1, 1983 were prepared by De Leuw, Cather & Company of New York, Inc., for FEMA under Contract No. EMW-C-0060. The work was completed in August 1981.

Newfane, Town of: the hydrologic and hydraulic analyses for the FIS report dated May 18, 1981 were prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O’Dea, Inc. for the FIA under Contract No. H-3831. The work was completed in December 1976.

Niagara, Town of: the hydrologic and hydraulic analyses for the FIS report dated December 15, 1983 were prepared by URS McPhee, Smith, Rosenstein Engineers, P.C. for FEMA under Contract No. H-4647. The work was completed in June 1982.

Niagara Falls, City of: the hydrologic and hydraulic analyses for the FIS revised September 5, 1990 were prepared by Dewberry & Davis, LLC, under agreement with FEMA. Technical data was provided by the USACE, Buffalo District. The work was completed in March 1989.

North Tonawanda, City of: the hydrologic and hydraulic analyses for the FIS report dated July 6, 1981 were prepared by De Leuw, Cather & Company of New York, Inc., for FEMA under Contract No. H-4552. The work was completed in March 1980.

Pendleton, Town of: the hydrologic and hydraulic analyses for the FIS report dated July 6, 1981 were prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O’Dea, Inc. for the FIA under Contract No. H-3831. The work was completed in August 1977.

Porter, Town of: the hydrologic and hydraulic analyses for the FIS report dated February 15, 1983 were prepared by De Leuw, Cather & Company of New York, Inc., for FEMA under Contract No. EMW-C-0060. The work was completed in November 1981.

Somerset, Town of: the hydrologic and hydraulic analyses for the FIS report dated August 3, 1981 were prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O’Dea, Inc. for FEMA

under Contract No. H-3831. The work was completed in April 1976.

Wheatfield, Town of: the hydrologic and hydraulic analyses for the FIS report revised November 4, 1992 were prepared by the USACE, Buffalo District, for FEMA under Inter-Agency Agreement No. EMW-89-E-2994, Project Order No. 1. The work was completed in July 1990. The revised hydrologic and hydraulic analyses were performed by Wendel Design. The work was completed in July 1991.

Wilson, Town of: the hydrologic and hydraulic analyses for the FIS report dated October 1, 1980 represent a revision prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O’Dea, Inc. for the FIA under Contract No. H-3831. The work was completed in February 1979.

Wilson, Village of: the hydrologic and hydraulic analyses for the FIS report dated May 1980 represent a revision prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O’Dea, Inc. for the FIA under Contract No. H-3831. The work was completed in February 1979.

Youngstown, Village of: the hydrologic and hydraulic analyses for the FIS report dated December 1979 represent a revision prepared by Parsons, Brinckerhoff, Quade & Douglas under subcontract Goodkind & O’Dea, Inc. for the FIA under Contract No. H-3831. The work was completed in April 1979.

The authority and acknowledgements for the towns of Hartland and Royalton, as well as the Village of Lewiston are not available because no FIS reports were published for those communities.

For this countywide FIS, revised hydrologic and hydraulic analyses for the streams shown in Table 3 were prepared for FEMA by Medina Consultants, P.C. under Contract No. EMN-2003-CO-0005. This work was completed in August 2008.

Digital orthophotography of Niagara County was collected in Color Infrared, Natural Color and Panchromatic Color to obtain orthophotography for the entire county.

The 12-inch resolution Color Infrared Orthoimagery was collected for Niagara County New York at 10,000 AMT to produce 1 foot resolution Color Infrared digital orthophotos, tiled. Client provided DEM was used for orthophoto rectification. A minimum of two base stations were established in the project area.

Image horizontal accuracy is +/-4 ft. at the 95% confidence level. Each file contains an image covering 3000 ft. by 2000 ft. on the ground.

The 12-inch resolution Natural Color Orthoimagery was collected for Niagara County New York at 10,000 AMT to produce 1 foot resolution Natural Color digital orthophotos, tiled. Client provided DEMs were used for orthophoto rectification. A minimum of two base stations were established in the project area. Image horizontal accuracy is +/-4 ft. at the 95% confidence level. Each file contains an image covering 3000 ft. by 2000 ft. on the ground.

The 24-inch resolution Panchromatic Orthoimagery contains 2005 digital orthoimagery of Niagara County, New York. Image pixel size is 2 ft. GSD. Image type is Panchromatic. Image horizontal accuracy is +/-8 ft. at the 95% confidence level. Each file contains an image covering 6000 ft. by 4000 ft. on the ground.

The coordinate system used for the production of the digital FIRM is Universal Transverse Mercator (UTM) Zone 18N. The horizontal datum as NAD 83, GRS 80 spheroid.

1.3 Coordination

Consultation Coordination Officer's (CCO) meetings may be held for each jurisdiction in this countywide FIS. An initial CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to explain the nature and purpose of a FIS and to identify the streams to be studied by detailed methods. A final CCO meeting is held typically with representatives of FEMA, the community, and the study contractor to review the results of the study.

The dates of the initial and final CCO meetings held for all jurisdictions within Niagara County and the incorporated communities within its boundaries are shown in Table 1, "Initial and Final CCO Meetings."

TABLE 1 – INITIAL AND FINAL CCO MEETINGS

<u>Community</u>	<u>Initial CCO Date</u>	<u>Final CCO Date</u>
Barker, Village of	*	June 14, 1983
Cambria, Town of	May 1979	June 22, 1982
Lewiston, Town of	November 4, 1976	July 10, 1979
Lockport, City of	*	March 3, 1980
Lockport, Town of	May 24, 1977	September 3, 1980
	July 8, 1999 ¹	August 3, 2000
Middleport, Village of	*	April 7, 1982
Newfane, Town of	September 25, 1975	November 24, 1980

* Data not available.

¹ Notified by letter.

TABLE 1 – INITIAL AND FINAL CCO MEETINGS (CONTINUED)

<u>Community</u>	<u>Initial CCO Date</u>	<u>Final CCO Date</u>
Niagara Falls, City of	August 11, 1976	May 12, 1982
Niagara, Town of	*	April 14, 1983
North Tonawanda, City of	May 23, 1977	February 10, 1981
Pendleton, Town of	*	January 28, 1981
Porter, Town of	May 1979	June 22, 1982
Somerset, Town of	September 25, 1975	January 27, 1981
Wheatfield, Town of	September 25, 1975	August 25, 1980
Wilson, Town of	*	January 6, 1977
Wilson, Village of	*	*
Youngstown, Village of	May 12, 1977	July 10, 1979

* Data not available.

¹ Notified by letter.

2.0 AREA STUDIED

2.1 Scope of Study

This FIS covers the geographic area of Niagara County, New York.

All or portions of the flooding sources listed in Table 2, "Flooding Sources Studied by Detailed Methods," were studied by detailed methods. Limits of detailed study are indicated on the Flood Profiles (Exhibit 1) and on the FIRM (Exhibit 2).

TABLE 2 - FLOODING SOURCES STUDIED BY
DETAILED METHODS

Beaver Creek	Gulf Tributary
Beaver Creek Tributary 1	Hopkins Creek
Bergholtz Creek	Johnson Creek 2
Brent Road Tributary	Johnson Creek 2 Tributary 1
Bull Creek	Keg Creek
Bull Creek Tributary	Lake Ontario
Cayuga Creek	Mud Creek
Cayuga Creek Tributary	Niagara River – Tonawanda Channel
Cayuga Creek West Tributary	North Tonawanda Creek
Cayuga Creek West Tributary Diversion	Raymond Road Tributary
Donner Creek	Sawyer Creek East
Eighteenmile Creek	Sawyer Creek West
Eighteenmile Creek, East Branch	Tonawanda Creek
Eighteenmile Creek, East Tributary	Town Ditch No. 2
Eighteenmile Creek, West Tributary	Tuscarora Bay
Erie Canal	

TABLE 2 - FLOODING SOURCES STUDIED BY
DETAILED METHODS (CONTINUED)

Fish Creek 1	Twelvemile Creek
Fish Creek 2	Twelvemile Creek, East Branch
Gill Creek	Twelvemile Creek, East Branch Tributary East
Gill Creek East Tributary	Twelvemile Creek, East Branch Tributary South
Golden Hill Creek	Twelvemile Creek Tributary 3
Gulf Branch	Twelvemile Creek Tributary 3A

For this countywide FIS, seven streams throughout Niagara County have been restudied using detailed methods. The streams and the limits of detailed study are shown in Table 3 – “Scope of Revision for September 2008, Countywide FIS.”

TABLE 3 – SCOPE OF REVISION FOR SEPTEMBER 2008, COUNTYWIDE FIS

<u>Stream Name</u>	<u>Limits of Detailed Study</u>
Bergholtz Creek	11.7 miles; from its confluence at Cayuga Creek to a point approximately 1.4 miles upstream of Route 425/Shawnee Road; in the City of Niagara Falls and towns of Cambria and Wheatfield.
Bull Creek	9.5 miles; from its confluence at Tonawanda Creek to a point approximately 500’ upstream of Lockport Road; in the City of North Tonawanda and towns of Cambria, Pendleton and Wheatfield.
Cayuga Creek	2.6 miles; from a point approximately 170’ upstream of Niagara Falls Boulevard to a point approximately 1.4 miles upstream of Porter Road; in the City of Niagara Falls, Town of Niagara and Town of Wheatfield.
Cayuga Creek West Tributary & Cayuga Creek West Tributary Diversion	3.4 miles; from its confluence with Cayuga Creek to a point approximately 250’ upstream of Lockport Road; in the Town of Niagara.
Donner Creek	1.3 miles; from Beattie Avenue to a point approximately 1,000’ upstream of Lincoln Avenue; in the City of Lockport and Town of Lockport
Lake Ontario	Entire shoreline within Niagara County
Tonawanda Creek	Entire reach within Niagara County
Sawyer Creek (East and West)	6.0 miles; from its confluence at Bull Creek to the confluence of Bergholtz Creek; in the City of North Tonawanda and Town of Wheatfield.
Tuscarora Bay	Entire shoreline within Niagara County
Town Ditch No. 2	2.7 miles; from its confluence at Tonawanda Creek to a point approximately 4,066’ upstream of Campbell Boulevard; in the Town of Pendleton.

Table 4, “Stream Name Changes,” lists streams that have names in this countywide FIS other than those used in previously printed FISs for the communities in which they are located.

TABLE 4 – STREAM NAME CHANGES

<u>Community</u>	<u>Old Name</u>	<u>New Name</u>
Porter, Town of	Tributary B-1	Beaver Creek Tributary 1
Niagara, Town of	West Tributary to Cayuga Creek	Cayuga Creek West Tributary
Lockport, Town of	East Branch Eighteenmile Creek	Eighteenmile Creek, East Branch
Newfane, Town of		
Lockport, Town of	East Tributary Eighteenmile Creek	Eighteenmile Creek East Tributary
Lockport, Town of	West Tributary Eighteenmile Creek	Eighteen Mile Creek West Tributary
Lewiston, Town of	Fish Creek	Fish Creek 1
Somerset, Town of	Fish Creek	Fish Creek 2
Niagara, Town of	East Tributary to Gill Creek	Gill Creek East Tributary
Middleport, Village of	Johnson Creek	Johnson Creek 2
Middleport, Village of	Tributary J-1	Johnson Creek 2 Tributary 1
Cambria, Town of	East Branch Twelvemile Creek	Twelvemile Creek East Branch
Wilson, Town of		
Wilson, Village of		
Wilson, Town of	Tributary East of East Branch Twelvemile Creek	Twelvemile Creek East Branch, East Tributary
Wilson, Town of	Tributary South of East Branch Twelvemile Creek	Twelvemile Creek East Branch, South Tributary
Porter, Town of	Tributary T-3	Twelvemile Creek Tributary 3
Porter, Town of	Tributary T-3A	Twelvemile Creek Tributary 3A

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction.

Numerous flooding sources in the country 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, and agreed upon by, FEMA and Niagara County.

This FIS also incorporates the determinations of letters issued by FEMA resulting in map changes (Letter of Map Revision [LOMR], Letter of Map Revision - based on Fill [LOMR-F], and Letter of Map Amendment [LOMA], as shown in Table 5, "Letters of Map Change."

TABLE 5 – LETTERS OF MAP CHANGE

<u>Community</u>	<u>Flooding Source(s) Project Identifier</u>	<u>Date Issued</u>	<u>Type</u>
Lockport, Town of	Tonawanda Creek / 7057 Tonawanda Creek Road	August 27, 1997	LOMA
Lockport, Town of	Mud Creek / 6978 Lockwood Lane	March 22, 2007	LOMA
Niagara Falls, City of	Gill Creek / 3635 Sherwood Avenue	April 10, 1998	LOMA
Niagara Falls, City of	Gill Creek / 3620 Sherwood Avenue	April 7, 1999	LOMA
Niagara Falls, City of	Gill Creek / 2939 Grand Avenue	April 11, 2001	LOMA
Niagara Falls, City of	Gill Creek / 2756 Welch Avenue	February 18, 2003	LOMA
Niagara Falls, City of	Niagara River / 9351 Champlain Avenue	August 11, 2005	LOMA

2.2 Community Description

Niagara County is located in the extreme western part of New York State, adjacent to Lake Ontario to the north, the Niagara River and Canada to the west, Orleans County to the east, Genesee County to the southeast, and Erie County to the south. Niagara County spans 1,140 square miles and according to the 2000 census, the population was 219,846. The County seat is the City of Lockport. Several major highways span Niagara County, including Interstate 190, US Route 62, State Routes 18, 31 and 78, and the Robert Moses State Parkway. Niagara County is also home to the Tuscarora Indian Reservation and the Tonawanda Indian Reservation.

Niagara County is home to the Niagara Falls, which in effect serves as a drainage ditch for four of the Great Lakes and borders both Niagara County and Canada. Water passing over Niagara Falls originates from Lake Erie and flows down the Niagara River before passing over Niagara Falls. Large electrical power plants are fed by Niagara Falls on both the American and Canadian sides.

Niagara County has a temperate climate with warm summers and cold winters. The average daily high temperature is 57 degrees and the average daily low temperature is 38 degrees. The average annual rainfall is approximately 36 inches and the average annual snowfall is approximately 82 inches.

2.3 Principal Flood Problems

Flooding in Niagara County is attributed mainly to heavy rains resulting from localized thunderstorms, hurricanes and, along its shoreline, high water levels in Lake Ontario combined with high winds

In the Village of Barker, flooding problems are caused by the overflow of Golden Hill Creek. Prolonged spring thaws and heavy summer rainfall create the most severe flooding conditions.

In the Town of Lewiston, inadequate drainage systems and heavy land development compound the problem of flooding during heavy rain storms.

In the City of Lockport, low-lying areas are subject to flooding caused by the overflow of Eighteenmile Creek, Gulf Branch and Lincoln Avenue Branch. Heavy rains in conjunction with snowmelt and ice jams in the early spring cause the most severe flooding.

In the Town of Lockport, floods in Tonawanda Creek are caused by snowmelt coupled with rainfall in the late winter and early spring. The floods from Tonawanda Creek generally overflow and cause floods in the Mud Creek Watershed.

In the Village of Middleport, flooding primarily occurs along Johnson Creek 2 Tributary 1, where an underground culvert system was inadequately designed and holds capacity less than the 10% annual-chance discharge. Debris collects at the trash rack of the opening to the system and obstructs flow to further add to overland flooding.

In the Town of Newfane, flooding is confined to low-lying areas adjacent to Lake Ontario on the east and west sides of Eighteenmile Creek. This usually occurs when heavy rains and high winds cause Lake Ontario's water levels to rise. However, some local floods along the channel may be attributed to ice jams.

In the City of Niagara Falls, low-lying areas are subject to flooding caused by overflow of Cayuga Creek, Bergholtz Creek and Gill Creek. Prolonged spring thaws and heavy summer rainfall create the most severe flooding conditions. Shallow flooding caused by ponding of runoff during heavy rains also occurs in several low-lying areas in the eastern portion of the City. In the past, flooding of Cayuga Island had been caused by the backwater effect created by ice jams in the Niagara River above the Falls, and long-duration storms over Lake Erie.

In the City of North Tonawanda, flooding problems on the Niagara River – Tonawanda Channel have been associated with high-water elevations and ice jams. Strong winds blowing across Lake Erie from the southwest cause a wind setup of the lake and high elevations on the river. Large ice jams occur on the river in the spring when the ice breaks up on the lake and flows down the river. Tonawanda Creek and Bull Creek have been relatively free of overbank flooding.

In the Town of Pendleton, flooding generally occurs along Tonawanda Creek, North Tonawanda Creek, Mud Creek, Branch Mud Creek, Bull Creek and Bull Creek Tributary. Flooding is generally a result of heavy rainfall and rapid thaws.

In the Town of Porter, flooding primarily occurs along the Niagara River during the spring thaw resulting from ice jams on the river. Other flooding in the area can be attributed to undersized or clogged culverts.

In the Town of Somerset, flooding has occurred at Golden Hill Creek and Fish Creek 2. Flatlands and farm pastures adjacent to the streams are subject to periodic flooding, usually a result of prolonged spring thaws and heavy summer rainfalls. Additionally, along Lake Ontario, high lake levels and prolonged easterly and northerly winds have resulted in considerable shoreline erosion and loss of private property.

In the Town of Wheatfield, flooding may occur during peak storm flows in areas adjacent to streams due to inadequate grades, low stream banks, undersized culverts, and debris and sediment deposits.

In the Town of Wilson, flooding due to heavy rains and high winds and water levels along Lake Ontario can occur. Flooding usually occurs in mostly undeveloped, low-lying areas of the town. Erosion along the lake shore occurs due to wave action and high water levels, caused by heavy rains and high winds.

In the Village of Wilson, flooding occurs along the shoreline of Lake Ontario and inland along the banks of Twelvemile Creek, East Branch.

In the Village of Youngstown, flooding primarily exists along the lower level of the bank of the Niagara River, usually due to ice jams. Because of limited differences in elevations between different parts of the community, stormwater runoff causes ponding, and local drainage facilities are inadequate.

Several severe storms have struck Niagara County in the past. The most severe of these storms are described below.

In February 1985, severe storms and flooding struck Niagara County. At USGS Gage No. 04218000 on Tonawanda Creek at Rapids, a peak streamflow of 8,500 cfs was recorded, and corresponded to a gage height of 16.38 feet (USGS, Ret. May 2008). This was the highest recording at that gage since 1960 and no higher stages have been recorded since. According to the National Weather Service (NWS), a flood at or above 16 feet would correspond to widespread flooding through most of North Clarence (Erie County), North Amherst (Erie County), Royalton, Newstead (Erie County) and cause significant road closures. Backwater flooding would also occur on Ransom Creek, Black Creek, Mud Creek and Beeman Creek (USGS, Ret. May 2008). The area was declared a federal disaster in March 1985.

In January 1998, severe winters snow and ice storms struck Niagara County. At USGS Gage No. 04218000 on Tonawanda Creek, a peak streamflow of 6,600 cfs was recorded, and corresponded to a gage height of 15.33 feet (USGS, Ret. May 2008). According to the NWS, a flood between 14 and 16 feet would correspond to moderate flooding and result in road closures in Royalton and Newstead. Some subdivisions in the Ransom Oaks area would experience flooding from backwater into smaller creeks (USGS, Ret. May 2008). The area was declared a federal disaster on January 21, 1998.

Other storms of significance occurred in January 1996, March 2003, April 2005 and March 2007 (USGS, Ret. May 2008).

2.4 Flood Protection Measures

In the Town of Cambria, flood protection measures are limited to clearing debris and ditching along Bergholtz Creek and Twelvemile Creek, East Branch.

In the Town of Lewiston, a 1973 drainage control law was enacted by the Town, as well as restrictions on new construction within the flood hazard area.

In the City of Lockport, a task force was assembled to periodically clean the inlet of the 72-inch culvert located at Lincoln Avenue, an area prone to flooding.

In the Town of Lockport, flood protection measures are limited to clearing and dredging troublesome portions of Donner Creek and Mud Creek. Additionally, town building permit systems regulate new development within the floodplains of the Town.

In the Village of Middleport, flood protection measures are limited to the clearing of troublesome portions of Johnson Creek 2 and Johnson Creek 2 Tributary 1, as needed.

In the Town of Newfane, after the storm of March 1973, the USACE assisted the Town by providing parallel seawalls constructed of riprap and stone gabions. The seawalls are located at the mouth of Eighteenmile Creek to prevent low-lying areas of Olcott from future flooding. These measures were effective during the April 1976 storm. Additionally, the Town has a Flood Control Ordinance which controls development within the flood hazard areas.

In the Town of Niagara, flood protection measures are limited to some minor artificial embankments which have been constructed on a portion of Cayuga Creek.

In the Town of Pendleton, maintenance of Tonawanda Creek is the responsibility of the State of New York, because Tonawanda Creek forms an integral part of the New York State Barge Canal system.

In the Town of Porter and Village of Youngstown, in an effort to reduce the ice jamming on the Niagara River, an ice boom is placed across the inlet of the river in the City of Buffalo, at the mouth of Lake Erie. The boom is removed in the spring, after five consecutive 35-degree days and when Lake Erie contains less than 600 square miles of ice. Additionally, troublesome portions of the Niagara River and other studies streams are cleared and ditched to redirect flow as needed.

In the Town of Somerset, concrete walls and riprap have been installed along the shoreline of Lake Ontario. Additionally, outflow from Lake Ontario is regulated by a powerhouse and dam at Barnhart Island, New York and is controlled following a written plan and procedure.

In the Town of Wheatfield, flood protection measures are limited to the annual cleaning and maintenance of existing ditches

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the county, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this FIS. Flood events of a magnitude which are 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 which equals or exceeds the 100-year flood (1-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, 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 FIS. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for the flooding sources studied in detail affecting the county.

Precountywide Analyses

Each jurisdiction within, Niagara County, with the exceptions of the towns of Hartland and Royalton, as well as the Village of Lewiston has a previously printed FIS report. The hydrologic and hydraulic analyses described in those reports have been compiled and are summarized below.

Elevation-frequency relationships for Lake Ontario were obtained from a study conducted by the USACE in 1988 (USACE, 1988). This study was a revision on the original 1977 report (USACE, 1977). In the revised study, gage information from seven continuously reporting gage stations was used:

- Oswego (Gage No. 2030), with record since 1935;
- Rochester (Gage No. 2058), with record since 1956;
- Cape Vincent (Gage No. 2000), with record since 1916;
- Port Weller (Canadian Gage No. 02HA018), with record since 1930;
- Toronto (Canadian Gage No. 02HC048), with record since 1915;
- Cobourg (Canadian Gage No. 02HD015), with record since 1956;
- Kingston (Canadian Gage No. 02HM008), with record since 1956.

For the updated Lake Ontario study, both the log-Pearson Type III and Pearson Type III distributions were investigated. Comparison of the two methods resulted in nearly identical skew values, and logarithmic transformation was not needed, therefore a Pearson Type III frequency distribution was used. A skew value of 0.4 was utilized for Lake Ontario. Flood levels for open-coast Lake Ontario were computed for each station taking into consideration years of gage record, physical environment and shoreline configuration. In the USACE study, stillwater elevations for Lake Ontario were divided into five regions, Region A, Region B, Region C, Region D and Region E. The shoreline within Niagara County corresponded to Region E. Elevations for the selected recurrence intervals of Lake Ontario were utilized for Tuscarora Bay as well.

Elevation-frequency relationships for Niagara River – Tonawanda Channel were derived using information supplied by the USACE (Bill Endell) and Ontario-Hydro (Ontario-Hydro, Unpublished). Stage elevations for the following gages were utilized: Black Rock Gage (Squaw Island in the City of Buffalo), Huntley Station Gage (in the Town of Buffalo), Tonawanda Island Gage (Tonawanda Island in the City of North Tonawanda) and the Lasalle Gage (in the City of Niagara Falls). For the maximum annual instantaneous peaks, statistical analyses were made for these gages using a non-log Pearson Type III distribution. Using a skew of 0.0 and the standard deviation computed for each gage, stage elevations were computed for the selected recurrence intervals. Profiles for the Niagara River – Tonawanda Channel were established by connecting the respective stage elevations at the various gages. A summary of stillwater elevations is shown in Table 6 – “Summary of Stillwater Elevations.”

TABLE 6- SUMMARY OF STILLWATER ELEVATIONS

<u>FLOODING SOURCE AND LOCATION</u>	<u>STILLWATER ELEVATION (feet NAVD)</u>			
	<u>10- PERCENT</u>	<u>2- PERCENT</u>	<u>1- PERCENT</u>	<u>0.2- PERCENT</u>
LAKE ONTARIO				
Entire Niagara County shoreline from confluence of Niagara River to eastern Niagara County corporate limits	247.7	248.5	248.7	249.4
NIAGARA RIVER – TONAWANDA CHANNEL				
At corporate limits of City of North Tonawanda – 42,900’ above Niagara Falls	568.1	568.7	568.9	569.4
At confluence of Tonawanda Creek – 57,900’ above Niagara Falls	569.2	569.8	570.0	570.6
TUSCARORA BAY				
Entire shoreline within the Town of Wilson and Village of Wilson	247.7	248.5	248.7	249.4

For streams studies by detailed methods in Niagara County, several methods were used for hydrologic analyses. For Eighteenmile Creek and Eighteenmile Creek, East Branch, a log-Pearson Type III analysis was performed based on the USGS gaging stations mentioned above, and then for comparison an analysis was conducted using the Bureau of Public Roads (BPR) Circular No. 4 (U.S. Department of Commerce, 1963). The results checked closely with each other, and the peak discharges from the log-Pearson Type III analysis were used.

For Gill Creek, peak discharge-frequency relationships were determined using the BPR Circular No. 4. Parameters such as drainage area, length and slope of stream, and precipitation were used to develop the peak rates of runoff along the stream.

For Golden Hill Creek, Twelvemile Creek and Twelvemile Creek, East Branch, the hydrologic analysis was performed by first determining the peak discharge-frequency relationships of nine USGS gaging stations on Cattaraugus Creek, Eighteenmile Creek, Smoke Creek, Buffalo Creek, Little Buffalo Creek, Cayuga Creek, Cazenovia Creek and Scajaquada Creek. Drainage area-discharge relationships were established using the standard log-Pearson Type III method as outlined by the Water Resources Council (Water Resources Council, 1976), without the influence of expected probability adjustments. The regional skew value of 0.0 was a computed weighted average considering the natural skews and years of record for each gage. Regional curves were then determined which graphically correlated peak discharge and drainage information, and that data was extended to cover all local watersheds with drainage areas less than 15 square miles. Methods outlined in BPR Circular No. 4 were also used and compared with the regional curves, and were found to closely match each other.

In the Town of Lewiston, peak discharges for Fish Creek 1 were determined using the same regional curve methodology described above.

In the City of Lockport, peak discharges for Gulf Branch and Lincoln Avenue Branch were determined using the same regional curve methodology described above.

In the Town of Lockport, peak discharges for Donner Creek were determined using the same regional curve methodology described above. Peak discharges for Mud Creek were obtained from the USACE report on floodplain management in the Tonawanda Creek watershed (USACE, 1976), which also used a standard log-Pearson Type III analysis on gage information on hydrologically similar drainage basins within the watershed. For comparison, peak discharges for Mud Creek were also calculated using the Interim Report and were found to be larger than the USACE study discharges for all events except the 0.2% annual-chance flood. Discharges for Tonawanda Creek within the Town of Lockport were calculated using HEC-1 computer modeling and a regional frequency analysis developed by the Buffalo District USACE for a Buffalo River/Lower Tonawanda Creek Study (USACE, 1978; USACE, 1990). The Rational Method ($Q=CIA$) was used to determine peak discharges for Eighteenmile Creek, East Tributary and Gulf Tributary.

In the Village of Middleport, hydrologic information for Johnson Creek 2 and Johnson Creek 2 Tributary 1 were obtained from an adaptation of regional flood-frequency curves previously determined (Goodkind and O’Dea, 1978) for other FISs in Niagara and Erie Counties, and the regional curve methodology described above.

In the Town of Newfane, peak discharges for Keg Creek and Hopkins Creek were determined using the regional curve methodology above.

In the Town of Niagara, peak discharges for Gill Creek, East Tributary were determined using the BPR Circular No. 4.

In the City of Niagara Falls, hydrologic analysis for the Niagara River – Tonawanda Channel was prepared by the Buffalo District USACE and consisted of deriving stage-frequency relationships for the gages along the channel and connecting the respective elevations at each gage to create flood profiles.

In the Town of Pendleton, peak discharges for North Tonawanda Creek, Mud Creek and Bull Creek Tributary were determined using the regional curve methodology described above.

In the Town of Porter, peak discharges for Beaver Creek, Beaver Creek Tributary B1, Twelvemile Creek Tributary 3 and Twelvemile Creek Tributary 3A were determined using the regional curve methodology described above.

In the Town of Somerset, peak discharges for Fish Creek 2 were determined using the same regional curve methodology described above.

In the Town of Wheatfield, peak discharges for Cayuga Creek, Cayuga Creek Tributary, Brent Road Tributary, and Raymond Road Tributary were determined using the same regional curve methodology described above. Flood profiles previously determined for the Niagara River – Tonawanda Channel were revised to reflect the more recent high water marks taken from the Flood Damage Study, Tonawanda Channel, Upper Niagara River, New York study (USACE, 1986).

In the Town of Wilson, peak discharges for Twelvemile Creek, East Branch Tributary East and Twelvemile Creek, East Branch Tributary South were determined using the same regional curve methodology above.

Revised Analyses

Information on the methods used to determine peak discharge-frequency relationships for the streams shown in Table 3, restudied as part of this countywide FIS is shown below.

Due to the lack of USGS gaging stations within the streams studied by detailed methods, two sets of regional regression equations were evaluated for the best peak flow estimate of the 10%, 2%, 1% and 0.2% annual chance event. These were

taken from two USGS published reports, WRI 90-4197 (USGS, 1991) and SIR 2006-5112 (USGS, 2006).

The National Flood Frequency (NFF) program (USGS, 2002) was used to calculate discharges for WRI 90-4197. The variables governing the discharges for each of the flow locations are drainage area (A), basin storage (ST), main channel slope (S) and mean annual precipitation (P). These variables were determined based on USGS 7.5-Minute Quadrangles. The P was calculated based on distribution of mean annual precipitation in New York.

The New York Flood Frequency Tool (NYFFT) (USGS, 2006) was used to calculate discharges for SIR 2006-5112. The variables governing the discharges for each of the flow locations are drainage area (A), basin storage (ST), mean annual runoff (RUNF) and slope ratio (SR). These variables were determined internally by the program with the exception of drainage area, which was determined using USGS 7.5-Minute Quadrangles.

For Sawyer Creek, the basin is split into two flow directions (East and West). Ward Road is the diving point. Sawyer Creek East flows into Bull Creek and West into Bergholtz Creek.

It was determined that the peak discharges calculated using the regression equations outlined in WRI 90-4197 resulted in the best estimate for Niagara County, based on comparisons of published peak flow occurrences, previous FISs and neighboring gage location with similar basin characteristics. For Donner Creek, an urban variable was added to reflect the significant development within the basin. This was performed by employing the nationwide urban equations as established in USGS WSP 2207 (USGS, 1983).

For Tonawanda Creek in this revision, hydrologic analysis was taken from the FIS for the Town of Amherst in Erie County, New York (FEMA, October 1992). Hydrologic data was developed for four portions on the creek. The peak discharges were calculated using a regional frequency analysis and runoff models using HEC-1 which were developed by the USACE, Buffalo District.

A summary of the drainage area-peak discharge relationships for all streams studied by detailed methods is shown in Table 7, "Summary of Discharges."

TABLE 7 - SUMMARY OF DISCHARGES

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10- PERCENT</u>	<u>2- PERCENT</u>	<u>1- PERCENT</u>	<u>0.2- PERCENT</u>
BEAVER CREEK					
At confluence with Twelvemile Creek Approximately 650' upstream of Braley Road	8.80	930	1,280	1,430	1,850
At New Road Approximately 700' upstream of New Road	4.80	540	740	830	1,070
At New Road Approximately 700' upstream of New Road	4.30	490	660	750	980
Approximately 2,600' upstream of State Route 93	4.20	460	650	740	960
Route 93	3.60	420	570	650	840
BEAVER CREEK TRIBUTARY 1					
At confluence with Beaver Creek	0.10	40	70	90	110
BERGHOLTZ CREEK					
At mouth	17.29	779	1,080	1,210	1,510
Downstream of confluence of Sawyer Creek	13.66	691	965	1,080	1,360
Upstream of confluence of Sawyer Creek	12.12	620	867	975	1,220
At Niagara Road	9.45	528	743	837	1,050
At Raymond Road	4.52	279	394	444	555
At Human Road	3.24	238	342	386	487
BRENT ROAD TRIBUTARY					
At mouth	1.70	265	405	470	650
BULL CREEK					
At mouth	28.48	1,050	1,430	1,590	1,960
Upstream of confluence with Sawyer Creek	21.26	815	1,110	1,240	1,530
At Loveland Road	14.10	574	785	877	1,080

TABLE 7 - SUMMARY OF DISCHARGES (CONTINUED)

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10- PERCENT</u>	<u>2- PERCENT</u>	<u>1- PERCENT</u>	<u>0.2- PERCENT</u>
BULL CREEK (CONTINUED)					
Downstream of confluence of Bull Creek Tributary	9.85	465	614	717	889
At upstream limit of detailed study	4.48	258	356	399	498
BULL CREEK TRIBUTARY					
At confluence with Bull Creek	2.02	105	156	178	234
At upstream corporate limits of the Town of Pendleton	0.87	50	76	88	118
CAYUGA CREEK					
At confluence with Little Niagara River	28.2	1,650	2,650	3,050	3,800
At upstream corporate limits of the City of Niagara Falls	14.3	950	1,450	1,650	2,100
Upstream of confluence of Bergholtz Creek	14.02	642	894	1,000	1,250
Downstream of confluence of Western Tributary	12.74	584	814	914	1,130
CAYUGA CREEK TRIBUTARY					
At mouth	1.85	290	420	490	680
CAYUGA CREEK WEST TRIBUTARY					
At mouth	1.81	173	253	287	366
At Packard Road	0.39	49.9	73.4	83.4	107
DONNER CREEK					
At South Transit Road	2.77	420	620	880	950
At Beattie Road	2.16	334	446	526	631
At Lincoln Road	0.72	190	267	300	362
EIGHTEENMILE CREEK					
At confluence with Lake Ontario	82.50	7,250	10,200	11,800	15,100

TABLE 7 - SUMMARY OF DISCHARGES (CONTINUED)

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10- PERCENT</u>	<u>2- PERCENT</u>	<u>1- PERCENT</u>	<u>0.2- PERCENT</u>
EIGHTEENMILE CREEK (CONTINUED)					
At downstream corporate limits of the Town of Lockport	21.90	1,850	2,650	3,100	4,000
Just downstream of confluence with West Tributary	21.30	1,821	2,608	3,049	3,937
At upstream corporate limits of the Town of Newfane	16.50	1,850	2,650	3,100	4,000
Just upstream of confluence with small tributary	10.60	1,228	1,740	2,009	2,632
At downstream corporate limits of the City of Lockport	10.00	1,200	1,700	1,960	2,570
At upstream corporate limits of the City of Lockport	2.20	330	490	545	770
EIGHTEENMILE CREEK, EAST BRANCH					
At confluence with Eighteenmile Creek	43.00	4,150	5,950	6,750	8,800
At Lake Avenue	40.90	3,931	5,639	6,393	8,340
At Wicks Road	39.40	3,813	5,471	6,200	8,091
At upstream corporate limits of the Town of Newfane	31.00	3,200	4,600	5,200	6,800
EIGHTEENMILE CREEK, EAST TRIBUTARY					
At downstream corporate limits of the Town of Lockport	1.10	289	366	405	493
At confluence of small tributary	0.60	167	215	238	265
EIGHTEENMILE CREEK, WEST TRIBUTARY					
At confluence with Eighteenmile Creek	10.10	1,061	1,587	1,821	2,376

TABLE 7 - SUMMARY OF DISCHARGES (CONTINUED)

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10- PERCENT</u>	<u>2- PERCENT</u>	<u>1- PERCENT</u>	<u>0.2- PERCENT</u>
EIGHTEENMILE CREEK, WEST TRIBUTARY (CONTINUED)					
Just upstream of confluence of small tributary	8.80	989	1,488	1,709	2,236
Just upstream of confluence of small tributary	6.60	790	1,192	1,370	1,795
ERIE CANAL					
At the confluence with Tonawanda Creek	1.51	440	620	760	880
FISH CREEK 1					
At mouth	4.69	650	960	1,050	1,470
At confluence of Tributary A	3.87	560	820	910	1,260
At upstream limit of detailed study	3.21	470	700	770	1,080
FISH CREEK 2					
At mouth	13.42	1,590	2,300	2,600	3,480
GILL CREEK					
At confluence with Niagara River	13.90	930	1,400	1,600	2,050
At Ferry Avenue	11.90	870	1,330	1,500	1,800
Downstream of confluence of East Gill Creek	10.20	720	1,080	1,220	1,560
Upstream of confluence of East Gill Creek	8.30	650	980	1,110	1,400
At Niagara Town – Niagara Falls City corporate boundary	5.60	480	720	830	1,050
At upstream corporate limit of the Town of Niagara	3.80	350	510	590	760
At confluence of reservoir stream	3.58	520	760	850	1,180

TABLE 7 - SUMMARY OF DISCHARGES (CONTINUED)

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10- PERCENT</u>	<u>2- PERCENT</u>	<u>1- PERCENT</u>	<u>0.2- PERCENT</u>
GILL CREEK (CONTINUED)					
At upstream limit of detailed study	2.24	350	520	570	800
GILL CREEK EAST TRIBUTARY					
Upstream of Interstate 190	1.30	230	350	390	480
Downstream of Lockport Road	0.70	170	270	330	460
GOLDEN HILL CREEK					
At mouth	21.80	2,380	3,400	3,800	5,100
At Hosmer Road	6.50	820	1,220	1,350	1,850
At Stone Road	4.50	610	880	995	1,360
At Niagara Street	3.50	495	720	810	1,130
GULF BRANCH					
At Stone Road	4.5	610	880	995	1,360
At upstream corporate limits of the City of Lockport	3.5	495	720	810	1,130
GULF TRIBUTARY					
At downstream corporate limits of the Town of Lockport	0.28	149	199	215	259
HOPKINS CREEK					
At confluence with Lake Ontario	15.20	1,780	2,500	2,870	3,800
JOHNSON CREEK 2					
At northern corporate limit of the Village of Middleport	12.30	1,130	1,560	1,670	1,700 ²
Downstream of confluence with Johnson Creek 2 Tributary 1	11.00	1,130	1,560	1,770	2,270
At Francis Street	8.90	950	1,300	1,480	1,900

TABLE 7 - SUMMARY OF DISCHARGES (CONTINUED)

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10- PERCENT</u>	<u>2- PERCENT</u>	<u>1- PERCENT</u>	<u>0.2- PERCENT</u>
JOHNSON CREEK 2 (CONTINUED)					
At southern corporate limit of the Village of Middleport	8.70	920	1,250	1,400	1,820
JOHNSON CREEK 2 TRIBUTARY 1					
At Kelly Street	2.10	240 ¹	330 ¹	360 ³	500 ³
KEG CREEK					
At confluence with Lake Ontario	13.50	1,570	2,280	2,560	3,450
MUD CREEK					
At confluence with Tonawanda Creek	41.10	1,900	2,400	2,700	3,100
At upstream corporate limits of the Town of Pendleton	40.70	1,900	2,400	2,700	3,100
At Rapids Road	32.60	1,650	2,230	2,470	3,030
NORTH TONAWANDA CREEK					
At confluence with Erie Canal	0.79	300	420	530	1,875
At confluence with Tonawanda Creek	0.47	260	370	460	1,795
RAYMOND ROAD TRIBUTARY					
At mouth	1.67	260	390	450	640
SAWYER CREEK EAST					
At confluence with Tonawanda Creek	6.90	279	375	417	510
At Nash Road	3.21	136	183	204	247
SAWYER CREEK WEST					
At confluence with Bergholtz Creek	1.54	84.1	114	127	156

¹ 20 cfs through underground culvert

TABLE 7 - SUMMARY OF DISCHARGES (CONTINUED)

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10- PERCENT</u>	<u>2- PERCENT</u>	<u>1- PERCENT</u>	<u>0.2- PERCENT</u>
TONAWANDA CREEK					
At Creekside Drive	530.00	13,000	17,000	18,700	22,300
At Twin Cities Memorial Highway	525.00	11,700	15,900	17,150	22,000
Downstream of confluence of Bull Creek	520.00	11,600	15,800	17,000	21,800
Upstream of confluence of Bull Creek	504.00	12,400	16,200	17,800	21,390
At upstream confluence of Ransom Creek	435.00	9,400	10,900	11,500	13,300
Upstream of confluence of Mud Creek	379.00	5,600	6,500	6,600	7,000
At Town of Lockport downstream corporate limits	351.00	*	*	6,600	*
At most upstream crossing of Rapids Road	331.00	*	*	8,950	*
TOWN DITCH NO. 2					
At mouth	4.29	172	230	256	310
At Main Road	2.70	117	157	174	212
TWELVEMILE CREEK					
At Lake Ontario	36.00	3,425	4,925	5,500	7,250
At Porter Town – Wilson Town corporate boundary	25.50	2,715	3,925	4,375	5,850
Downstream of confluence with Beaver Creek	23.40	2,200	3,000	3,400	4,400
Upstream of confluence with Beaver Creek	14.60	1,480	20,000	2,300	2,900

*Data not available

TABLE 7 - SUMMARY OF DISCHARGES (CONTINUED)

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10- PERCENT</u>	<u>2- PERCENT</u>	<u>1- PERCENT</u>	<u>0.2- PERCENT</u>
TWELVEMILE CREEK (CONTINUED)					
Approximately 600' upstream of State Route 93	13.10	1,320	1,800	2,040	2,670
TWELVEMILE CREEK, EAST BRANCH					
At Lake Ontario	37.70	3,530	5,040	5,710	7,540
At State Route 18	36.50	3,530	5,040	5,710	7,540
At upstream corporate limit of the Town of Wilson	17.30	1,975	2,850	3,200	4,275
At North Ridge Road	16.90	1,680	2,300	2,600	3,370
TWELVEMILE CREEK, EAST BRANCH TRIBUTARY EAST					
At confluence with Twelvemile Creek, East Branch	3.00	420	630	694	960
At Irish Road	2.30	380	570	630	880
TWELVEMILE CREEK, EAST BRANCH TRIBUTARY SOUTH					
At confluence with Twelvemile Creek, East Branch	1.55	240	360	410	570
At upstream corporate limit of the Town of Wilson	0.67	135	200	220	315
TWELVEMILE CREEK TRIBUTARY 3					
Upstream of confluence with Twelvemile Creek	8.50	900	1,220	1,400	1,800
At Balmer Road	7.00	760	1,020	1,180	1,500
At Dickersonville Road	5.20	580	800	900	1,150
At southern corporate limit of the Town of Porter	4.80	540	740	830	1,070

TABLE 7 - SUMMARY OF DISCHARGES (CONTINUED)

<u>FLOODING SOURCE AND LOCATION</u>	<u>DRAINAGE AREA (sq. miles)</u>	<u>PEAK DISCHARGES (cfs)</u>			
		<u>10- PERCENT</u>	<u>2- PERCENT</u>	<u>1- PERCENT</u>	<u>0.2- PERCENT</u>
TWELVEMILE CREEK TRIBUTARY 3A					
At confluence with Twelvemile Creek Tributary T3	1.80	90	110	125	140
At southern corporate limit of the Town of Porter	1.40	180	250	280	360
Approximately 500' downstream of railroad culvert	0.90 ¹	45 ¹	55 ¹	65 ¹	75 ¹
Downstream face of railroad culvert	0.80 ¹	35 ¹	40 ¹	45 ¹	50 ¹
Upstream face of railroad culvert	0.80 ¹	80 ¹	120 ¹	130 ¹	160 ¹
1,200' upstream of railroad culvert	1.00	140	190	210	270

¹ Restriction in flow due to railroad culvert

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the source 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 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. For construction and/or floodplain management purposes, users are encouraged to use the flood elevation data presented in this FIS in conjunction with the data shown on the FIRM.

Precountywide Analyses

Each jurisdiction within Niagara County, with the exceptions of the towns of Hartland and Royalton, and the Village of Lewiston, has a previously printed FIS report. The hydraulic analyses described in those reports have been compiled and are summarized below.

For streams studied by detailed methods, water-surface elevations of floods of the selected recurrence intervals were predominantly computed through the use of the USACE HEC-2 step-backwater program (USACE, 1976; 1974). Cross sections for the backwater analyses of the streams studied in detail were field-surveyed and located at close intervals above and below bridges and culverts, in order to

compute the significant backwater effects of these structures in highly urbanized areas.

Starting water-surface elevations for Eighteenmile Creek were obtained from the 50% annual-chance water surface level of Lake Ontario in the towns of Lockport and Newfane, and were determined using the slope-area method in the City of Lockport. Starting water-surface elevations for Eighteenmile Creek, East Branch, were taken from the Eighteenmile Creek profiles in the towns of Lockport and Newfane.

Starting water surface elevations for Gill Creek were determined using the slope-area method in the City of Niagara Falls and the Town of Niagara. Starting water-surface elevations for Golden Hill Creek were obtained from the 50% annual-chance water surface level of Lake Ontario.

Starting water surface elevations for Tonawanda Creek were determined using the 50% annual-chance water surface elevation of the Niagara River – Tonawanda Channel in the City of North Tonawanda. In the Town of Wheatfield, starting elevations were taken from a rating curve determined by Parsons, Brinckerhoff, Quade and Douglas. In the Towns of Lockport and Pendleton, starting elevations were taken from a rating curve developed by the USACE in 1967.

Starting water-surface elevations for Twelvemile Creek were determined using the 50% annual-chance water-surface elevation of Lake Ontario in the Town of Wilson, while in the Town of Porter the slope-area method was used. Starting water surface elevations for Twelvemile Creek, East Branch were also determined using the 50% annual-chance water-surface elevation of Lake Ontario in the Town of Wilson, while in the Town of Cambria the slope-area method was used.

In the City of Lockport, starting water-surface elevations for Fish Creek 1 were determined by the critical depths at the outfall immediately downstream of the Robert Moses Parkway Bridge. Starting water-surface elevations for Gulf Branch were obtained from the profiles for Eighteenmile Creek. Water-surface elevations for the inlet ends of the Lincoln Avenue Branch culvert and Eighteenmile Creek culvert were obtained from a stage-discharge rating curve.

In the Town of Lockport, starting water surface elevations for Gulf Tributary were taken from the profiles for Gulf Branch. Starting water-surface elevations for Eighteenmile Creek Tributary East and Eighteenmile Creek Tributary West were determined using the slope-area method.

In the Village of Middleport, starting water-surface elevations for Johnson Creek 2 and Johnson Creek 2 Tributary 1 were determined using the slope-area method. For Johnson Creek 2 Tributary 1, the 20 cfs capacity of the underground culvert was subtracted from each of the peak flood discharges.

In the Town of Newfane, starting water surface elevations for Hopkins Creek and Keg Creek were based upon a 50% annual-chance flood frequency level of Lake Ontario.

In the Town of Niagara, starting water-surface elevations for Gill Creek East Tributary were taken from the flood profiles for Gill Creek.

In the Town of Pendleton, starting water-surface elevations for the Erie Canal and Mud Creek were obtained from the profiles for Tonawanda Creek. Starting water-surface elevations for North Tonawanda Creek were obtained from the profiles for the Erie Canal.

In the Town of Porter, starting water-surface elevations for Twelvemile Creek Tributary 3, Twelvemile Creek Tributary 3A and Beaver Creek were obtained from the profiles for Twelvemile Creek. Starting water-surface elevations for Beaver Creek Tributary 1 were obtained from the profiles for Beaver Creek.

In the Town of Somerset, starting water-surface elevations for Fish Creek 2 were based upon the 50% annual-chance flood elevation of Lake Ontario.

In the Town of Wheatfield, starting water-surface elevations for Brent Road Tributary and Raymond Road Tributary were obtained from the profiles for Bergholtz Creek.

In the town of Wilson, starting water-surface elevations for Twelvemile Creek, East Branch Tributary East and Twelvemile Creek, East Branch Tributary South were obtained from the profiles for Twelvemile Creek, East Branch.

Revised Analyses

Information on the methods used to determine peak discharge-frequency relationships for the streams listed in Table 3, restudied as part of this countywide FIS, is shown below.

Water-surface elevations of floods of the selected recurrence intervals were computed through the use of the USACE HEC-RAS step-backwater program (ref).

For Bergholtz Creek, in the City of Niagara Falls and towns of Cambria and Wheatfield, starting water-surface elevations were taken from the profiles for Cayuga Creek at its confluence with Bergholtz Creek. For this study, a total of 182 cross-sections, including 38 structures were modeled. Structures including 26 bridges, 13 culverts and two miscellaneous structures.

For Bull Creek, in the City of North Tonawanda and the towns of Cambria, Pendleton and Wheatfield, starting water-surface elevations were derived from the HEC-RAS program using the Normal Depth boundary condition. For this study, a total of 128 cross-sections, including 25 structures were modeled. Structures included 21 bridges, two culverts and two miscellaneous structures.

For Cayuga Creek, in the City of Niagara Falls and Town of Niagara, starting water-surface elevations were taken from the profiles of selected recurrence

intervals from the effective FIS from the City of Niagara Falls (FEMA, September 1990), where the effective study met the revised downstream limit of detailed study. For this study, a total of 32 cross-sections, including five structures were modeled. Structures included four bridges and one miscellaneous structure.

For Cayuga Creek West Tributary in the Town of Niagara, starting water-surface elevations were derived from the HEC-RAS program using the Normal Depth boundary condition. For this study, a total of 51 cross-sections, including nine structures, were modeled. Structures included three bridges, five culverts and one miscellaneous structure. A separate HEC-RAS model is created for stormwater existing main stem via a right overbank lateral weir flow. Diverted flows are conveyed by Cayuga Creek West Tributary Diversion and eventually discharge into Cayuga Creek through an underground culvert running along Porter Road. Starting water-surface elevation, for this diversion, was derived from the HEC-RAS program using the Normal Depth boundary condition.

For Donner Creek, in the City of Lockport and Town of Lockport, starting water-surface elevations were taken from the profiles of selected recurrence intervals from the effective FIS from the Town of Lockport (FEMA, October 2002), where the effective study met the revised downstream limit of detailed study. For this study, a total of 34 cross-sections, including seven structures, were modeled. Structures included one bridge, five culverts and one miscellaneous structure.

For Sawyer Creek, in the City of Tonawanda and Town of Wheatfield, the stream was divided into East and West portions based on the direction of flow.

For Sawyer Creek East, starting water surface elevations were derived from the HEC-RAS program using the Normal Depth boundary condition. For this study, 162 cross-sections, including 42 structures were modeled.

For Sawyer Creek West, starting water surface elevations were derived from the HEC-RAS program using the Normal Depth boundary condition. For this study, 122 cross-sections, including 34 structures were modeled.

For Town Ditch No. 2, in the Town of Pendleton, starting water surface elevations were derived from the HEC-RAS program using the Normal Depth boundary condition. For this study, 57 cross-sections, including 15 structures were modeled. Structures included 10 bridges and five culverts.

For Tonawanda Creek, hydraulic data was taken from the FIS for the Town of Amherst in Erie County, New York. Water surface elevations were computed using HEC-2. During the delineation of increased elevations on North Tonawanda Creek, which is influenced by the Erie Canal and Tonawanda Creek, no evidence existed to verify that the culvert at North Tonawanda Creek Boulevard acted as an energy dissipater. Therefore, elevations on North Tonawanda Creek were linearly interpolated between East Canal Road and North Tonawanda Creek Boulevard.

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

Channel roughness factors (Manning’s “n”) for these hydraulic computations were assigned on the basis of field inspection of floodplain areas and the study of past floods. Channel roughness factors for streams studied by detailed methods are listed in Table 10, “Manning’s “n” Values.”

TABLE 10 – MANNING’S “n” VALUES

<u>Stream</u>	<u>Channel “n”</u>	<u>Overbank “n”</u>
Beaver Creek	0.025-0.045	0.050-0.100
Beaver Creek Tributary 1	0.025-0.035	0.040-0.100
Bergholtz Creek	0.045-0.050	0.040-0.100
Brent Road Tributary	0.030-0.035	0.050-0.065
Bull Creek	0.040	0.030-0.100
Bull Creek Tributary	0.035	0.075
Cayuga Creek	0.045	0.040-0.100
Cayuga Creek Tributary	0.030-0.035	0.050-0.065
Cayuga Creek West Tributary	0.040-0.045	0.030-0.100
Donner Creek	0.045-0.050	0.035-0.150
Eighteenmile Creek	0.030-0.040	0.060-0.080
Eighteenmile Creek, East Branch	0.030-0.040	0.060-0.080
Eighteenmile Creek, East Tributary	0.030	0.060
Eighteenmile Creek, West Tributary	0.030	0.060
Erie Canal	0.030	0.060
Fish Creek (Lewiston)	0.014-0.030	0.085
Fish Creek (Somerset)	0.030	0.080
Gill Creek	0.030-0.040	0.040-0.100
Gill Creek East Tributary	0.030-0.040	0.070
Golden Hill Creek	0.030	0.080
Gulf Branch	0.030	0.060-0.070
Gulf Tributary	0.030	0.060
Hopkins Creek	0.030-0.040	0.060
Johnson Creek 2	0.015-0.037	0.045-0.120
Johnson Creek 2 Tributary 1	0.035	0.040-0.100
Keg Creek	0.030-0.040	0.060
Mud Creek	0.030-0.040	0.050-0.120
North Tonawanda Creek	0.030	0.060
Raymond Road Tributary	0.030-0.035	0.050-0.065
Sawyer Creek East	0.045	0.030-0.100
Sawyer Creek West	0.040	0.030-0.100
Tonawanda Creek	0.020-0.055	0.040-0.110
Town Ditch No. 2	0.045	0.035-0.100
Twelvemile Creek	0.025-0.042	0.040-0.120
Twelvemile Creek East Branch	0.030-0.040	0.050-0.120
Twelvemile Creek East Branch ,Tributary East	0.040	0.100

TABLE 10 – MANNING’S “n” VALUES
(CONTINUED)

<u>Stream</u>	<u>Channel “n”</u>	<u>Overbank “n”</u>
Twelvemile Creek East Branch, Tributary South	0.040-0.050	0.100-0.150
Twelvemile Creek Tributary 3	0.027-0.040	0.040-0.100
Twelvemile Creek Tributary 3A	0.020-0.040	0.040-0.100

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross sections are also shown on the FIRM (Exhibit 2).

All 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.

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

It is important to note that 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 this FIS and FIRM. Interested individuals may contact FEMA to access this data.

3.3 Vertical Datum

All FISs 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 in use for newly created or revised FISs and FIRMs was the National Geodetic Vertical Datum of 1929 (NGVD29). With the finalization of the North American Vertical Datum of 1988 (NAVD88), many FIS reports and FIRMs are being prepared using NAVD88 as the referenced vertical datum.

All flood elevations shown in this FIS report and on the FIRM are referenced to NAVD88. Structure and ground elevations in the community must, therefore, be referenced to NAVD88. It is important to note that adjacent communities may be referenced to NGVD29. This may result in difference in Base Flood Elevations (BFEs) across the corporate limits between the communities. The conversion factor used for Niagara County is -0.50 feet for conversion from NGVD29 to NAVD88.

For more information on NAVD88, see Converting the National Flood Insurance Program to the North American Vertical Datum of 1988, FEMA Publication FIA-20/June 1992, or contact the Vertical Network Branch, National Geodetic Survey, Coast and Geodetic Survey, National Oceanic and Atmospheric Administration, Rockville, Maryland 20910 (Internet address <http://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 provides 1-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 1-percent annual chance floodway. This information is presented on the FIRM and in many components of the FIS, including Flood Profiles, Floodway Data tables, and Summary of Stillwater Elevation tables. Users should reference the data presented in the FIS 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

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 county. For the streams studied in detail, the 1- and 0.2-percent annual chance floodplain boundaries have been delineated using the flood elevations determined at each cross section.

The 1- and 0.2-percent-annual-chance floodplain boundaries are shown on the FIRM (Exhibit 2). On this map, the 1-percent-annual chance floodplain boundary corresponds to the boundary of areas of special flood hazards (Zones A, AE, V and VE); and the 0.2-percent-annual-chance flood 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 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 (Exhibit 2).

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 1-percent annual chance flood can be carried without substantial increases in flood heights. Minimum federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this FIS 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 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 9). 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.

Portions of the floodways for the Niagara River, Niagara River – Tonawanda Channel and Tonawanda Creek extend beyond the County boundary.

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 9, "Floodway Data." In order 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.

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 of the 1-percent annual chance flood by more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to floodplain development are shown in Figure 1.

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BEAVER CREEK								
A	460 ¹	83	497	2.9	304.1	304.1	305.1	1.0
B	5240 ¹	30	219	3.8	311.3	311.3	312.1	0.8
C	8000 ¹	29	179	4.6	315.3	315.3	316.1	0.8
D	9700 ¹	35	193	3.8	318.5	318.5	319.2	0.7
E	12580 ¹	79	372	2.0	323.9	323.9	324.8	0.9
BEAVER CREEK TRIBUTARY B-1								
A	500 ²	46	115	0.8	318.4	318.4	319.1	0.7
B	1300 ²	9	27	3.3	320.2	320.2	321.0	0.8
BERGHOLTZ CREEK								
A	270 ³	101	707	1.7	570.2	570.2	571.2	1.0
B	1191 ³	119	842	1.4	570.5	570.5	571.4	0.9
C	1402 ³	87	628	1.9	570.8	570.8	571.6	0.8
D	1948 ³	90	738	1.6	571.0	571.0	571.8	0.8
E	2107 ³	96	640	1.9	571.0	571.0	571.9	0.9
F	3280 ³	124	889	1.4	571.4	571.4	572.1	0.7
G	4266 ³	66	551	2.2	571.7	571.7	572.3	0.6
H	4921 ³	107	815	1.5	571.9	571.9	572.5	0.6
I	5155 ³	79	609	2.0	572.0	572.0	572.6	0.6
J	6117 ³	71	541	2.2	572.3	572.3	573.1	0.8
K	6781 ³	151	1225	1.0	572.4	572.4	573.2	0.8
L	7016 ³	67	472	2.6	572.5	572.5	573.4	0.9
M	7710 ³	224	1342	0.9	572.8	572.8	573.6	0.8

¹ Feet above confluence with Twelvemile Creek

² Feet above mouth

³ Feet above confluence with Cayuga Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

**BEAVER CREEK – BEAVER CREEK TRIBUTARY B-1 –
BERGHOLTZ CREEK**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BERGHOLTZ CREEK (CONTINUED)								
N	8553	205	1199	1	572.9	572.9	573.7	0.8
O	9114	85	844	1.3	573.0	573.0	573.7	0.7
P	9365	84	683	1.6	573.3	573.3	574.0	0.7
Q	10258	117	552	1.8	573.4	573.4	574.1	0.7
R	10953	98	437	2.2	573.7	573.7	574.5	0.8
S	11409	80	578	1.7	575.6	575.6	576.0	0.4
T	11811	181	1257	0.8	575.7	575.7	576.1	0.4
U	12046	62	478	2	575.8	575.8	576.3	0.5
V	12784	55	432	2.3	576.0	576.0	576.5	0.5
W	13051	95	602	1.6	576.3	576.3	576.8	0.5
X	13687	147	773	1.3	576.4	576.4	577.0	0.6
Y	14416	152	868	1.1	576.4	576.4	577.1	0.7
Z	14572	129	718	1.4	576.5	576.5	577.1	0.6
AA	15067	100	555	1.8	576.5	576.5	577.3	0.8
AB	15253	42	286	3.4	576.7	576.7	577.5	0.8
AC	15686	48	283	3.5	577.4	577.4	578.0	0.6
AD	15974	74	471	2.1	577.9	577.9	578.7	0.8
AE	16158	61	436	2.2	578.2	578.2	579.0	0.8
AF	17047	147	856	1.1	578.4	578.4	579.3	0.9
AG	17225	233	1280	0.8	578.5	578.5	579.4	0.9
AH	18314	636	3305	0.3	578.5	578.5	579.4	0.9
AI	19135	1230	5110	0.2	578.5	578.5	579.4	0.9
AJ	19378	1381	5061	0.2	578.5	578.5	579.4	0.9
AK	20268	1275	4479	0.2	578.5	578.5	579.4	0.9

¹ Feet above confluence with Cayuga Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

BERGHOLTZ CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BERGHOLTZ CREEK (CONTINUED)								
AL	21037	594	2006	0.5	578.5	578.5	579.4	0.9
AM	21534	110	439	2.2	578.5	578.5	579.4	0.9
AN	22280	31	206	4.7	579.8	579.8	580.5	0.7
AO	22462	78	424	2.3	580.2	580.2	581.2	1.0
AP	23059	110	500	2	580.6	580.6	581.5	0.9
AQ	23310	38	260	3.2	580.7	580.7	581.6	0.9
AR	23506	161	895	0.9	581.2	581.2	582.2	1.0
AS	24655	96	395	2.1	581.3	581.3	582.3	1.0
AT	25430	78	439	1.9	582.0	582.0	583.0	1.0
AU	26632	212	731	1.1	583.0	583.0	584.0	1.0
AV	27547	133	437	1.9	584.6	584.6	585.5	0.9
AW	28132	119	544	1.5	585.3	585.3	586.2	0.9
AX	28461	73	343	2.4	586.2	586.2	586.8	0.6
AY	29280	51	266	3.2	587.9	587.9	588.8	0.9
AZ	29616	54	328	2.6	589.6	589.6	590.2	0.6
BA	29772	59	380	2.2	590.0	590.0	590.5	0.5
BB	30435	75	461	1.8	590.4	590.4	591.1	0.7
BC	30853	93	556	1.5	590.6	590.6	591.4	0.8
BD	31260	136	778	1.1	590.8	590.8	591.6	0.8
BE	31555	77	470	1.8	591.1	591.1	592.0	0.9
BF	31745	110	812	1	594.0	594.0	594.9	0.9
BG	32164	144	1004	0.8	594.0	594.0	595.0	1.0
BH	32359	165	1189	0.7	594.1	594.1	595.1	1.0
BI	32814	177	1297	0.7	594.2	594.2	595.2	1.0

¹ Feet above confluence with Cayuga Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

BERGHOLTZ CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BERGHOLTZ CREEK (CONTINUED)								
BK	33759	157	854	1	594.3	594.3	595.3	1.0
BL	34617	104	515	1.6	595.0	595.0	595.8	0.8
BM	35445	154	725	1.2	595.6	595.6	596.4	0.8
BN	36919	117	465	1.8	596.6	596.6	597.5	0.9
BO	38203	135	678	1.2	598.0	598.0	598.9	0.9
BP	39217	103	373	2.2	598.6	598.6	599.5	0.9
BQ	40243	117	464	1	599.5	599.5	600.5	1.0
BR	40440	108	542	0.8	603.0	603.0	603.8	0.8
BS	41922	104	443	1	603.4	603.4	604.3	0.9
BT	43564	60	191	2.3	604.5	604.5	605.4	0.9
BU	44766	42	136	3.3	606.6	606.6	607.4	0.8
BV	44936	44	166	2.7	607.2	607.2	608.0	0.8
BW	45126	71	257	1.7	609.0	609.0	609.2	0.2
BX	45671	82	288	1.5	609.2	609.2	609.5	0.3
BY	45867	180	597	0.7	610.2	610.2	610.4	0.2
BZ	46417	267	558	0.8	610.2	610.2	610.5	0.3
CA	46950	95	321	1.4	610.3	610.3	610.6	0.3
CB	47148	120	520	0.9	612.2	612.2	613.2	1.0
CC	48361	38	64	6.9	613.0	613.0	613.1	0.1
CD	48529	78	326	1.4	618.1	618.1	618.4	0.3
CE	49835	31	52	7.5	619.1	619.1	619.1	0.0
CF	50070	55	241	1.6	623.7	623.7	624.1	0.4
CG	50801	90	390	1.0	623.9	623.9	624.3	0.4
CG	51460	88	362	1.1	623.9	623.9	624.4	0.5

¹ Feet above confluence with Cayuga Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

BERGHOLTZ CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BERGHOLTZ CREEK (CONTINUED)								
CH	53062 ¹	71	164	2.4	624.4	624.4	625.1	0.7
CI	54263 ¹	66	247	1.6	625.8	625.8	626.3	0.5
CJ	54464 ¹	96	423	0.9	628.3	628.3	629.1	0.8
CK	55229 ¹	211	815	0.5	628.3	628.3	629.2	0.9
CL	56248 ¹	246	760	0.5	628.4	628.4	629.2	0.8
CM	56419 ¹	199	623	0.6	628.4	628.4	629.2	0.8
CN	57001 ¹	95	240	1.6	628.5	628.5	629.3	0.8
CO	57162 ¹	85	260	1.5	628.6	628.6	629.5	0.9
CP	58230 ¹	80	185	2.1	629.6	629.6	630.2	0.6
CQ	58421 ¹	75	155	2.5	629.9	629.9	630.8	0.9
CR	59536 ¹	188	431	0.9	630.9	630.9	631.9	1.0
CS	60488 ¹	265	656	0.6	631.1	631.1	632.0	0.9
CT	60644 ¹	237	698	0.6	631.1	631.1	632.0	0.9
CU	60933 ¹	256	1149	0.3	631.1	631.1	632.1	1.0
CV	61145 ¹	283	1230	0.3	631.1	631.1	632.1	1.0
CW	61739 ¹	314	961	0.4	631.1	631.1	632.1	1.0
BRENT ROAD TRIBUTARY								
A	220 ²	40	91	4.9	585.8	584.3 ³	584.3	0.0
B	570 ²	40	118	3.8	585.8	585.2 ³	585.5	0.3
C	730 ²	36	116	3.8	585.8	585.5 ³	585.8	0.3
D	1580 ²	38	115	3.9	587.3	587.3	587.5	0.2

¹ Feet above confluence with Cayuga Creek

² Feet above mouth

³ Elevation computed without consideration of backwater effects

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

BERGHOLTZ CREEK – BRENT ROAD TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BULL CREEK								
A	176	71	536	3.0	575.0 ²	568.7	569.1	0.4
B	1020	60	516	3.1	575.0 ²	569.2	569.5	0.3
C	1880	50	458	3.5	575.0 ²	569.5	570.0	0.5
D	2346	47	463	3.4	575.0 ²	569.7	570.2	0.5
E	2844	57	513	3.1	575.0 ²	570.0	570.6	0.6
F	3249	49	451	2.8	575.0 ²	570.3	570.9	0.6
G	4184	58	492	2.5	575.0 ²	570.5	571.4	0.9
H	5465	62	513	2.4	575.0 ²	571.2	572.2	1.0
I	6234	62	538	2.3	575.0 ²	571.7	572.7	1.0
J	7268	131	768	1.6	575.0 ²	572.4	573.4	1.0
K	8004	76	613	2.0	575.0 ²	573.1	574.0	0.9
L	8216	75	608	2.0	575.0 ²	573.6	574.5	0.9
M	9154	122	915	1.4	575.0 ²	574.2	575.1	0.9
N	9778	80	636	2.0	575.0 ²	574.5	575.4	0.9
O	10451	161	1186	1.1	575.0 ²	574.9	575.8	0.9
P	11189	175	1049	1.2	575.1	575.1	576.0	0.9
Q	12104	163	1122	1.1	575.4	575.4	576.2	0.8
R	12302	173	1075	1.2	576.0	576.0	576.8	0.8
S	14023	234	1063	1.2	576.2	576.2	577.2	1.0
T	14489	308	1427	0.9	576.5	576.5	577.4	0.9
U	15161	349	1793	0.7	576.6	576.6	577.5	0.9
V	15425	308	1158	1.1	576.6	576.6	577.6	1.0
W	15728	322	1738	0.7	576.7	576.7	577.7	1.0
X	16252	393	1708	0.7	576.9	576.9	577.8	0.9
Y	17969	358	1599	0.8	577.0	577.0	577.9	0.9

¹ Feet above confluence with Tonawanda Creek

² Elevation computed without consideration of backwater effects of Tonawanda Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

BULL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BULL CREEK (CONTINUED)								
Z	18176	372	1603	0.6	577.2	577.2	578.2	1.0
AA	19747	242	1058	0.8	577.3	577.3	578.3	1.0
AB	21553	215	810	1.1	577.9	577.9	578.9	1.0
AC	21751	183	796	1.1	578.5	578.5	579.3	0.8
AD	22745	276	1020	0.9	578.8	578.8	579.8	1.0
AE	25175	176	802	1.1	579.9	579.9	580.8	0.9
AF	25571	131	613	1.4	580.2	580.2	581.1	0.9
AG	26211	170	664	1.3	580.3	580.3	581.3	1.0
AH	26874	178	760	1.2	580.7	580.7	581.6	0.9
AI	27052	192	761	1.2	580.8	580.8	581.8	1.0
AJ	27754	175	700	1.3	581.4	581.4	582.2	0.8
AK	28814	143	555	1.6	582.4	582.4	583.2	0.8
AL	29614	74	433	2.0	583.1	583.1	583.9	0.8
AM	29859	86	484	1.8	584.3	584.3	585.1	0.8
AN	30363	131	792	1.1	584.5	584.5	585.5	1.0
AO	30533	144	828	1.1	584.6	584.6	585.6	1.0
AP	30900	253	1133	0.8	584.7	584.7	585.7	1.0
AQ	31553	148	704	1.3	584.9	584.9	585.9	1.0
AR	32049	99	462	1.9	585.9	585.9	586.8	0.9
AS	32260	145	782	1.1	586.8	586.8	587.5	0.7
AT	33885	253	686	1.3	587.6	587.6	588.1	0.5
AU	35079	267	928	0.9	588.6	588.6	588.8	0.2
AV	36131	174	648	1.4	589.0	589.0	589.5	0.5
AW	36314	223	752	1.2	589.0	589.0	589.7	0.7

¹ Feet above confluence with Tonawanda Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

BULL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
BULL CREEK (CONTINUED)								
AX	36943 ¹	205	684	1.1	589.1	589.1	590.0	0.9
AY	38600 ¹	136	500	1.4	589.7	589.7	590.5	0.8
AZ	38868 ¹	217	785	0.9	589.7	589.7	590.6	0.9
BA	40354 ¹	196	627	1.1	590.0	590.0	590.9	0.9
BB	40497 ¹	342	1085	0.7	591.0	591.0	591.9	0.9
BC	41046 ¹	520	1459	0.5	591.1	591.1	592.0	0.9
BD	41852 ¹	560	1682	0.4	591.3	591.3	592.1	0.8
BE	42043 ¹	590	1826	0.4	591.3	591.3	592.3	1.0
BF	43248 ¹	338	769	0.9	591.3	591.3	592.3	1.0
BG	44465 ¹	261	535	1.3	591.9	591.9	592.9	1.0
BH	44687 ¹	55	280	2.6	595.0	595.0	595.2	0.2
BI	45257 ¹	112	457	1.6	595.0	595.0	595.5	0.5
BJ	46535 ¹	95	375	1.9	595.0	595.0	595.9	0.9
BK	47981 ¹	29	79	9.0	597.2	597.2	598.2	1.0
BL	49355 ¹	60	264	2.7	603.1	603.1	604.1	1.0
BM	49855 ¹	129	579	1.2	604.1	604.1	605.0	0.9
BULL CREEK TRIBUTARY 1								
A	460 ²	29	52	3.1	588.7	587.0 ³	587.1	0.1
B	685 ²	19	33	4.9	588.7	588.0 ³	588.1	0.1
C	1435 ²	40	157	1.0	591.0	591.0	591.1	0.1
D	2395 ²	23	26	6.2	592.1	592.1	593.1	1.0
E	4285 ²	30	77	1.5	594.4	594.4	594.5	0.1
F	5345 ²	29	52	3.1	596.1	596.1	596.8	0.7

¹ Feet above confluence with Tonawanda Creek

² Feet above confluence with Bull Creek

³ Elevation computed without consideration of backwater effects from Bull Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

BULL CREEK – BULL CREEK TRIBUTARY 1

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CAYUGA CREEK								
A	175	45	496	6.1	568.0	566.2 ²	567.2	1.0
B	1465	75	876	3.5	568.0	567.1 ²	567.9	0.8
C	3455	80	676	4.5	569.1	569.1	569.9	0.8
D	4545	95	944	3.2	569.8	569.8	573.6	3.8
E	6410	45	453	3.6	570.6	570.6	571.2	0.6
F	6707	34	306	3.3	570.5	570.5	571.1	0.6
G	6866	42	337	3.0	570.7	570.7	571.3	0.6
H	7663	114	767	1.3	571.0	571.0	571.6	0.6
I	8787	69	413	2.4	571.2	571.2	571.9	0.7
J	9967	49	329	3.0	572.4	572.4	573.0	0.6
K	10129	90	469	2.1	572.8	572.8	573.6	0.8
L	11084	40	266	3.8	573.8	573.8	574.5	0.7
M	12044	345	1222	0.8	574.1	574.1	575.0	0.9
N	12650	243	966	1.0	574.2	574.2	575.1	0.9
O	13000	52	322	3.1	574.2	574.2	575.2	1.0
P	13197	40	241	4.2	574.6	574.6	575.4	0.8
Q	13490	50	261	3.8	577.0	577.0	577.3	0.3
R	13901	93	478	2.1	578.4	578.4	578.7	0.3
S	14261	203	881	1.1	578.6	578.6	578.8	0.2
T	14647	183	1033	0.9	578.8	578.8	579.1	0.3
U	15846	59	338	2.7	578.8	578.8	579.2	0.4
V	16370	44	227	4.0	579.2	579.2	579.5	0.3
W	17096	39	269	3.4	581.7	581.7	581.8	0.1
X	17663	37	259	3.5	582.1	582.1	582.2	0.1
Y	18042	46	302	3.0	582.4	582.4	582.5	0.1

¹ Feet above confluence with Little Niagara River

² Elevation computed without consideration of backwater effects from Little Niagara River

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

CAYUGA CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CAYUGA CREEK (CONTINUED)								
Z	19344	60	337	2.7	583.1	583.1	583.3	0.2
AA	20348	53	313	2.9	583.7	583.7	583.8	0.1
AB	20370	80	475	3.4	587.0	587.0	587.0	0.0
AC	21120	80	437	3.7	587.3	587.3	587.3	0.0
AD	21870	80	399	4.0	587.6	587.6	587.6	0.0
AE	22245	85	556	2.9	588.2	588.2	588.2	0.0
AF	23085	90	520	3.1	588.3	588.3	588.5	0.2
AG	25270	50	180	8.9	589.5	589.5	590.1	0.6
AH	25398	50	353	4.5	595.1	595.1	595.1	0.0
AI	25810	40	159	10.1	595.1	595.1	595.1	0.0
AJ	25960	40	285	5.6	597.5	597.5	597.5	0.0
AK	26660	65	431	3.7	598.0	598.0	598.2	0.2
AL	27090	52	171	9.3	599.6	599.6	599.6	0.0
AM	27270	65	604	2.6	604.1	604.1	604.1	0.0
AN	27810	45	273	5.9	604.1	604.1	604.1	0.0
AO	27985	50	446	3.6	608.2	608.2	608.2	0.0
AP	28745	90	349	4.6	608.4	608.4	608.4	0.0
AQ	29815	95	44	3.6	609.1	609.1	609.8	0.7
AR	30765	100	719	1.5	609.5	609.5	610.4	0.9
AS	31335	100	480	2.3	609.6	609.6	610.5	0.9
AT	31955	100	380	2.9	610.1	610.1	611.0	0.9
AU	32125	80	367	3.0	611.8	611.8	611.9	0.1
AV	32895	60	291	3.8	612.3	612.3	612.8	0.5
AW	33005	40	247	4.4	612.3	612.3	613.0	0.7

¹ Feet above confluence with Little Niagara River

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FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

CAYUGA CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CAYUGA CREEK (CONTINUED)								
AX	33165 ¹	40	264	4.1	615.0	615.0	615.0	0.0
AY	33405 ¹	40	255	4.3	615.1	615.1	617.2	2.1
AZ	33545 ¹	40	269	4.0	615.2	615.2	615.4	0.2
BA	33715 ¹	65	391	2.8	615.2	615.2	615.6	0.4
CAYUGA CREEK TRIBUTARY								
A	525 ²	30	77	6.1	609.7	609.7	609.7	0.0
B	1160 ²	30	143	3.2	610.7	610.7	611.6	0.9
C	2220 ²	30	110	3.7	612.0	612.0	612.9	0.9
D	3000 ²	30	122	3.3	613.0	613.0	613.9	0.9
CAYUGA CREEK WEST TRIBUTARY								
A	111 ³	16	22	2.8	578.6	575.3 ⁴	575.3	0.0
B	693 ³	15	19	3.3	578.6	578.4 ⁴	578.4	0.0
C	1197 ³	28	48	1.3	579.4	579.4	579.4	0.0
D	1446 ³	32	69	0.9	579.7	579.7	579.7	0.0
E	2223 ³	25	52	1.2	579.9	579.9	580.0	0.1
F	3433 ³	21	40	1.5	580.7	580.7	580.7	0.0
G	5742 ³	92	186	1.5	583.0	583.0	583.6	0.6
H	6321 ³	192	563	0.5	585.5	585.5	586.5	1.0
I	6655 ³	100	263	1.1	585.6	585.6	586.5	0.9
J	6894 ³	55	130	2.2	585.8	585.8	586.6	0.8
K	7030 ³	136	350	0.9	586.6	586.6	587.5	0.9

¹ Feet above confluence with Little Niagara River

² Feet above mouth

³ Feet above confluence with Cayuga Creek

⁴ Elevation computed without consideration of backwater effects from Cayuga Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

**CAYUGA CREEK – CAYUGA CREEK TRIBUTARY –
CAYUGA CREEK WEST TRIBUTARY**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
CAYUGA CREEK WEST TRIBUTARY (CONTINUED)								
L	7225 ¹	133	400	0.7	586.6	586.6	587.6	1.0
M	7507 ¹	60	162	1.8	586.6	586.6	587.6	1.0
N	7986 ¹	35	107	2.7	587.3	587.3	587.9	0.6
O	8449 ¹	47	112	2.6	589.4	589.4	590.4	1.0
P	9908 ¹	72	56	5.1	597.0	597.0	597.0	0.0
Q	10284 ¹	47	94	3.1	599.8	599.8	600.3	0.5
R	10861 ¹	61	71	4.0	604.5	604.5	604.8	0.3
S	11275 ¹	56	210	0.4	610.0	610.0	610.6	0.6
T	11508 ¹	43	109	0.8	610.0	610.0	610.6	0.6
U	11780 ¹	27	18	4.6	611.4	611.4	611.4	0.0
V	11941 ¹	11	35	2.4	615.2	615.2	615.6	0.4
W	12254 ¹	26	24	3.4	616.7	616.7	616.9	0.2
X	12474 ¹	62	222	0.4	621.1	621.1	622.1	1.0
Y	12634 ¹	92	286	0.3	621.1	621.1	622.1	1.0
CAYUGA CREEK WEST TRIBUTARY DIVERSION								
A	0 ²	55	270	1.3	582.0	582.0	582.8	0.8
B	437 ²	115	380	0.6	582.0	582.0	583.0	1.0
C	1009 ²	165	508	0.5	582.0	582.0	583.0	1.0
DONNER CREEK								
A	0 ³	20	128	6.1	605.5	605.5	606.4	0.9
B	2326 ³	84	295	3.0	608.9	608.9	609.7	0.8

¹ Feet above confluence with Cayuga Creek

² Feet above Porter Road

³ Feet above Transit Road

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

**CAYUGA CREEK WEST TRIBUTARY – CAYUGA CREEK
WEST TRIBUTARY DIVERSION – DONNER CREEK**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
DONNER CREEK (CONTINUED)								
C	3826	78	261	3.4	612.4	612.4	612.7	0.3
D	4874	100	357	2.5	615.1	615.1	615.3	0.2
E	5786	72	471	1.2	616.7	616.7	617.3	0.6
F	6472	59	364	1.5	616.8	616.8	617.5	0.7
G	6665	76	446	1.3	616.8	616.8	617.6	0.8
H	6881	103	578	0.9	617.0	617.0	617.7	0.7
I	7217	76	399	1.3	617.1	617.1	617.8	0.7
J	7335	59	355	1.5	617.1	617.1	617.9	0.8
K	7438	90	644	0.8	617.1	617.1	617.9	0.8
L	7528	81	392	1.3	617.2	617.2	617.9	0.7
M	8029	80	324	1.5	618.0	618.0	618.9	0.9
N	8138	140	540	0.9	618.0	618.0	618.9	0.9
O	8423	145	553	0.9	618.2	618.2	619.0	0.8
P	8661	137	253	2.0	618.1	618.1	619.1	1.0
Q	8740	116	389	1.4	618.5	618.5	619.2	0.7
R	8873	123	844	0.8	618.6	618.6	619.3	0.7
S	8992	65	256	2.1	618.6	618.6	619.3	0.7
T	9712	47	142	3.7	619.3	619.3	620.0	0.7
U	10482	37	125	4.2	621.8	621.8	622.6	0.8
V	10676	77	183	2.9	623.0	623.0	623.8	0.8
W	11547	36	122	4.3	626.3	626.3	626.4	0.1
X	11966	47	186	2.8	628.4	628.4	628.6	0.2
Y	12746	35	114	2.6	630.8	630.8	631.8	1.0
Z	12948	38	106	2.8	631.1	631.1	632.0	0.9

¹ Feet above Transit Road

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

DONNER CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
EIGHTEENMILE CREEK								
A	0	201	2049	1.5	248.7	246.6 ²	247.6	1.0
B	850	180	1411	8.4	248.7	247.3 ²	248.1	0.8
C	1540	273	3041	3.9	248.9	248.9	249.4	0.5
D	1770	349	2984	4.0	249.4	249.0	249.5	0.5
E	2540	403	3877	3.0	249.4	249.4	249.8	0.4
F	3730	381	2923	4.0	249.7	249.7	250.1	0.4
G	4915	338	2638	4.5	250.3	250.3	250.6	0.3
H	6775	329	2535	4.7	251.4	251.4	251.6	0.2
I	8125	283	2406	4.9	252.2	252.2	252.4	0.2
J	9245	395	3279	3.5	252.9	252.9	253.1	0.2
K	9760	238	2019	5.7	253.0	253.0	253.2	0.2
L	9995	190	1680	6.9	253.1	253.1	253.2	0.1
M	10770	150	1177	9.8	253.6	253.6	253.6	0.0
N	10980	156	1966	5.9	255.0	255.0	256.0	1.0
O	11190	338	12949	0.9	302.4	302.4	302.4	0.0
P	11700	369	14483	0.8	302.4	302.4	302.4	0.0
Q	12235	345	13464	0.9	302.4	302.4	302.4	0.0
R	13030	340	11718	1.0	302.4	302.4	302.4	0.0
S	13240	414	14010	0.8	302.4	302.4	302.4	0.0
T	14160	305	8837	1.3	302.4	302.4	302.4	0.0
U	15230	260	6417	1.8	302.4	302.4	302.4	0.0
V	16475	273	5140	2.2	302.4	302.4	302.4	0.0
W	18335	256	3360	3.4	302.5	302.5	302.5	0.0
X	19610	286	3436	3.4	302.7	302.7	302.7	0.0
Y	19885	283	3589	3.2	302.8	302.8	302.8	0.0

¹ Feet above confluence with Lake Ontario

² Elevation computed without consideration of backwater effects from Lake Ontario

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

EIGHTEENMILE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
EIGHTEENMILE CREEK (CONTINUED)								
Z	20895	340	3459	3.0	302.9	302.9	303.0	0.1
AA	22430	250	2511	4.2	303.2	303.2	303.2	0.0
AB	23075	215	1979	5.3	303.2	303.2	303.6	0.4
AC	23735	295	1841	5.7	304.1	304.1	304.5	0.4
AD	24515	140	1229	8.5	305.0	305.0	306.0	1.0
AE	26105	230	1454	7.2	312.1	312.1	312.7	0.6
AF	26775	132	1010	10.0	313.6	313.6	314.4	0.8
AG	26995	150	1372	7.4	317.1	317.1	317.1	0.0
AH	27625	238	2092	4.9	318.2	318.2	318.5	0.3
AI	27770	215	1475	6.9	318.2	318.2	318.5	0.3
AJ	27975	180	1799	5.6	330.2	330.2	330.2	0.0
AK	28650	190	1568	6.5	330.7	330.7	330.7	0.0
AL	30180	250	2452	4.1	331.6	331.6	332.2	0.6
AM	31450	270	2384	4.3	332.2	332.2	332.9	0.7
AN	32820	240	1626	6.2	333.1	333.1	334.1	1.0
AO	33850	265	1843	5.5	337.7	337.7	337.7	0.0
AP	34000	320	2428	4.2	338.2	338.2	338.2	0.0
AQ	34970	266	1989	5.1	338.8	338.8	339.1	0.3
AR	35990	280	1640	6.2	340.4	340.4	341.0	0.6
AS	36690	317	1999	5.1	341.4	341.4	342.0	0.6
AT	37260	377	2111	4.8	342.4	342.4	343.1	0.7
AU	38190	378	2538	4.0	343.8	343.8	344.7	0.9
AV	39175	250	1765	5.8	344.6	344.6	345.5	0.9
AW	40170	370	2813	3.3	346.4	346.4	347.0	0.6

¹ Feet above confluence with Lake Ontario

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

EIGHTEENMILE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
EIGHTEENMILE CREEK (CONTINUED)								
AX	40950	162	1144	8.1	346.4	346.4	347.0	0.6
AY	41060	200	1918	4.8	348.9	348.9	349.4	0.5
AZ	41500	285	2623	3.5	349.7	349.7	350.0	0.3
BA	42960	350	2575	3.6	350.4	350.4	350.8	0.4
BB	44045	350	3199	2.9	351.0	351.0	351.6	0.6
BC	44910	344	2877	3.2	351.2	351.2	351.9	0.7
BD	46530	442	3857	2.4	352.0	352.0	352.7	0.7
BE	47545	310	2521	3.7	352.0	352.0	353.0	1.0
BF	48350	301	3232	2.9	352.8	352.8	353.5	0.7
BG	49320	450	4306	2.1	353.2	353.2	354.0	0.8
BH	50040	360	3813	2.4	353.3	353.3	354.1	0.8
BI	51430	460	4943	1.9	353.6	353.6	354.4	0.8
BJ	52060	330	2442	1.3	353.7	353.7	354.6	0.9
BK	53400	250	1915	1.6	353.9	353.9	354.8	0.9
BL	53600	260	2040	1.5	354.1	354.1	354.9	0.8
BM	54560	303	2159	1.5	354.3	354.3	355.1	0.8
BN	55410	140	1162	2.7	354.3	354.3	355.1	0.8
BO	56330	150	1145	2.7	354.9	354.9	355.9	1.0
BP	57065	151	1281	2.5	355.2	355.2	356.1	0.9
BQ	57900	350	3097	1.0	357.8	357.8	358.8	1.0
BR	59250	175	1445	2.1	357.8	357.8	358.7	0.9
BS	60550	300	2010	1.5	358.0	358.0	359.0	1.0
BT	62150	400	2575	1.2	358.4	358.4	359.3	0.9
BU	63800	200	1374	2.2	359.8	359.8	360.5	0.7

¹ Feet above confluence with Lake Ontario

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

EIGHTEENMILE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
EIGHTEENMILE CREEK (CONTINUED)								
BV	65050	150	601	5.1	360.1	360.1	361.1	1.0
BW	66250	140	587	3.4	362.3	362.3	362.7	0.4
BX	68300	160	1013	2.0	363.9	363.9	364.4	0.5
BY	70235	78	338	5.9	364.1	364.1	364.1	0.0
BZ	71085	90	567	3.5	364.1	364.1	364.1	0.0
CA	71725	71	476	2.4	364.1	364.1	364.1	0.0
CB	72245	43	187	6.1	364.1	364.1	364.1	0.0
CC	69386	190	1452	1.4	364.1	364.1	364.8	0.7
CD	72695	37	114	10.0	366.9	366.9	366.9	0.0
CE	72835	36	113	10.1	368.8	368.8	368.8	0.0
CF	73395	26	102	11.2	381.9	381.9	382.1	0.2
CG	73995	38	115	9.9	410.5	410.5	410.5	0.0
CH	74075	16	86	13.2	417.4	417.4	417.4	0.0
CI	74357	41	117	9.7	428.7	428.7	428.7	0.0
CJ	74482	30	138	8.3	431.4	431.4	431.4	0.0
CK	74642	40	135	8.5	436.7	436.7	436.7	0.0
CL	74762	55	335	3.4	451.4	451.4	451.5	0.1
CM	74797	52	330	3.5	451.4	451.4	451.5	0.1
CN	74897	65	377	3.0	451.5	451.5	451.6	0.1
CO	75747	28	103	11.0	456.9	456.9	457.0	0.1
CP	76467	140	279	4.1	460.3	460.3	460.9	0.6
CQ	76667	145	179	6.4	467.0	467.0	467.0	0.0
CR	77067	41	117	9.7	470.1	470.1	470.1	0.0
CS	77312	50	250	4.6	472.3	472.3	473.0	0.7

¹ Feet above confluence with Lake Ontario

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FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

EIGHTEENMILE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
EIGHTEENMILE CREEK (CONTINUED)								
CT	77412 ¹	68	284	4.0	473.9	473.9	474.1	0.2
CU	77592 ¹	70	342	3.3	474.1	474.1	474.3	0.2
CB	77715 ¹	75	639	1.8	484.5	484.5	484.5	0.0
CW	78110 ¹	47	194	5.9	484.5	484.5	484.5	0.0
CX	78210 ¹	56	231	4.9	484.5	484.5	484.5	0.0
CY	78730 ¹	38	117	8.5	485.4	485.4	485.5	0.1
CZ	82910 ¹	36	102	9.7	616.0	616.0	616.0	0.0
DA	83800 ¹	71	291	3.4	618.0	618.0	618.9	0.9
DB	84640 ¹	110	406	2.4	618.5	618.5	619.5	1.0
DC	85720 ¹	37	160	6.3	620.3	620.3	620.5	0.2
DD	85880 ¹	50	273	3.6	621.1	621.1	621.1	0.0
DE	86130 ¹	70	401	1.5	621.1	621.1	621.5	0.4
EIGHTEENMILE CREEK EAST TRIBUTARY								
A	750 ²	170	937	0.4	359.7	359.7	360.4	0.7
B	2250 ²	83	138	1.7	359.7	359.7	360.4	0.7
C	4115 ²	130	282	0.8	362.3	362.3	363.1	0.8
D	5270 ²	130	158	1.5	362.8	362.8	363.5	0.7
EIGHTEENMILE CREEK WEST TRIBUTARY								
A	795 ²	400	2190	0.8	358.6	358.6	359.6	1.0
B	2170 ²	230	1036	1.8	359.1	359.1	360.9	1.8

¹ Feet above confluence with Lake Ontario

² Feet above confluence with Eighteenmile Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

EIGHTEENMILE CREEK – EIGHTEENMILE CREEK EAST TRIBUTARY – EIGHTEENMILE CREEK WEST TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
EIGHTEENMILE CREEK WEST TRIBUTARY (CONTINUED)								
C	3350	125	922	2.0	359.5	359.5	360.4	0.9
D	5800	277	2192	0.8	376.8	376.8	376.9	0.1
E	6860	166	986	1.7	377.0	377.0	377.1	0.1
F	8500	164	941	1.8	377.4	377.4	377.5	0.1
G	9380	104	317	5.4	377.6	377.6	377.6	0.0
H	12480	200	559	2.5	380.8	380.8	381.7	0.9
EIGHTEENMILE CREEK. EAST BRANCH								
A	630	220	2225	3.0	353.7	353.7	354.7	1.0
B	1430	240	1965	3.4	353.9	353.9	354.9	1.0
C	1632	240	1868	3.6	354.0	354.0	355.0	1.0
D	2387	216	1847	3.7	354.5	354.5	355.4	0.9
E	3527	190	1783	3.8	355.4	355.4	356.1	0.7
F	3777	190	1536	4.4	355.9	355.9	356.2	0.3
G	4477	180	1309	5.2	356.2	356.2	356.7	0.5
H	5202	150	1209	5.6	357.0	357.0	357.9	0.9
I	6870	383	2946	2.3	361.1	361.1	361.7	0.6
J	8650	362	4611	2.6	361.7	361.7	362.4	0.7
K	10150	339	2423	2.7	362.1	362.1	363.0	0.9
L	11775	250	1716	3.9	362.9	362.9	363.7	0.8
M	12750	575	3350	2.0	364.4	364.4	365.2	0.8
N	14150	245	1652	4.0	365.1	365.1	366.0	0.9

¹ Feet above confluence with Eighteenmile Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

**EIGHTEENMILE CREEK WEST TRIBUTARY –
EIGHTEENMILE CREEK, EAST BRANCH**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
EIGHTEENMILE CREEK EAST BRANCH (CONTINUED)								
O	15150 ¹	536	3939	1.7	366.6	366.6	367.3	0.7
P	16470 ¹	269	1962	3.4	367.2	367.2	367.8	0.6
Q	17250 ¹	163	1347	4.9	367.6	367.6	368.4	0.8
R	19475 ¹	248	2332	2.7	369.6	369.6	370.4	0.8
S	21655 ¹	315	1554	2.5	370.2	370.2	371.0	0.8
T	23250 ¹	378	3141	2.0	371.8	371.8	372.6	0.8
U	24150 ¹	457	3740	1.7	372.1	372.1	372.9	0.8
V	26190 ¹	300	2829	2.2	373.2	373.2	373.9	0.7
W	27715 ¹	413	4095	1.5	373.8	373.8	374.6	0.8
X	29305 ¹	375	3713	1.7	374.1	374.1	374.9	0.8
Y	30260 ¹	220	1741	3.2	374.2	374.2	374.2	0.0
Z	30685 ¹	232	1837	3.0	374.2	374.2	374.2	0.0
AA	31135 ¹	65	624	8.8	374.2	374.2	374.2	0.0
AB	31255 ¹	156	1651	3.3	374.2	374.2	374.2	0.0
AC	36045 ¹	210	1918	2.9	374.3	374.3	375.1	0.8
AD	38645 ¹	220	2100	2.5	374.9	374.9	375.8	0.9
ERIE CANAL								
A	670 ²	204	4021	0.2	579.6	575.8 ³	576.8	1.0
B	2040 ²	242	4606	0.2	579.6	575.8 ³	576.8	1.0
C	3520 ²	223	4462	0.2	579.6	575.8 ³	576.8	1.0
D	3630 ²	235	4939	0.1	579.6	575.8 ³	576.8	1.0
E	4575 ²	231	4267	0.2	579.6	575.8 ³	576.8	1.0
F	5870 ²	207	3503	0.2	579.6	575.8 ³	576.8	1.0

¹ Feet above confluence with Eighteenmile Creek

² Feet above confluence with Tonawanda Creek

³ Elevation computed without consideration of backwater effects of Tonawanda Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

**EIGHTEENMILE CREEK, EAST BRANCH –
ERIE CANAL**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
FISH CREEK 1								
A	570	15	96	10.2	559.7	559.7	559.7	0.0
B	650	34	125	7.9	561.5	561.5	561.5	0.0
C	730	32	125	7.9	563.0	563.0	563.0	0.0
D	880	33	132	7.4	566.6	566.6	566.6	0.0
E	1000	37	145	6.7	566.7	566.7	566.7	0.0
F	1150	32	168	5.9	570.3	570.3	570.3	0.0
G	1550	30	130	7.5	571.7	571.7	571.7	0.0
H	1680	39	223	4.4	574.2	574.2	574.2	0.0
I	1980	32	126	7.8	574.2	574.2	574.3	0.1
J	2140	32	293	3.3	579.1	579.1	579.1	0.0
K	2200	38	249	3.9	579.1	579.1	579.1	0.0
L	2360	43	288	3.4	581.1	581.1	581.1	0.0
M	2420	41	300	3.3	581.2	581.2	581.2	0.0
N	2550	40	356	2.8	581.9	581.9	582.0	0.1
O	2950	40	211	4.7	582.0	582.0	582.2	0.2
P	3550	37	128	7.6	585.9	585.9	585.9	0.0
Q	4250	30	122	8.0	590.8	590.8	590.8	0.0
R	4380	26	190	5.2	592.0	592.0	592.0	0.0
S	4880	35	299	3.3	592.1	592.1	592.5	0.4
T	4950	41	324	3.0	592.2	592.2	592.5	0.3
U	5150	44	328	3.0	592.2	592.2	592.6	0.4
V	5210	52	375	2.6	592.2	592.2	592.6	0.4
W	5370	45	331	3.0	592.2	592.2	592.6	0.4
X	5720	43	257	3.8	592.2	592.2	592.7	0.5
Y	5860	50	356	2.8	592.3	592.3	593.1	0.8

¹ Feet above mouth

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

FISH CREEK 1

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
FISH CREEK 1 (CONTINUED)								
Z	6060 ¹	72	453	2.2	592.4	592.4	593.3	0.9
AA	6200 ¹	130	672	1.5	592.4	592.4	593.4	1.0
AB	7000 ¹	160	565	1.7	592.8	592.8	593.8	1.0
AC	7550 ¹	170	591	1.7	593.5	593.5	594.4	0.9
AD	8150 ¹	140	250	3.9	594.9	594.9	595.0	0.1
AE	8550 ¹	143	428	2.3	595.9	595.9	596.6	0.7
AF	8690 ¹	120	592	1.7	598.8	598.8	598.8	0.0
AG	9390 ¹	138	742	1.3	598.8	598.8	598.9	0.1
FISH CREEK 2								
A	40 ²	65	317	8.2	249.8	249.8	250.8	1.0
B	250 ²	93	574	4.5	251.4	251.4	252.1	0.7
C	865 ²	77	439	5.9	252.1	252.1	253.0	0.9
D	1625 ²	42	205	12.7	257.8	257.8	258.0	0.2
E	1825 ²	68	675	3.8	264.1	264.1	264.9	0.8
GILL CREEK								
A	0 ³	112	556	2.9	561.2	561.2	562.1	0.9
B	190 ³	105	491	3.3	561.8	561.8	562.4	0.6
C	615 ³	35	206	7.8	564.7	564.7	564.9	0.2
D	1540 ³	35	296	5.4	567.7	567.7	568.0	0.3
E	2370 ³	61	600	2.7	568.4	568.4	568.9	0.5
F	3410 ³	58	523	3.1	568.5	568.5	569.0	0.5
G	4585 ³	69	500	3.2	570.3	570.3	570.8	0.5

¹ Feet above mouth

² Feet above confluence with Lake Ontario

³ Feet above confluence with Niagara River

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

FISH CREEK 1 – FISH CREEK 2 – GILL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
GILL CREEK (CONTINUED)								
H	5570	53	466	3.2	570.7	570.7	571.3	0.6
I	6415	60	514	2.9	572.5	572.5	573.0	0.5
J	7865	267	2333	0.5	575.6	575.6	576.6	1.0
K	8755	237	2076	0.6	575.6	575.6	576.6	1.0
L	11135	180	831	1.3	575.6	575.6	576.6	1.0
M	12260	36	272	4.1	578.5	578.5	578.6	0.1
N	13035	126	880	0.9	578.7	578.7	579.0	0.3
O	14365	88	521	1.6	578.8	578.8	579.1	0.3
P	16200	54	333	2.5	580.3	580.3	580.8	0.5
Q	17480	52	376	2.2	581.5	581.5	582.0	0.5
R	18360	18	128	6.5	581.7	581.7	582.2	0.5
S	19450	142	733	1.1	585.0	585.0	585.7	0.7
T	19800	100	454	1.8	585.1	585.1	585.8	0.7
U	20500	33	149	5.6	585.1	585.1	586.1	1.0
V	21110	113	889	0.9	589.0	589.0	590.0	1.0
W	21500	134	870	1.0	589.0	589.0	590.0	1.0
X	22000	55	312	2.7	590.3	590.3	591.3	1.0
Y	22280	153	1027	0.8	590.5	590.5	591.5	1.0
Z	23050	51	233	3.6	590.6	590.6	591.6	1.0
AA	24160	55	322	1.8	592.7	592.7	593.2	0.5
AB	24850	45	362	1.6	598.0	598.0	599.0	1.0
AC	25160	38	265	2.2	598.0	598.0	599.0	1.0
AD	25410	80	355	2.5	597.9	597.9	598.3	0.4
AE	27210	65	152	5.9	599.9	599.9	600.6	0.7

¹ Feet above confluence with Niagara River

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

GILL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
GILL CREEK (CONTINUED)								
AF	27360 ¹	80	384	2.3	602.8	602.8	603.7	0.9
AG	27450 ¹	80	479	1.9	603.0	603.0	603.9	0.9
AH	27900 ¹	79	347	2.0	603.2	603.2	604.2	1.0
AI	28500 ¹	80	394	1.8	604.2	604.2	604.9	0.7
AJ	28800 ¹	80	311	2.3	604.4	604.4	605.2	0.8
AK	30740 ¹	91	244	2.9	608.5	608.5	608.8	0.3
AL	31740 ¹	111	360	2.0	610.0	610.0	610.7	0.7
AM	32070 ¹	112	376	1.9	610.1	610.1	611.1	1.0
AN	33200 ¹	38	146	4.9	613.4	613.4	613.4	0.0
AO	34270 ¹	40	187	3.8	617.1	617.1	617.1	0.0
AP	35300 ¹	34	168	4.2	619.4	619.4	619.4	0.0
AQ	36700 ¹	46	270	2.6	622.0	622.0	622.0	0.0
AR	37550 ¹	36	252	2.8	622.8	622.8	622.8	0.0
AS	37700 ¹	36	257	2.8	622.9	622.9	622.9	0.0
GILL CREEK EAST TRIBUTARY								
A	630 ²	46	249	1.3	596.8	596.8	597.8	1.0
B	1126 ²	45	270	1.2	597.7	597.7	598.6	0.9
C	1700 ²	46	216	1.5	597.8	597.8	598.7	0.9
D	1960 ²	29	155	2.1	598.7	598.7	599.5	0.8
E	2220 ²	80	295	1.1	598.8	598.8	599.7	0.9
F	2490 ²	103	518	0.6	600.4	600.4	601.4	1.0
G	2890 ²	97	233	1.4	600.4	600.4	601.4	1.0

¹ Feet above confluence with Niagara River

² Feet above Town of Niagara corporate limits

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

GILL CREEK – GILL CREEK EAST TRIBUTARY

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
GOLDEN HILL CREEK								
A	1151	116	909	4.1	265.8	265.8	266.8	1.0
B	2555	106	649	5.8	267.8	267.8	268.7	0.9
C	2658	82	619	6.1	270.3	270.3	270.3	0.0
D	3718	100	646	5.8	270.9	270.9	271.7	0.8
E	4638	55	515	7.3	272.3	272.3	273.2	0.9
F	4795	67	726	5.2	275.7	275.7	275.7	0.0
G	6045	100	979	3.3	276.1	276.1	276.7	0.6
H	6625	100	589	5.4	276.1	276.1	276.7	0.6
I	6795	100	820	3.9	278.6	278.6	278.8	0.2
J	7590	150	617	5.2	279.2	279.2	279.6	0.4
K	8635	210	639	5.0	283.2	283.2	284.0	0.8
L	9250	100	699	6.4	287.0	287.0	287.0	0.0
M	10015	100	584	5.5	289.0	289.0	289.7	0.7
N	10900	109	555	5.8	292.1	292.1	292.4	0.3
O	11955	100	504	6.3	296.8	296.8	297.3	0.5
P	12415	81	586	5.4	298.3	298.3	299.1	0.8
Q	12545	108	662	4.8	300.1	300.1	300.5	0.4
R	13825	92	423	7.5	302.8	302.8	302.8	0.0
S	14675	100	453	7.0	306.2	306.2	306.3	0.1
T	15475	100	639	5.0	308.2	308.2	309.1	0.9
U	16975	99	296	10.8	315.3	315.3	315.3	0.0
V	17120	100	902	3.5	317.4	317.4	317.9	0.5
W	18020	115	866	3.3	317.8	317.8	318.3	0.5
X	19060	140	1191	2.4	318.2	318.2	318.8	0.6
Y	20875	140	1233	2.3	318.6	318.6	319.2	0.6

¹ Feet above Golden Hill State Park Bridge

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

GOLDEN HILL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
GOLDEN HILL CREEK (CONTINUED)								
Z	22290	130	902	3.2	319.0	319.0	319.6	0.6
AA	23675	120	799	3.6	320.2	320.2	320.8	0.6
AB	24815	120	741	3.8	321.7	321.7	322.1	0.4
AC	24955	120	768	3.7	323.9	323.9	323.9	0.0
AD	26405	160	1262	2.3	324.4	324.4	324.8	0.4
AE	27725	200	1377	2.1	324.6	324.6	325.4	0.8
AF	27880	240	2024	1.4	324.7	324.7	325.6	0.9
AG	28795	280	1891	1.5	324.8	324.8	325.7	0.9
AH	29840	280	1873	1.2	324.9	324.9	325.8	0.9
AI	30870	300	1681	1.2	325.1	325.1	326.0	0.9
AJ	31820	300	1656	1.2	325.2	325.2	326.2	1.0
AK	33265	240	1030	1.9	325.5	325.5	326.4	0.9
AL	33460	120	527	3.8	328.8	328.8	328.8	0.0
AM	33577	120	510	3.9	329.0	329.0	329.0	0.0
AN	34480	120	649	3.1	329.3	329.3	329.7	0.4
AO	35980	120	696	2.8	330.1	330.1	331.1	1.0
AP	36080	160	585	3.4	331.2	331.2	331.3	0.1
AQ	36180	200	984	2.0	331.6	331.6	331.7	0.1
AR	38120	370	826	2.2	332.4	332.4	333.4	1.0
AS	39070	140	398	4.5	336.2	336.2	336.2	0.0
AT	39230	100	540	3.3	338.3	338.3	338.3	0.0
AU	39390	100	582	3.1	338.4	338.4	338.4	0.0
AV	39940	200	835	2.2	338.4	338.4	338.6	0.2
AW	40080	200	636	2.8	339.2	339.2	339.2	0.0

¹ Feet above Golden Hill State Park Bridge

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

GOLDEN HILL CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
GOLDEN HILL CREEK (CONTINUED)								
AX	40140 ¹	240	794	2.3	339.2	339.2	339.2	0.0
AY	41730 ¹	320	665	2.7	340.4	340.4	341.2	0.8
AZ	42730 ¹	110	367	4.9	343.4	343.4	343.4	0.0
BA	44070 ¹	110	430	4.2	345.8	345.8	346.8	1.0
BB	45190 ¹	170	718	2.0	347.2	347.2	348.0	0.8
BC	46180 ¹	200	936	1.5	347.6	347.6	348.4	0.8
BD	48360 ¹	240	726	2.0	348.5	348.5	349.3	0.8
BE	49750 ¹	150	383	4.8	352.6	352.6	352.6	0.0
GULF BRANCH								
A	100 ²	200	387	2.5	362.6	362.6	363.0	0.4
B	495 ²	54	225	4.3	362.7	362.7	363.4	0.7
C	940 ²	64	186	5.2	363.5	363.5	364.0	0.5
D	1320 ²	71	118	8.1	365.5	365.5	366.4	0.9
E	1840 ²	48	110	8.7	372.8	372.8	372.8	0.0
F	1945 ²	50	117	8.2	375.0	375.0	375.0	0.0
G	3095 ²	50	117	8.2	415.1	415.1	415.1	0.0
H	4400 ²	50	117	8.2	438.0	438.0	438.0	0.0
I	5820 ²	50	147	6.5	456.5	456.5	456.5	0.0
J	6885 ²	50	140	6.9	466.8	466.8	466.8	0.0
K	7800 ²	234	1460	0.6	480.0	480.0	480.0	0.0
L	9510 ²	84	119	6.8	508.7	508.7	508.7	0.0
M	10650 ²	53	101	8.0	539.9	539.9	539.9	0.0

¹ Feet above Golden Hill State Park Bridge

² Feet above confluence with Eighteenmile Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

GOLDEN HILL CREEK – GULF BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
GULF TRIBUTARY								
A	750 ¹	106	58	3.7	508.8	508.8	509.3	0.5
B	2015 ¹	53	42	5.1	511.1	511.1	511.1	0.0
HOPKINS CREEK								
A	80 ²	300	1683	1.7	248.7	246.6 ⁵	247.6	1.0
B	1400 ²	196	868	3.3	248.7	247.0 ⁵	247.8	0.8
C	1600 ²	285	1211	1.7	248.7	247.4 ⁵	248.1	0.7
D	2320 ²	131	254	8.0	248.9	248.9	248.9	0.0
E	2990 ²	41	207	9.8	253.8	253.8	253.8	0.0
F	3190 ²	27	286	7.1	259.6	259.6	259.6	0.0
G	3740 ²	60	622	3.3	259.8	259.8	259.9	0.1
H	4310 ²	60	360	5.6	259.8	259.8	260.2	0.4
I	4780 ²	60	240	8.5	262.0	262.0	262.0	0.0
J	4980 ²	60	1177	1.7	278.6	278.6	278.6	0.0
JOHNSON CREEK 2								
A	21850 ³	29	135	12.3	486.2	486.2	486.2	0.0
B	23250 ³	88	504	3.2	511.9	511.9	511.9	0.0
C	25000 ³	121	707	2.1	521.3	521.3	522.2	0.9
D	27000 ³	135	608	2.4	540.8	540.8	541.8	1.0
JOHNSON CREEK 2 TRIBUTARY 1								
A	1500 ⁴	61	217	1.8	525.7	525.7	526.6	0.9

¹ Feet above confluence with Gulf Branch

² Feet above confluence with Lake Ontario

³ Feet above confluence with Jeddo Creek

⁴ Feet above confluence with Johnson Creek 2

⁵ Elevation computed without consideration of backwater effects of Lake Ontario

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

**GULF TRIBUTARY – HOPKINS CREEK – JOHNSON
CREEK 2 – JOHNSON CREEK 2 TRIBUTARY 1**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
KFG CRFFK								
A	0 ¹	441	1016	2.5	248.5	246.6 ³	247.6	1.0
B	90 ¹	465	1999	1.3	249.8	249.8	249.8	0.0
C	790 ¹	193	553	4.6	249.8	249.8	249.8	0.0
D	1490 ¹	121	422	6.1	251.4	251.4	251.5	0.1
E	2690 ¹	35	230	11.1	255.6	255.6	256.6	1.0
F	2880 ¹	60	902	2.8	267.1	267.1	267.2	0.1
MUD CREEK								
A	280 ²	54	605	4.5	583.0	576.6 ⁴	576.7	0.1
B	1180 ²	93	878	3.1	583.0	576.9 ⁴	577.2	0.3
C	2105 ²	84	771	3.5	583.0	577.0 ⁴	577.3	0.3
D	2365 ²	82	518	5.2	583.0	577.0 ⁴	577.3	0.3
E	3075 ²	90	822	3.3	583.0	577.5 ⁴	577.8	0.3
F	3925 ²	214	2390	1.2	583.0	581.1 ⁴	582.1	1.0
G	8685 ²	91	1014	2.7	583.0	581.7 ⁴	582.7	1.0
H	10385 ²	72	580	4.8	583.0	582.4 ⁴	583.4	1.0
I	16840 ²	192	1726	1.6	585.8	585.8	586.8	1.0
J	22240 ²	96	972	2.5	587.5	587.5	588.4	0.9
K	30075 ²	262	2340	1.1	590.0	590.0	590.8	0.8

¹ Feet above confluence with Lake Ontario

² Feet above confluence with Tonawanda Creek

³ Elevation computed without consideration of backwater effects from Lake Ontario

⁴ Elevation computed without consideration of backwater effects from Tonawanda Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

KEG CREEK– MUD CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
NORTH TONAWANDA CREEK								
A	730 ¹	61	417	1.3	579.6	*	*	*
B	1540 ¹	60	200	2.6	579.6	*	*	*
C	1712 ¹	23	144	3.7	579.7	*	*	*
D	2145 ¹	52	364	1.5	579.9	*	*	*
E	2735 ¹	23	154	3.4	580.1	*	*	*
F	4575 ¹	92	567	0.8	580.8	*	*	*
G	6505 ¹	82	441	1.0	581.6	*	*	*
H	7965 ¹	122	422	1.1	582.2	*	*	*
I	9895 ¹	30	206	2.2	582.9	*	*	*
RAYMOND ROAD TRIBUTARY								
A	770 ²	49	278	1.5	594.9	593.9 ⁴	593.9	0.0
B	1840 ²	30	52	7.9	594.9	594.1 ⁴	594.1	0.0
C	2620 ²	28	93	4.5	599.0	599.0	599.1	0.1
D	4060 ²	32	99	3.6	602.1	602.1	602.5	0.4
E	4550 ²	30	107	3.4	602.9	602.9	603.4	0.5
SAWYER CREEK EAST								
A	47 ³	66	271	1.5	575.0	569.4 ⁵	569.4	0.0
B	268 ³	46	216	1.9	575.0	569.5 ⁵	569.5	0.0
C	678 ³	35	166	2.5	575.0	569.6 ⁵	569.7	0.1
D	1308 ³	65	257	1.6	575.0	570.1 ⁵	570.2	0.1
E	2027 ³	38	183	2.3	575.0	570.4 ⁵	570.5	0.1
F	2913 ³	44	201	2.1	575.0	571.0 ⁵	571.1	0.1
G	3265 ³	48	230	1.8	575.0	571.4 ⁵	571.5	0.1

¹ Feet above confluence with Erie Canal

² Feet above mouth

³ Feet above confluence with Bull Creek

⁴ Elevation computed without consideration of backwater effects

⁵ Elevation computed without consideration of backwater effects of Bull Creek

* Data not available

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

**NORTH TONAWANDA CREEK – RAYMOND ROAD
TRIBUTARY – SAWYER CREEK EAST**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
SAWYER CREEK EAST (CONTINUED)								
H	3594	47	235	1.8	575.0	571.6 ²	571.7	0.1
I	3779	46	239	1.7	575.0	571.8 ²	571.9	0.1
J	4080	57	266	1.6	575.0	572.0 ²	572.1	0.1
K	4278	43	224	1.9	575.0	572.2 ²	572.3	0.1
L	4702	35	180	2.3	575.0	572.4 ²	572.5	0.1
M	4890	49	216	1.9	575.0	572.6 ²	572.7	0.1
N	5320	50	263	1.6	575.0	572.7 ²	572.8	0.1
O	5521	51	286	1.5	575.0	573.0 ²	573.1	0.1
P	5789	50	275	1.5	575.0	573.1 ²	573.2	0.1
Q	5978	50	300	1.4	575.0	573.4 ²	573.5	0.1
R	6431	43	238	1.8	575.0	573.8 ²	573.9	0.1
S	6662	45	263	1.6	575.0	574.0 ²	574.1	0.1
T	6801	51	317	1.3	575.0	574.3 ²	574.5	0.2
U	7341	62	379	1.1	575.0	574.8 ²	574.9	0.1
V	7627	72	439	1.0	575.0	574.8 ²	575.0	0.2
W	7797	51	341	1.2	575.0	575.0	575.3	0.3
X	8160	54	477	0.9	575.2	575.2	575.8	0.6
Y	8545	50	390	1.1	575.6	575.6	576.3	0.7
Z	8840	61	375	1.1	575.7	575.7	576.5	0.8
AA	9375	62	437	1.0	576.0	576.0	576.9	0.9
AB	9997	95	566	0.8	576.4	576.4	577.3	0.9
AC	10161	107	545	0.8	576.5	576.5	577.4	0.9
AD	10621	93	465	0.9	576.8	576.8	577.7	0.9
AE	10881	97	505	0.8	576.9	576.9	577.8	0.9

¹ Feet above confluence with Bull Creek

² Elevation computed without consideration of backwater effects of Bull Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

SAWYER CREEK EAST

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
SAWYER CREEK EAST (CONTINUED)								
AF	11101 ¹	93	509	0.8	577.1	577.1	577.9	0.8
AG	11354 ¹	71	375	1.1	577.3	577.3	578.1	0.8
AH	11648 ¹	98	659	0.3	577.3	577.3	578.3	1.0
AI	12170 ¹	97	744	0.3	577.3	577.3	578.3	1.0
AJ	12765 ¹	106	850	0.2	577.4	577.4	578.3	0.9
AK	13102 ¹	106	796	0.3	577.4	577.4	578.4	1.0
AL	13422 ¹	115	862	0.2	577.4	577.4	578.4	1.0
AM	13785 ¹	112	769	0.3	577.4	577.4	578.4	1.0
AN	14245 ¹	118	786	0.3	577.7	577.7	578.4	0.7
AO	14917 ¹	132	772	0.3	577.7	577.7	578.4	0.7
AP	15185 ¹	55	364	0.6	577.7	577.7	578.4	0.7
AQ	15472 ¹	75	394	0.5	577.8	577.8	578.5	0.7
AR	15797 ¹	63	418	0.5	577.8	577.8	578.5	0.7
AS	16248 ¹	53	343	0.6	577.9	577.9	578.5	0.6
AT	16452 ¹	53	407	0.5	577.9	577.9	578.6	0.7
AU	17267 ¹	62	420	0.5	577.9	577.9	578.6	0.7
AV	17738 ¹	69	462	0.4	577.9	577.9	578.7	0.8
AW	18157 ¹	39	346	0.6	577.9	577.9	578.7	0.8
AX	18569 ¹	47	395	0.5	577.9	577.9	578.7	0.8
SAWYER CREEK WEST								
A	171 ²	18	40	3.2	573.3	569.2 ³	569.2	0.0
B	309 ²	18	40	3.2	573.3	569.8 ³	569.8	0.0

¹ Feet above confluence with Bull Creek

² Feet above confluence with Bergholtz Creek

³ Elevation computed without consideration of backwater and lateral effects from Bergholtz Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

SAWYER CREEK EAST – SAWYER CREEK WEST

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
SAWYER CREEK WEST (CONTINUED)								
C	722 ¹	34	56	2.3	573.3	571.1 ²	571.2	0.1
D	976 ¹	64	151	0.8	573.4	572.3 ²	572.6	0.3
E	1728 ¹	26	77	1.7	573.8	572.6 ²	572.8	0.2
F	2377 ¹	65	165	0.8	575.6	573.2 ²	573.4	0.2
G	2647 ¹	36	99	1.3	575.7	573.4 ²	573.6	0.2
H	2758 ¹	45	132	1	575.7	573.5 ²	573.8	0.3
I	2937 ¹	21	88	1.4	575.7	574.3 ²	575.2	0.9
J	3078 ¹	42	189	0.7	575.9	574.4 ²	575.2	0.8
K	3293 ¹	180	487	0.3	576.0	574.6 ²	575.4	0.8
L	3570 ¹	106	434	0.3	576.3	574.7 ²	575.4	0.7
M	3926 ¹	138	553	0.2	576.3	574.7 ²	575.4	0.7
N	4097 ¹	159	447	0.3	576.3	574.7 ²	575.4	0.7
O	4923 ¹	121	331	0.4	576.4	574.7 ²	575.5	0.8
P	5154 ¹	53	261	0.5	576.5	574.8 ²	575.6	0.8
Q	5963 ¹	275	512	0.3	576.9	576.3 ²	577.2	0.9
R	6265	327	1137	0.2	577.3	576.3 ²	577.2	0.9
S	6670 ¹	381	1107	0.2	578.0	576.3 ²	577.2	0.9
T	6913 ¹	428	1050	0.2	578.2	576.4 ²	577.2	0.8
U	7133 ¹	454	1246	0.1	578.3	576.4 ²	577.2	0.8
V	7541 ¹	461	861	0.2	578.4	576.4 ²	577.2	0.8
W	7766 ¹	215	623	0.2	578.4	576.4 ²	577.2	0.8
X	8146 ¹	196	584	0.2	578.5	576.4 ²	577.2	0.8
Y	8408 ¹	144	369	0.3	578.5	576.4 ²	577.3	0.9
Z	8581 ¹	115	376	0.3	578.5	576.4 ²	577.3	0.9

¹ Feet above confluence with Bergholtz Creek

² Elevation computed without consideration of backwater and lateral effects from Bergholtz Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

SAWYER CREEK WEST

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
SAWYER CREEK WEST (CONTINUED)								
AA	8784 ¹	155	608	0.2	578.5	576.4	577.3	0.9
AB	9287 ¹	189	690	0.2	578.5	576.4	577.4	1.0
AC	9650 ¹	178	483	0.3	578.5	576.4	577.4	1.0
AD	10078 ¹	246	670	0.2	578.5	576.4	577.4	1.0
AE	10790 ¹	98	411	0.3	578.5	576.4	577.4	1.0
AF	11259 ¹	172	543	0.2	578.5	576.5	577.5	1.0
AG	11774 ¹	121	440	0.3	578.5	576.5	577.5	1.0
AH	12004 ¹	77	416	0.3	578.5	576.8	577.7	0.9
AI	12450 ¹	36	253	0.5	578.5	576.9	577.7	0.8
AJ	12884 ¹	19	158	0.8	578.5	576.9	577.7	0.8
TONAWANDA CREEK								
A	2290 ²	196/115	3852	4.5	570.3	569.7 ³	570.7	1.0
B	8140 ²	290/170	4930	3.5	571.4	571.4	572.2	0.8
C	9200 ²	**	4713	3.5	571.5	571.5	572.2	0.7
D	19850 ²	190 ⁴	3540	5.3	573.6	573.6	573.6	0.0
E	24500 ²	218 ⁴	4351	4.3	574.8	574.8	574.9	0.1
F	29500 ²	230 ⁴	3947	4.5	575.7	575.7	575.8	0.1
G	34540 ²	250 ⁴	4387	4.1	577.2	577.2	577.6	0.4
H	35870 ²	173 ⁴	3741	4.8	577.3	577.3	577.7	0.4
I	41360 ²	223 ⁴	4708	3.8	577.9	577.9	578.4	0.5
J	47220 ²	243 ⁴	4659	3.8	578.3	578.3	578.9	0.6
K	51520 ²	270 ⁴	5585	3.2	578.7	578.7	579.2	0.5
L	55000 ²	265 ⁴	5295	2.2	579.1	579.1	579.7	0.6

¹ Feet above confluence with Bergholtz Creek

² Feet above confluence with Niagara River – Tonawanda Channel

³ Elevation computed without consideration of backwater effects from Niagara River – Tonawanda Channel

⁴ Width extends beyond county boundary

* Data not available

** Floodway coincident with channel bank

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

SAWYER CREEK WEST – TONAWANDA CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
TONAWANDA CREEK (CONTINUED)								
M	59850 ¹	177 ³	3038	3.8	579.7	579.7	580.3	0.6
N	63900 ¹	185 ³	3313	3.5	581.4	581.4	582.0	0.6
O	69880 ¹	211 ³	3155	2.1	583.1	583.1	584.1	1.0
P	73025 ¹	153 ³	2608	2.6	583.6	583.6	584.6	1.0
Q	76425 ¹	113 ³	2020	3.3	584.5	584.5	585.4	0.9
R	80975 ¹	197 ³	3181	2.1	585.3	585.3	586.3	1.0
S	83625 ¹	135 ³	2310	2.9	585.8	585.8	586.8	1.0
T	89725 ¹	213 ³	3460	1.9	587.1	587.1	588.1	1.0
U	93475 ¹	213 ³	3480	1.9	587.6	587.6	588.6	1.0
V	98725 ¹	182 ³	2566	2.6	588.5	588.5	589.4	0.9
W	101825 ¹	229 ³	3052	2.2	589.2	589.2	590.0	0.8
X	105875 ¹	230 ³	3264	2.1	589.9	589.9	590.8	0.9
Y	109275 ¹	*	*	*	590.5	*	*	*
Z	115475 ¹	*	*	*	591.2	*	*	*
AA	122625 ¹	*	*	*	591.5	*	*	*
AB	128775 ¹	*	*	*	592.0	*	*	*
AC	133800 ¹	*	*	*	592.7	*	*	*
AD	144000 ¹	*	*	*	593.0	*	*	*
TOWN DITCH NO. 2								
A	0 ²	29	84	3.0	577.5	566.7 ⁴	567.0	0.3
B	150 ²	21	100	2.6	577.5	570.3 ⁴	570.3	0.0
C	276 ²	53	163	1.6	577.5	570.5 ⁴	570.5	0.0
D	397 ²	18	89	2.9	577.5	570.6 ⁴	570.6	0.0

¹ Feet above confluence with Niagara River – Tonawanda Channel

² Feet above confluence with Tonawanda Creek

³ Width extends beyond county boundary

⁴ Elevation computed without consideration of backwater and lateral effects from Tonawanda Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

TONAWANDA CREEK – TOWN DITCH NO. 2

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
TOWN DITCH NO. 2 (CONTINUED)								
E	489	27	152	1.7	577.5	572.3 ²	572.4	0.1
F	611	26	141	1.8	577.5	572.3 ²	572.4	0.1
G	747	30	147	1.7	577.5	572.4 ²	572.9	0.5
H	855	35	201	1.3	577.5	572.5 ²	572.9	0.4
I	1000	13	64	4.0	577.5	572.4 ²	572.9	0.5
J	1158	58	448	0.6	577.5	575.6 ²	576.5	0.9
K	1394	73	500	0.5	577.5	575.6 ²	576.5	0.9
L	1592	63	404	0.6	577.5	575.6 ²	576.5	0.9
M	1736	64	388	0.7	577.5	575.6 ²	576.5	0.9
N	1947	50	289	0.9	577.5	575.6 ²	576.5	0.9
O	2142	51	337	0.8	577.5	575.6 ²	576.6	1.0
P	2295	36	244	1.1	577.5	575.7 ²	576.6	0.9
Q	2393	35	225	1.1	577.5	575.7 ²	576.6	0.9
R	2517	32	210	1.2	577.5	575.7 ²	576.6	0.9
S	2676	33	217	1.2	577.5	576.3 ²	577.3	1.0
T	2778	51	282	0.9	577.5	576.4 ²	577.4	1.0
U	3009	74	299	0.9	577.5	576.4 ²	577.4	1.0
V	3165	102	585	0.4	577.5	576.4 ²	577.4	1.0
W	4034	214	962	0.3	577.5	576.4 ²	577.4	1.0
X	5353	233	861	0.3	577.5	576.5 ²	577.5	1.0
Y	6339	310	983	0.3	577.5	576.5 ²	577.5	1.0
Z	7874	211	846	0.3	577.5	576.6 ²	577.5	0.9
AA	8908	185	517	0.5	577.5	576.6 ²	577.6	1.0
AB	9066	250	640	0.4	577.5	576.6 ²	577.6	1.0

¹ Feet above confluence with Tonawanda Creek

² Elevation computed without consideration of backwater effects from Tonawanda Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

TOWN DITCH NO. 2

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
TOWN DITCH NO. 2 (CONTINUED)								
AC	10082 ¹	85	284	0.9	577.5	576.7 ²	577.7	1.0
AD	10232 ¹	67	234	0.7	577.5	576.7 ²	577.7	1.0
AE	10349	23	121	1.4	577.5	577.3 ²	578.3	1.0
AF	10642 ¹	130	491	0.4	577.5	577.3 ³	578.3	1.0
AG	11572 ¹	196	780	0.2	577.5	577.3 ³	578.3	1.0
AH	13059 ¹	117	312	0.6	577.5	577.4 ³	578.4	1.0
AI	14385 ¹	114	409	0.4	577.5	577.5	578.5	1.0
TWELVEMILE CREEK								
A	300 ²	280	2254	2.4	251.4	251.4	251.7	0.3
B	670 ²	290	2485	2.2	251.5	251.5	251.8	0.3
C	1730 ²	205	2022	2.7	251.8	251.8	252.0	0.2
D	1890 ²	205	1817	3.0	251.8	251.8	252.0	0.2
E	2690 ²	263	1870	2.9	252.2	252.2	252.4	0.2
F	3440 ²	240	1719	3.2	252.6	252.6	252.8	0.2
G	4790 ²	205	1578	3.5	253.4	253.4	253.6	0.2
H	6020 ²	215	1615	3.4	254.2	254.2	254.4	0.2
I	7920 ²	160	1338	4.1	255.4	255.4	255.6	0.2
J	9770 ²	163	1182	4.7	257.4	257.4	257.5	0.1
K	10920 ²	150	1245	4.4	259.5	259.5	260.0	0.5
L	12380 ²	150	1100	5.0	263.4	263.4	264.0	0.6
M	13500 ²	149	1405	3.9	267.3	267.3	267.8	0.5
N	15040 ²	161	1581	3.5	269.8	269.8	270.4	0.6

¹ Feet above confluence with Tonawanda Creek

² Elevation computed without consideration of backwater effects from Tonawanda Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

TOWN DITCH NO. 2 – TWELVEMILE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
TWELVEMILE CREEK (CONTINUED)								
O	15310 ²	150	1700	3.2	273.9	273.9	273.9	0.0
P	17510 ²	230	1158	4.7	275.4	275.4	276.3	0.9
Q	19960 ²	250	1374	3.2	281.9	281.9	282.4	0.5
R	22110 ²	300	1991	2.2	284.0	284.0	284.9	0.9
S	23130	200	938	4.7	285.0	285.0	285.6	0.6
T	25530	450	2304	1.9	289.8	289.8	290.0	0.2
U	26380	150	1969	2.2	289.8	289.8	290.7	0.9
V	26550	150	1289	3.4	293.0	293.0	293.0	0.0
W	28530	180	1528	2.9	294.8	294.8	294.8	0.0
X	31710	180	1482	3.0	296.5	296.5	297.5	1.0
Z	43500	211	2003	1.9	303.8	303.8	304.4	0.6
AA	46850	156	1146	2.0	305.5	305.5	306.0	0.5
AB	50500	182	1480	1.6	307.3	307.3	307.9	0.6
TWELVEMILE CREEK EAST BRANCH								
A	4400	150	1066	5.4	250.3	250.3	250.6	0.3
B	5100	350	18232	3.1	251.2	251.2	251.7	0.5
C	6100	356	2088	2.7	252.0	252.0	252.9	0.9
D	7475	180	1606	3.6	253.9	253.9	254.6	0.7
E	7670	193	1654	3.5	256.1	256.1	256.4	0.3
F	7970	203	1654	3.5	256.5	256.5	257.0	0.5
G	8210	160	792	7.2	256.5	256.5	257.0	0.5
H	8395	155	1053	5.4	257.6	257.6	258.1	0.5
I	9885	300	1156	4.9	262.7	262.7	262.7	0.0

¹ Feet above confluence with Tonawanda Creek

² Feet above confluence with Lake Ontario

³ Elevation computed without consideration of backwater effects from Tonawanda Creek

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

TWELVEMILE CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
TWELVEMILE CREEK EAST BRANCH (CONTINUED)								
J	10695	105	583	9.8	268.0	268.0	268.1	0.1
K	11395	300	1049	3.5	273.5	273.5	273.8	0.3
L	13550	280	1486	3.8	277.8	277.8	278.4	0.6
M	15050	300	1735	3.3	280.7	280.7	280.9	0.2
N	17250	300	1153	5.0	284.8	284.8	285.3	0.5
O	19875	380	1590	3.2	292.5	292.5	292.5	0.0
P	20005	380	2966	1.7	294.3	294.3	294.3	0.0
Q	22040	380	1999	2.5	295.3	295.3	295.3	0.0
R	24540	320	1487	3.4	296.9	296.9	297.9	1.0
S	26790	223	1478	3.4	301.2	301.2	302.1	0.9
T	28190	274	1556	3.2	303.6	303.6	304.4	0.8
U	30310	250	1291	3.9	309.8	309.8	310.2	0.4
V	30430	275	1547	3.2	311.0	311.0	311.3	0.3
W	33485	300	1667	3.0	318.8	318.8	319.4	0.6
X	34385	300	1782	2.8	320.1	320.1	320.8	0.7
Y	34575	300	2100	2.4	321.0	321.0	322.0	1.0
Z	37375	250	891	5.2	326.0	326.0	326.0	0.0
AA	37495	200	1120	4.5	327.5	327.5	327.5	0.0
AB	38795	306	1702	3.0	329.9	329.9	330.4	0.5
AC	42045	270	1998	2.5	338.9	338.9	339.6	0.7

¹ Feet above confluence with Lake Ontario

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

**TWELVEMILE CREEK –
TWELVEMILE CREEK EAST BRANCH**

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE ¹	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
TWELVEMILE CREEK EAST BRANCH (CONTINUED)								
AD	42995	230	1286	3.9	339.8	339.8	340.3	0.5
AE	45895	302	1822	2.8	343.9	343.9	344.3	0.4
AF	48095	354	1711	2.9	346.2	346.2	346.8	0.6
AG	49495	350	1818	2.4	348.0	348.0	348.7	0.7
AH	51195	300	1466	3.0	349.6	349.6	350.6	1.0
AI	53695 ¹	150	1285	3.4	354.1	354.1	354.3	0.2
AJ	53845 ¹	255	1634	2.7	355.4	355.4	355.6	0.2
AK	55345 ¹	300	1609	2.7	357.1	357.1	357.4	0.3
AL	56845 ¹	296	1575	2.8	358.6	358.6	359.2	0.6
AM	59345 ¹	200	1178	3.7	361.5	361.5	361.9	0.4
AN	59505 ¹	200	1807	2.4	363.1	363.1	363.2	0.1
AO	60855 ¹	264	1817	2.4	364.0	364.0	364.0	0.0
AP	62955 ¹	300	2270	1.5	364.6	364.6	365.1	0.5
AQ	65005 ¹	301	1714	1.9	366.1	366.1	366.3	0.2
AR	67405 ¹	300	1357	2.4	366.7	366.7	367.2	0.5
AS	70005 ¹	300	1919	1.7	368.9	368.9	369.7	0.8
AT	71300 ¹	143	737	3.5	369.9	369.9	370.8	0.9
AU	73100 ¹	88	669	3.9	372.3	372.3	373.3	1.0

¹ Feet above confluence with Lake Ontario

TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

TWELVEMILE CREEK EAST BRANCH

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION (FEET NAVD)			
CROSS SECTION	DISTANCE	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
TWELVEMILE CREEK EAST BRANCH. TRIBUTARY EAST								
A	2000 ²	300	1154	0.6	364.6	364.6	365.6	1.0
B	4030 ²	300	870	0.8	365.6	365.6	366.1	0.5
C	5030 ²	250	418	1.5	366.1	366.1	366.9	0.8
D	5140 ²	200	508	1.2	367.8	367.8	367.9	0.1
TWELVEMILE CREEK EAST BRANCH. TRIBUTARY SOUTH								
A	2430 ¹	120	676	0.6	365.8	365.8	366.3	0.5
B	3930 ¹	120	685	0.5	365.8	365.8	366.6	0.8
C	4530 ¹	120	440	0.5	365.9	365.9	366.8	0.9
TWELVEMILE CREEK TRIBUTARY 3								
A	4000 ²	143	679	2.1	316.2	316.2	316.8	0.6
B	7200 ²	143	562	1.6	319.9	319.9	320.6	0.7
TWELVEVMILE CREEK TRIBUTARY 3A								
A	1100 ³	89	281	0.4	318.8	318.8	319.8	1.0
B	4300 ³	20	36	7.7	323.0	323.0	324.0	1.0

¹ Feet above confluence with Lake Ontario

² Feet above confluence with Twelvemile Creek East Branch

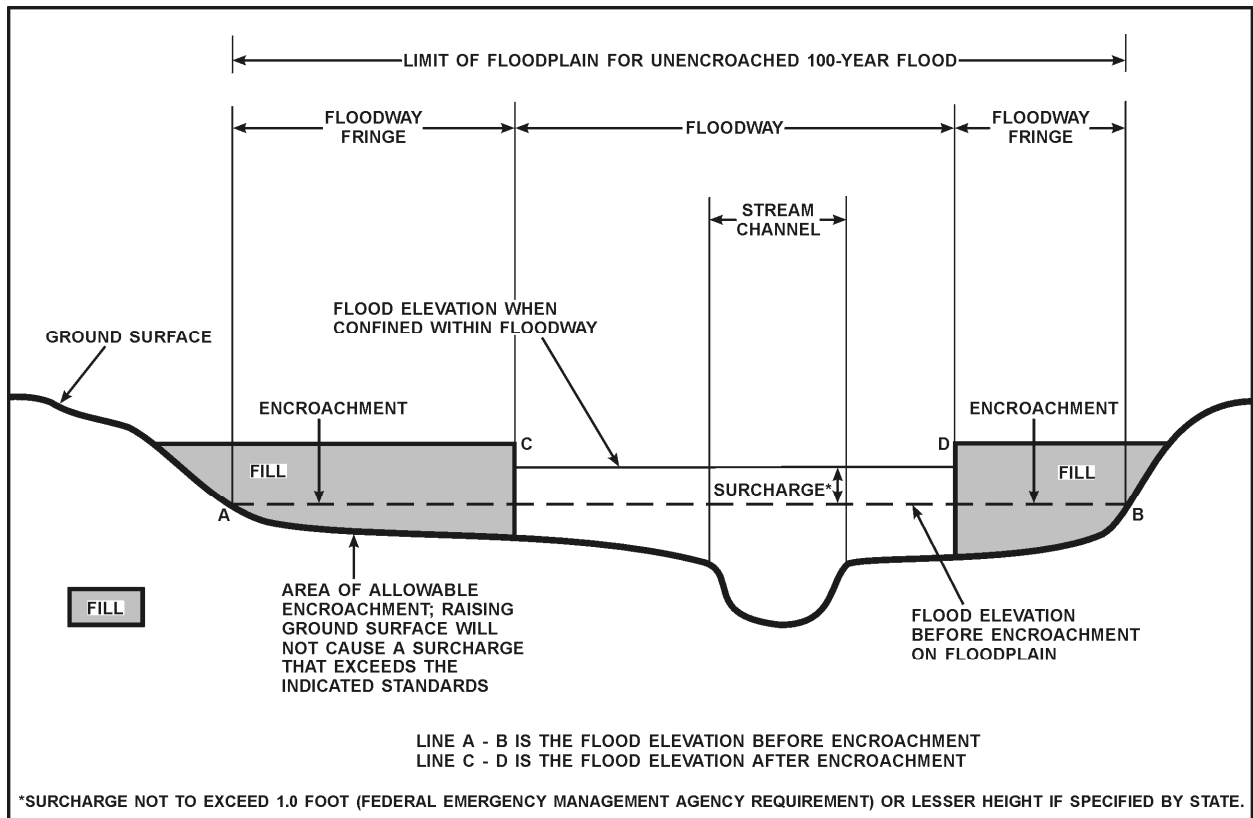
TABLE 9

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NEW YORK
(ALL JURISDICTIONS)**

FLOODWAY DATA

**TWELVEMILE CREEK EAST BRANCH – TWELVEMILE
CREEK EAST BRANCH, TRIBUTARY EAST**



FLOODWAY SCHEMATIC

Figure 1

5.0 INSURANCE APPLICATIONS

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. The 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 by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations 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 by detailed methods. In most instances, whole-foot base flood elevations 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 the 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 base flood depths derived from the detailed hydraulic analyses are shown within this zone.

Zone AR

Zone AR is the flood insurance rate zone that corresponds to the area of special flood hazard formerly protected from the 1-percent annual chance flood event by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1-percent annual chance or greater flood event.

Zone A99

Zone A99 is the flood insurance rate zone that corresponds to areas of the 1-percent annual chance floodplain that will be protected by a Federal flood protection system where construction has reached specified statutory milestones. No base flood elevations or depths are shown within this zone.

Zone V

Zone V is the flood insurance rate zone that corresponds to the 1-percent annual chance coastal floodplains that have additional hazards associated with storm waves. Because approximate hydraulic analyses are performed for such areas, no base flood elevations 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 base flood elevations 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, and to 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, and areas protected from the 1-percent annual chance flood by levees. No base flood elevations or depths are shown within this zone.

Zone D

Zone D is the flood insurance rate zone that corresponds to unstudied areas where flood hazards are undetermined, but possible.

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 base flood elevations or average depths. Insurance agents use the zones and base flood elevations 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 are shown where applicable.

The current FIRM presents flooding information for the entire geographic area of Niagara County. Previously, separate Flood Hazard Boundary Maps and/or FIRMs were prepared for each identified flood-prone jurisdiction in Niagara county. 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, up to and including this countywide FIS, are presented in Table 10, "Community Map History."

7.0 OTHER STUDIES

A FIS is currently being prepared for Erie County, New York (All Jurisdictions). An FIS has also been prepared for the Town of Yates in Orleans County, New York (U.S. Department of Housing and Urban Development, March 1978). No FISs have been published for two additional municipalities bordering Niagara County in Orleans County; the towns of Ridgeway and Shelby, and no FIS has been published for the Town of Alabama, bordering Niagara County in Genesee County, New York.

Information pertaining to each jurisdiction within Niagara County has been compiled into this FIS. Therefore, this FIS supersedes all previously printed FIS Reports, FHBMs, FBFMs, and FIRMs for all jurisdictions within Niagara County.

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Barker, Village of	May 3, 1974	June 11, 1976	May 1, 1984	
Cambria, Town of	April 12, 1974	September 3, 1976	September 30, 1983	
Hartland, Town of	April 12, 1974	May 21, 1976	October 7, 1983	
Lewiston, Town of	April 12, 1974	August 6, 1976	June 18, 1980	
Lockport, City of	October 22, 1976	None	February 4, 1981	
Lockport, Town of	October 22, 1976	None	September 2, 1981	February 19, 1992 October 4, 2002
Middleport, Village of	May 31, 1974	December 26, 1975	August 1, 1983	
Newfane, Town of	May 17, 1974	April 23, 1976	November 18, 1981	
Niagara Falls, City of	March 29, 1974	November 14, 1975	March 16, 1983	September 5, 1990
Niagara, Town of	March 22, 1974	April 30, 1976	June 15, 1984	
North Tonawanda, City of	April 12, 1974	May 7, 1976	January 6, 1982	
Pendleton, Town of	May 13, 1974	April 16, 1976	January 6, 1982	
Porter, Town of	April 12, 1974	November 19, 1976	August 15, 1983	

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NY
(ALL JURISDICTIONS)**

COMMUNITY MAP HISTORY

COMMUNITY NAME	INITIAL IDENTIFICATION	FLOOD HAZARD BOUNDARY MAP REVISIONS DATE	FIRM EFFECTIVE DATE	FIRM REVISIONS DATE
Royalton, Town of	May 3, 1974	September 12, 1975	July 6, 1979	
Somerset, Town of	March 15, 1974	June 18, 1976	February 3, 1982	
Wheatfield, Town of	January 16, 1974	July 30, 1976	July 16, 1981	March 1, 1984 February 2, 1989
Wilson, Town of	May 17, 1974	July 23, 1976	February 1, 1978	April 1, 1981
Wilson, Village of	April 5, 1974	June 11, 1976	April 17, 1978	November 19, 1980
Youngstown, Village of	March 1, 1974	July 23, 1976	June 4, 1980	

TABLE 10

FEDERAL EMERGENCY MANAGEMENT AGENCY

**NIAGARA COUNTY, NY
(ALL JURISDICTIONS)**

COMMUNITY MAP HISTORY

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this FIS can be obtained by contacting FEMA, Federal Insurance and Mitigation Division, 26 Federal Plaza, Room 1351, New York, New York 10278.

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