EMERGENCY TRANSPORTATION INFRASTRUCTURE RECOVERY
WATER BASIN ASSESSMENT
AND FLOOD HAZARD MITIGATION ALTERNATIVES

ORISKANY CREEK
ONEIDA COUNTY, NEW YORK

April 2014

MMI #5231-01

Photo Source: Milone & MacBroom, Inc. (2013)

This document was prepared for the New York State Department of Transportation, in cooperation with the New York State Department of Environmental Conservation.

Prepared by:

MILONE & MACBROOM, INC.
134 Main Street, Suite A1
New Paltz, NY 12561
(845) 633-8153
www.miloneandmacbroom.com

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ABBREVIATIONS/ACRONYMS

BCA	Benefit-Cost Analysis
BCR	Benefit Cost Ratio
CFS	Cubic Feet per Second
CME	Creighton Manning Engineering
D/S	Downstream
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance
FT	Feet
FTP	File Transfer Protocol
GIS	Geographic Information System
HMA	Hazard Mitigation Assistance
HMGP	Hazard Mitigation Grant Program
MMI	Milone & MacBroom, Inc.
NFIP	National Flood Insurance Program
NFIRA	National Flood Insurance Reform Act
NOAA	National Oceanic and Atmospheric Administration
NWS	National Weather Service
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
PDM	Pre-Disaster Mitigation
SFHA	Special Flood Hazard Area
SQ. MI.	Square Mile
STA	River Station
U/S	Upstream
USGS	United States Geological Survey
YR	Year

1.0 INTRODUCTION

1.1 Project Background

A severe precipitation system in June 2013 caused excessive flow rates and flooding in a number of communities in the greater Utica region. As a result, the New York State Department of Transportation (NYSDOT) in consultation with the New York State Department of Environmental Conservation (NYSDEC) retained Milone & MacBroom, Inc. (MMI) through a subconsultant agreement with Creighton Manning Engineering (CME) to undertake a comprehensive water basin assessment of 13 watersheds in Herkimer, Oneida, and Montgomery Counties, including the Oriskany Creek watershed. Prudent Engineering was also contracted through CME to provide support services.

Work conducted for this study included field assessment of the watersheds, streams, and rivers; analysis of flood mitigation needs in the affected areas; hydrologic assessment; and identification of long-term recommendations for mitigation of future flood hazards.

Oriskany Creek flows through the town of Madison in Madison County, and the towns of Marshall, Kirkland, Westmoreland, and Whitestown in Oneida County. The creek drains an area of 147 square miles. The watershed is approximately 41 percent forested, with a mix of rural residential and agriculture land uses. Figure 1 depicts the contributing watershed.

Oriskany Creek has an average slope of 0.6 percent over its entire length. Tributaries include Buckley Mill Creek, Big Creek, Turkey Creek, White Creek, and Deans Creek. At 0.6 percent slope, Oriskany Creek is a low gradient watercourse and therefore does not generate excessively high stream power during high flows.

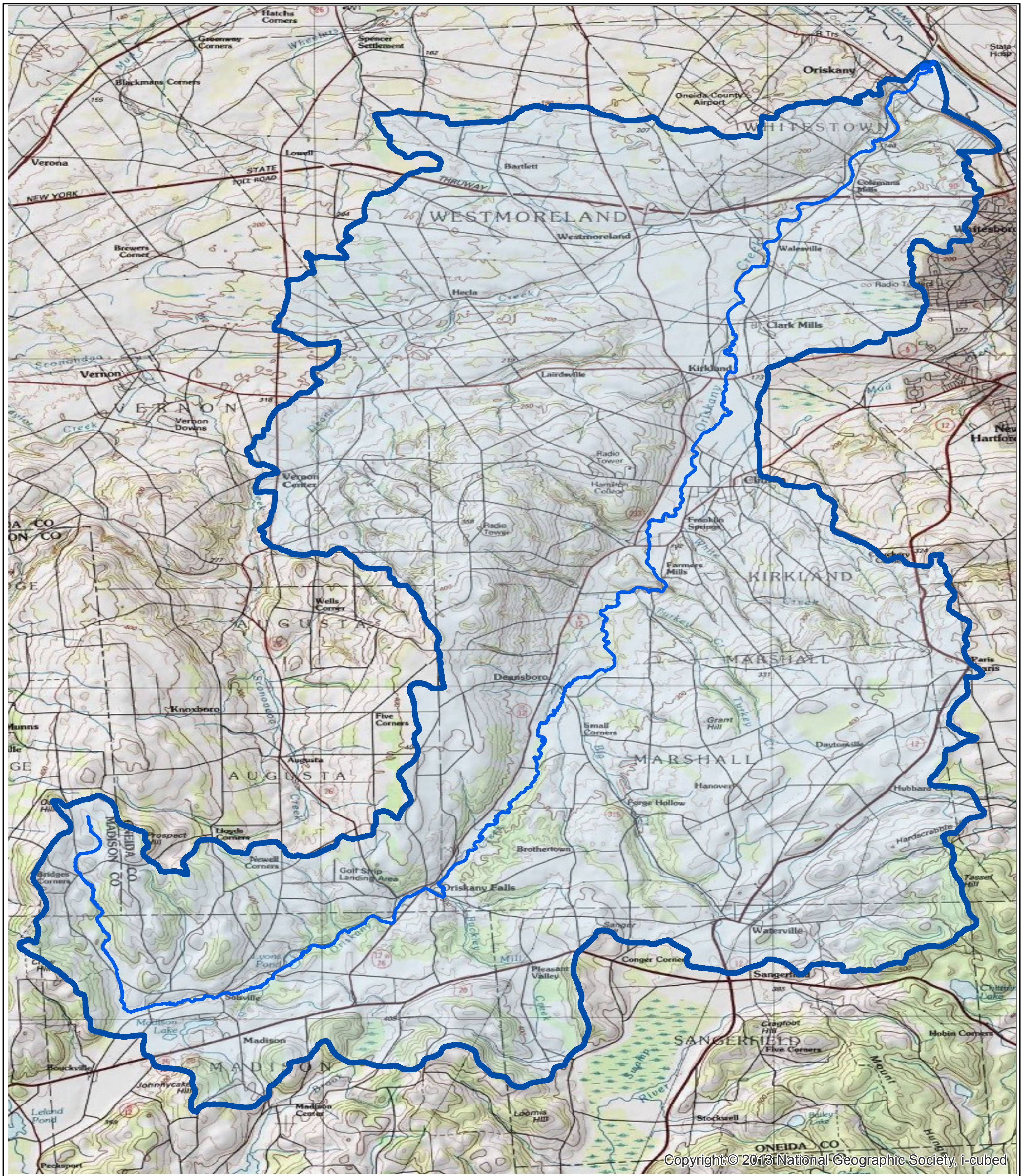
The Oriskany watershed has a low density of development, including development within the floodplain. The main flood vulnerabilities associated with the creek stem from undersized road and railroad crossings that act as hydraulic pinch points. Bank erosion is occurring at a number of locations along the watercourse, contributing sediment and woody debris to the creek and restricting channel and bridge capacity in depositional areas.

Local officials and residents report flooding problems in the vicinity of Van Hyning Road downstream of Oriskany Falls, at the Norton Avenue bridge in Kirkland, along Valley Road, in the vicinity of the Little League field in Oriskany, and at several other locations along the creek.

The goals of the subject water basin assessment were to:

1. Collect and analyze information relative to the June 28, 2013 flood and other historic flooding events

2. Identify critical areas subject to flood risk



SOURCE(S):

Figure 1: Oriskany Creek Drainage Basin Location

LOCATION:
Oneida County, New York

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NYDOT: Emergency Transportation Infrastructure Recovery

MXD: Y:\5231-01\GIS\Maps\Figure 1 Maps\Figure 1 Oriskany Creek.mxd

Map By: CMP
MMI#: 5231-01
Original: 01/06/2014
Revision: 1/6/2014
Scale: 1 inch = 12,500 feet

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(203) 271-1773 Fax: (203) 272-9733
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3. Develop and evaluate flood hazard mitigation alternatives for each high risk area within the stream corridor

1.2 Nomenclature

In this report and associated mapping, stream stationing is used as an address to identify specific points along the watercourse. Stationing is measured in feet and begins at the outlet of Oriskany Creek at STA 0+00 and continues upstream to STA 1806+00. As an example, STA 73+00 indicates a point in the channel located 7,300 linear feet upstream of the mouth. Figure 2 depicts the stream stationing along Oriskany Creek.

All references to right bank and left bank in this report refer to "river right" and "river left," meaning the orientation assumes that the reader is standing in the river looking downstream.

2.0 DATA COLLECTION

2.1 Initial Data Collection

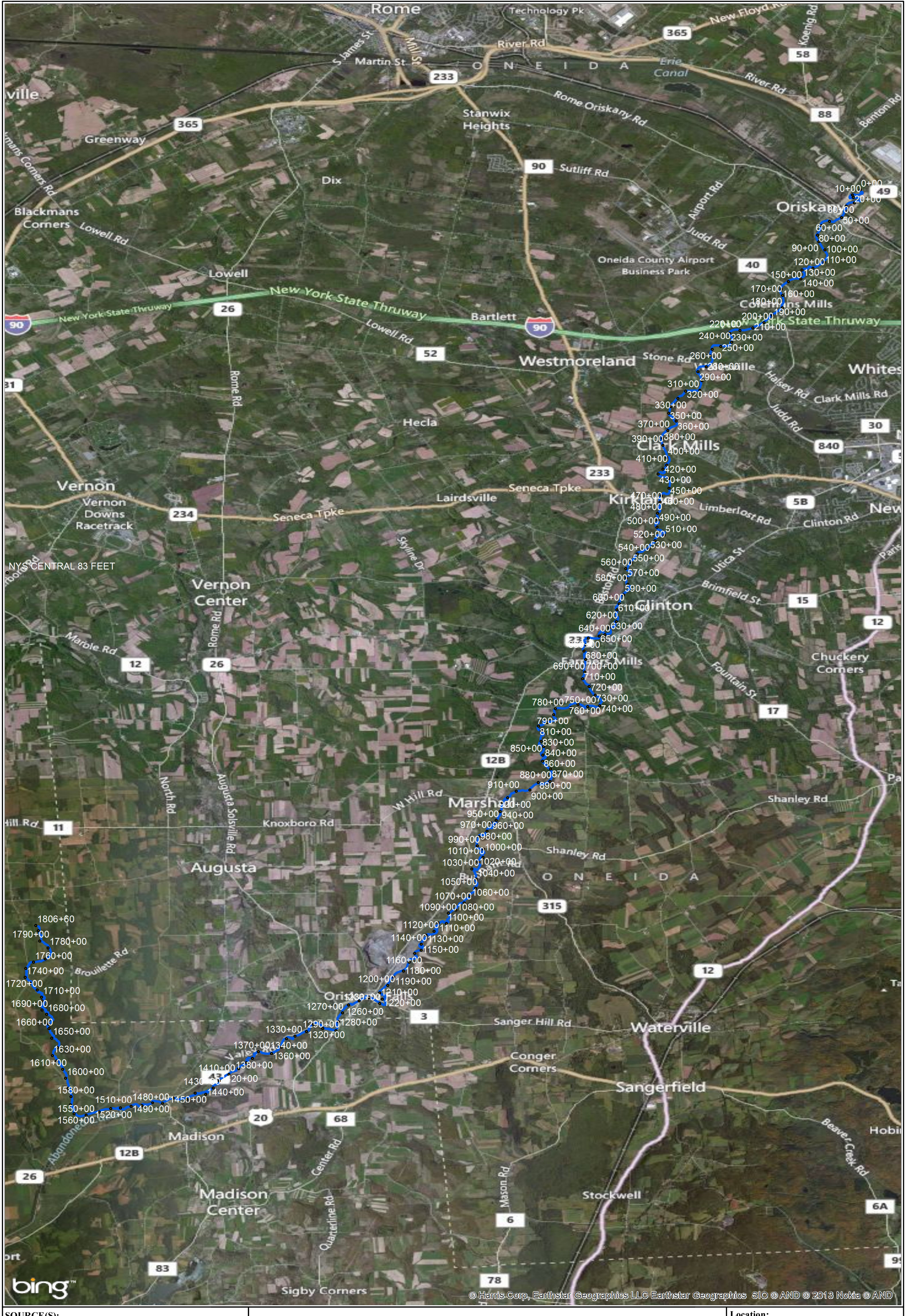
Public information pertaining to Oriskany Creek was collected from previously published documents as well as through meetings with municipal, county, and state officials. Data collected includes reports, photographs, newspaper articles, Federal Emergency Management Agency (FEMA) Flood Insurance Studies (FIS), aerial photographs, and geographic information system (GIS) mapping. Appendix A is a summary listing of data and reports collected.

2.2 Public Outreach

An initial kickoff meeting was held in early October 2013 with representatives from NYSDOT and NYSDEC, followed by public outreach meetings held in the affected communities, including a meeting held in October 2013 at Oneida Community Hall to discuss Oriskany and Big Creeks. These meetings provided more detailed, firsthand accounts of past flooding events; identified specific areas that flooded in each community and the extent and severity of flood damage; and provided information on post-flood efforts such as bridge reconstruction, road repair, channel modification, and dredging. This outreach effort assisted in the identification of target areas for field investigations and future analysis.

2.3 Field Assessment

Following initial data gathering and outreach meetings, field staff from Prudent Engineering and MMI undertook field data collection efforts, with special attention given to areas identified in the outreach meetings.



SOURCE(S): XXXXX	Figure 2: Oriskany Creek Watercourse Stationing	Location: Oneida County, New York

N	NYDOT: Emergency Transportation Infrastructure Recovery	Map By: CMP MMI#: 5231-01 MXD: Y:\5231-01\GIS\Maps\Figure 2 Maps\Figure 2 Oriskany Creek.mxd 1st Version: 01/06/2014 Revision: 1/6/2014 Scale: 1 in = 8,750 ft	MILONE & MACBROOM 99 Realty Drive Cheshire, CT 06410 (203) 271-1773 Fax: (203) 272-9733 www.miloneandmacbroom.com

Initial field assessment of all 13 watersheds was conducted in October and November 2013. Selected locations identified in the initial phase were assessed more closely by multiple field teams in late November 2013. Information collected during field investigations included the following:

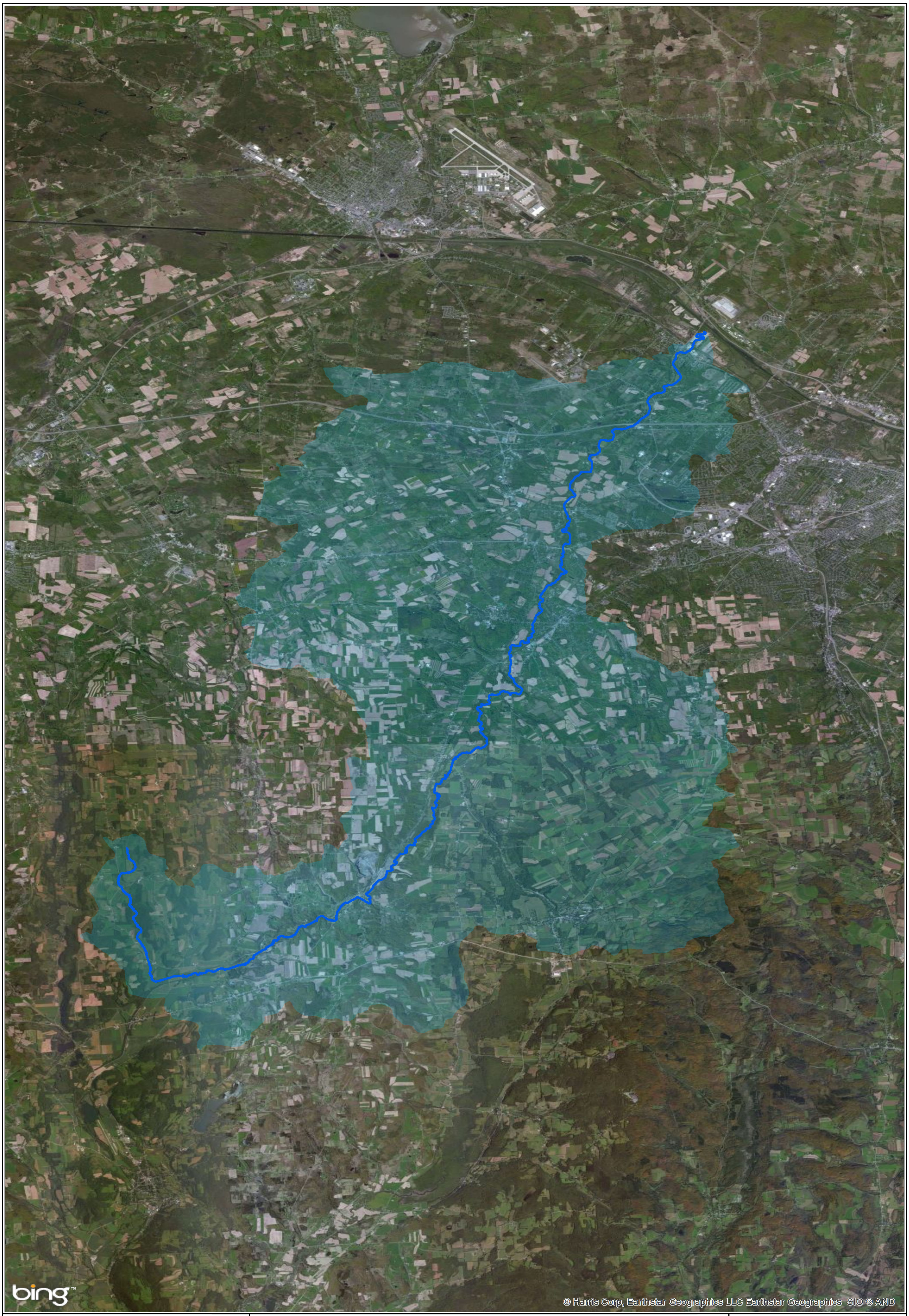
- Rapid "windshield" river corridor inspection
- Photo documentation of inspected areas
- Measurement and rapid hydraulic assessment of bridges, culverts, and dams
- Geomorphic classification and assessment, including measurement of bankfull channel widths and depths at key cross sections
- Field identification of potential flood storage areas
- Wolman pebble counts
- Cohesive soil shear strength measurements
- Characterization of key bank failures, headcuts, bed erosion, aggradation areas, and other unstable channel features
- Preliminary identification of potential flood hazard mitigation alternatives, including those requiring further analysis

Included in Appendix B is a copy of the River Assessment Reach Data Form, River Condition Assessment Form, Bridge Waterway Inspection Form, and Wolman Pebble Count Form. Appendix C is a photo log of select locations within the river corridor. Field Data Collection Index Summary mapping has been developed to graphically depict the type and location of field data collected. Completed data sheets, field notes, photo documentation, and mapping developed for this project have been uploaded onto the NYSDOT ProjectWise system and the project-specific file transfer protocol (FTP) site. The data and mapping were also provided electronically to NYSDEC.

2.4 Watershed Land Use

Figure 3 is a watershed map of Oriskany Creek. The creek flows through the town of Madison in Madison County, and the towns of Marshall, Kirkland, Westmoreland, and Whitestown in Oneida County. The creek drains an area of 147 square miles. The watershed is approximately 41 percent forested, with a mix of rural residential and agriculture land uses. The creek flows through several more densely developed communities, where development has occurred closer to the watercourse. These include the villages and hamlets of Oriskany Falls, Deansboro, Clinton, Kirkland, Clark Mills, and Oriskany. The Oriskany Creek corridor is primarily forested for much of its length.

Oriskany Creek originates at STA 1806+00 in an area of primarily agricultural lands approximately five miles upstream of the hamlet of Solsville at STA 1476+00. The creek flows south, then bends to the northeast just upstream of Solsville and flows toward Oriskany Falls at STA 1238+00. Downstream of Oriskany Falls, the creek flows past a quarry operation near STA 1172+00. The stream corridor in this vicinity is primarily wooded.



SOURCE(S):

Figure 3: Oriskany Creek Drainage Basin Aerial

Location:
Oneida County, New York

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NYDOT: Emergency Transportation Infrastructure Recovery

Map By: CMP
MMI#: 5231-01
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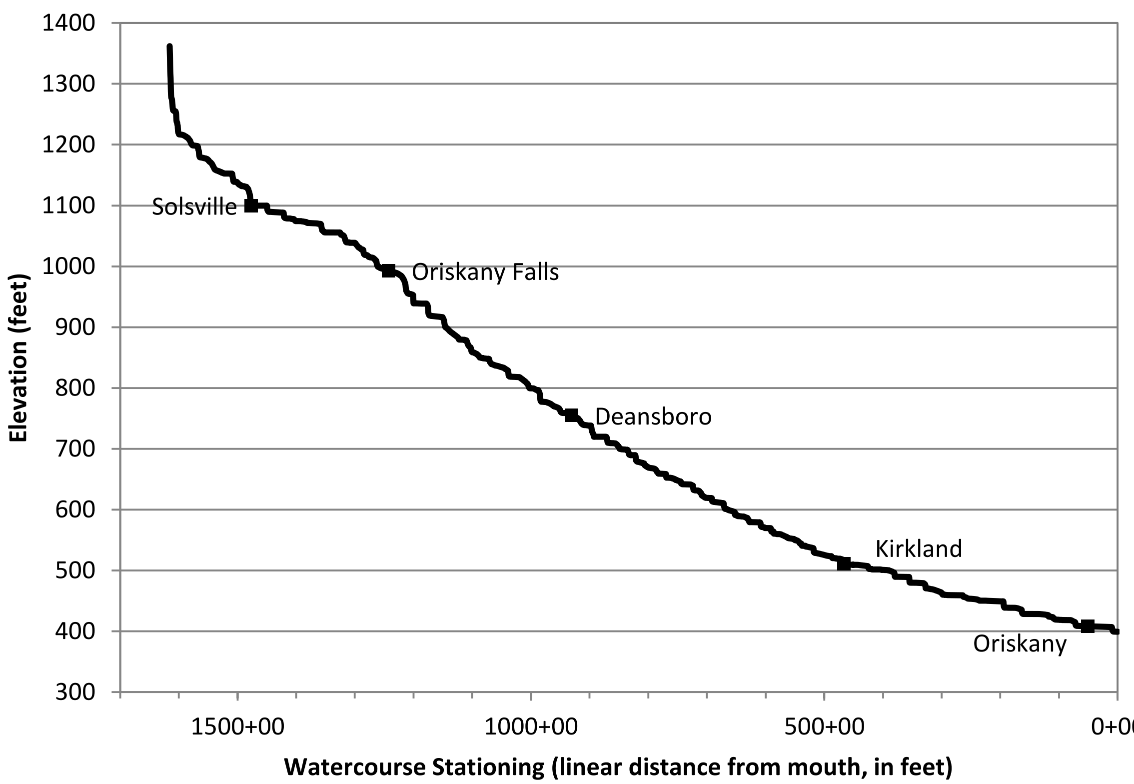
Downstream of Oriskany Falls, Oriskany Creek flows generally north and northeast through the hamlet of Deansboro (STA 932+ 00), after which it is joined by the tributary Big Creek (STA 904+00). Downstream of Deansboro, the creek winds through agricultural lands before passing under Route 12B near Franklin Springs (STA 691+50), where the stream corridor is primarily forested. The creek then flows north through the hamlets of Kirkland (466+00) and Clark Mills (STA 392+00) and passes under I-90 (STA 202+00), flowing toward Oriskany (STA 54+00). At STA 0+00, Oriskany Creek discharges into the Mohawk River.

2.5 Geomorphology

Oriskany Creek has an average slope of 0.6 percent over its 30.6-mile length, dropping a total of 963 vertical feet from its headwaters near the hamlet of Bridges Corners to its outlet at the Mohawk River. Figure 4 presents a profile of Oriskany Creek, showing the watercourse elevation versus the linear distance from the mouth of the watercourse, as well as several points of reference.

FIGURE 4
Oriskany Creek Profile



Oriskany Creek has a low gradient and few high-energy reaches when compared to other watercourses in the region. The basin has a rural character, with a heavily forested stream corridor. As such, it lacks a high degree of excessive erosion and sediment deposition. There are few signs of channel excavation and bank armoring. Oriskany Creek is known as an excellent fly fishing stream, especially for brown trout.

Tributaries to Oriskany Creek include Buckley Mill Creek, Lindsey Brook, Watermans Brook, Big Creek, Turkey Creek, White Creek, St. Mary's Brook, and Deans Creek.

Several discrete areas of bank erosion were observed along Oriskany Creek, which collectively contribute a sediment load to the channel. Areas of sediment deposition were observed where gravel bars had formed in the channel, especially in flat, meandering reaches such as between STA 594+00 and STA 581+00; between STA 532+00 and STA 472+00; and between STA 456+00 and STA 394+00. One area where severe bank erosion was observed is located on the right bank just downstream of Valley Road (Route 32) in the vicinity of STA 120+00. The eroding bank in this area is contributing coarse-grained sediment and woody debris that deposits in the channel. Some of this debris is introduced as entire trees become uprooted when they are undermined by bank erosion and fall into the creek. A large, mid-channel sediment bar has formed just downstream of the dam at STA 81+50.

2.6 Hydrology

Alluvial river channels adjust their width and depth around a long-term dynamic equilibrium condition that corresponds to "bankfull" conditions. Extensive data sets indicate that the channel-forming or bankfull discharge in specific regions is primarily a function of watershed area. The bankfull width and depth of alluvial channels represent long-term equilibrium conditions and are important design criteria. Table 1 below lists estimated bankfull discharge, width, and depth at several points along Oriskany Creek, as derived from the United States Geological Survey (USGS) *StreamStats* program.

TABLE 1
Estimated Bankfull Discharge, Width, and Depth
(Source: USGS *StreamStats*)

Location along Oriskany Creek	Station	Watershed Area (sq. mi.)	Discharge (cfs)	Bankfull Width (ft)	Bankfull Depth (ft)
Route 315 Crossing	936+00	37.9	598	57.1	3.03
Route 5 Crossing	466+00	86.4	1120	83.2	3.57
At Oriskany Little League Field	73+00	145	3210	106	3.96

It can be informative to compare the actual bankfull widths measured on Oriskany Creek to the regional bankfull channel dimensions reported above. The measured bankfull width at the Route 315 crossing in the upstream reach of Oriskany Creek is 36.0 feet compared to a regional bankfull channel width of 57.1 feet provided by *StreamStats*. Further downstream at the Route 5 bridge, the measured bankfull width is 58.0 feet relative to the regional bankfull width of 83.2 feet. Adjacent to the Little League field located in the town of Oriskany, the bankfull channel width was measured at 95.0 feet compared to 106.0 feet regionally.

Oriskany Creek is primarily natural and relatively free of dredged and channelized reaches. The values derived from *StreamStats* provide only an estimate of the regional channel dimensions and flows. However, the comparison indicates that certain sections of Oriskany Creek may be undersized to convey flood flows.

There are no USGS stream gauging stations on Oriskany Creek; however, hydrologic data on peak flood flow rates are available from the FEMA FIS and from *StreamStats* regional data. The most current FEMA FIS that applies to Oriskany Creek is for all of Oneida County. The FIS has an effective date of September 27, 2013. According to the FIS, the most recent hydraulic modeling for Oriskany Creek was completed in 1980 and 1984.

The hydrologic analysis methods employed by FEMA used a regional analysis of stream flow gauges in the area. A linear correlation was made for the gauges to relate the logarithm of the peak flows and the logarithm of the drainage area at the gauges. The analysis was supplied by the USGS and followed the standard log-Pearson Type III method as presented by the Water Resources Council (Water Resources Council, 1976).

Discharges developed by FEMA were applied in a backwater analysis on Oriskany Creek, and the resulting water-surface elevations were compared with historical elevations and checked for reasonableness. The results were published in the FIS, and the resulting mapping was published as the effective Flood Insurance Rate Map (FIRM) for Oneida County.

Estimated peak discharges for the 10-, 50-, 100-, and 500-year frequency events were calculated by MMI using *StreamStats*, and these values were compared to peak discharges reported in the FEMA FIS. Table 2 lists estimated peak flows at Oriskany Creek's confluence with the Mohawk River, located at STA 0+00. FEMA reports the basin size at this location to be 146.0 square miles while *StreamStats* indicates that the basin size is 147.0 square miles.

While the differences in watershed area at the corresponding cross sections are generally less than one square mile, the peak discharges derived from *StreamStats* for the 100-year event range from 11 percent to 47 percent greater than the discharges reported by FEMA. It is noteworthy that while the watershed areas reported by FEMA increase as one moves downstream the peak discharge values do not always increase.

TABLE 2
Oriskany Creek FEMA and *StreamStats* Peak Discharges

Location	Drainage Area (sq. mi.)	10-Yr	50-Yr	100-Yr	500-Yr
		FEMA Peak Discharges			
Corporate Limits of Marshall/Oriskany Falls	29.6	2,250	3,120	3,530	4,425
Approximately 73 ft D/S Van Hyning Road	34.0	2,520	3,495	3,900	4,925
U/S Confluence of Big Creek	38.1	2,715	3,765	4,250	5,375
Corporate Limits of Marshall/Kirkland	58.6	3,750	5,200	5,850	7,350
D/S Confluence of Turkey Creek	70.1	4,775	7,345	8,650	11,800
D/S Confluence of White Creek	82.7	5,420	8,300	9,760	13,900
D/S Confluence of St. Mary's Brook	94.4	5,995	9,150	10,750	14,300
Corporate Limits of Kirkland/Westmoreland	95.2	6,030	9,210	10,820	14,400
Corporate Limits of Westmoreland/Whitestown	102.8	5,610	7,785	8,700	11,000
U/S Dean's Creek	105.7	5,212	7,818	8,994	12,000
Confluence of Mohawk	146.0	6,690	10,002	11,493	15,000
		***StreamStats* Peak Discharges**			
Corporate Limits of Marshall/Oriskany Falls	29.4	2,570	3,770	4,360	5,750
Approximately 73 ft D/S Van Hyning Road	34.4	3,010	4,410	5,100	6,730
U/S Confluence of Big Creek	38.0	3,210	4,690	5,430	7,150
Corporate Limits of Marshall/Kirkland	58.9	4,940	7,200	8,320	11,000
D/S Confluence of Turkey Creek	70.2	5,700	8,280	9,570	12,600
D/S Confluence of White Creek	83.2	6,590	9,560	11,000	14,500
D/S Confluence of St. Mary's Brook	92.4	7,160	10,400	12,000	15,700
Corporate Limits of Kirkland/Westmoreland	95.0	7,280	10,500	12,200	15,900
Corporate Limits of Westmoreland/Whitestown	102.0	7,660	11,100	12,800	16,700
U/S Dean's Creek	103.0	7,590	11,000	12,600	16,500
Confluence of Mohawk	147.0	9,560	13,700	15,700	20,400

2.7 Infrastructure

Oriskany Creek follows Route 12B for much of its upstream reaches and then flows along Route 233 for a segment and crosses under State Route 5. Moving downstream, it parallels County Route 32 in its lower reaches, passing under the New York State Throughway (I-90). Bridge spans and heights were measured as part of the field investigations performed for this study and are summarized in Table 3.

Comparing the bridge measurements to estimated bankfull widths, many of the bridge crossings fail to span Oriskany Creek's bankfull width, indicating that they are undersized. At stations 390+00 and 554+00 (Main Street and Norton Avenue), both crossings fall short of bankfull width by approximately 13 feet. Route 12B and Van Hyning Road at STA 692+00 and STA 1096+00 are substantially smaller than the regional bankfull width.

TABLE 3
Summary of Stream Crossing Data

Roadway Crossing	BIN Number	Station	Width (ft)	Height (ft)	Bankfull Width (ft)
Van Hyning Road	000000002205880	1096+00	29.3	7.6	54.0
Burnham Road	000000003310840	1043+00	61.5	8.2	54.5
Route 315	000000001045640	936+50	47.0	9.0	57.1
Lumbard Road	000000003311470	752+00	65.0	13.0	75.7
Dugway Road	000000003311480	729+50	79.0	13.2	75.7
Route 12B	000000001009890	692+00	57.0	11.4	76.4
College Street	000000001047960	603+00	49.0x2	13.5	82.1
Norton Avenue	000000002205770	554+00	69.5	13.3	82.6
Seneca Turnpike (Route 5)	000000001002200	466+00	99.0	7.0	83.2
Main Street	000000003310690	390+00	74.0	12.8	86.9
Old Railroad Bridge	---	385+00	---	---	86.9
Peckville Road	000000002205430	310+00	62.5	22.7	90.2
Stone Road	000000003311430	278+00	87.0	13.0	90.2
Interstate 90	000000005513069	203+00	---	---	103.0
Old Judd Road	000000002206270	187+75	100.0	19.6	104.0
Judd Road	000000003311420	156+00	111.0x2	32.3	104.0
Valley Road	000000003311410	123+50	126.0	20.4	105.0
Utica Street	000000002206300	56+50	97.6	16.0	106.0
Erie Boulevard (Route 69)	000000001060220	53+50	22.0x4	16.5	106.0
Railroad Bridge	---	43+50	---	---	106.0

Flood profiles published in the FEMA FIS were evaluated to determine which bridges on Oriskany Creek may be acting as hydraulic constrictions during large flood events and which bridges overtop during these events, based on FEMA modeling for the 10-, 50-, 100-, and 500-year frequency flood events. According to the profiles, many of the crossings over Oriskany Creek are clearly undersized and are acting as substantial hydraulic constrictions. These include bridges where some of the most severe flooding to buildings and property has been reported, such as at Route 315 (STA 936+50); at Norton Avenue (STA 554+00); upstream of Utica Street (STA 56+50); Erie Boulevard (STA 53+50); and the railroad bridge (STA 43+50).

The profiles identify additional bridges that are acting as hydraulic constrictions but where no flooding of structures has been reported, most likely due in part to the low density of development in proximity to many of these crossings. These include Van Hyning Road (STA 1096+00), Lumbard Road (STA 752+00), Route 12B (STA 692+00), College Street (STA 603+00), an abandoned railroad bridge (STA 385+00), Peckman Road (STA 310+00), and Stone Road (STA 278+00).

There are several low head dams located along Oriskany Creek. Most do not appear to be contributing to flooding problems, with two exceptions. The dam located downstream of Route 5 in Kirkland at STA 436+00 is acting to increase water surface elevations from the dam extending to upstream of the Route 5 bridge, and flood-related damage and overtopping of Valley Road (Route 32) have been reported upstream of the dam located at STA 81+50.

3.0 FLOODING HAZARDS AND MITIGATION ALTERNATIVES

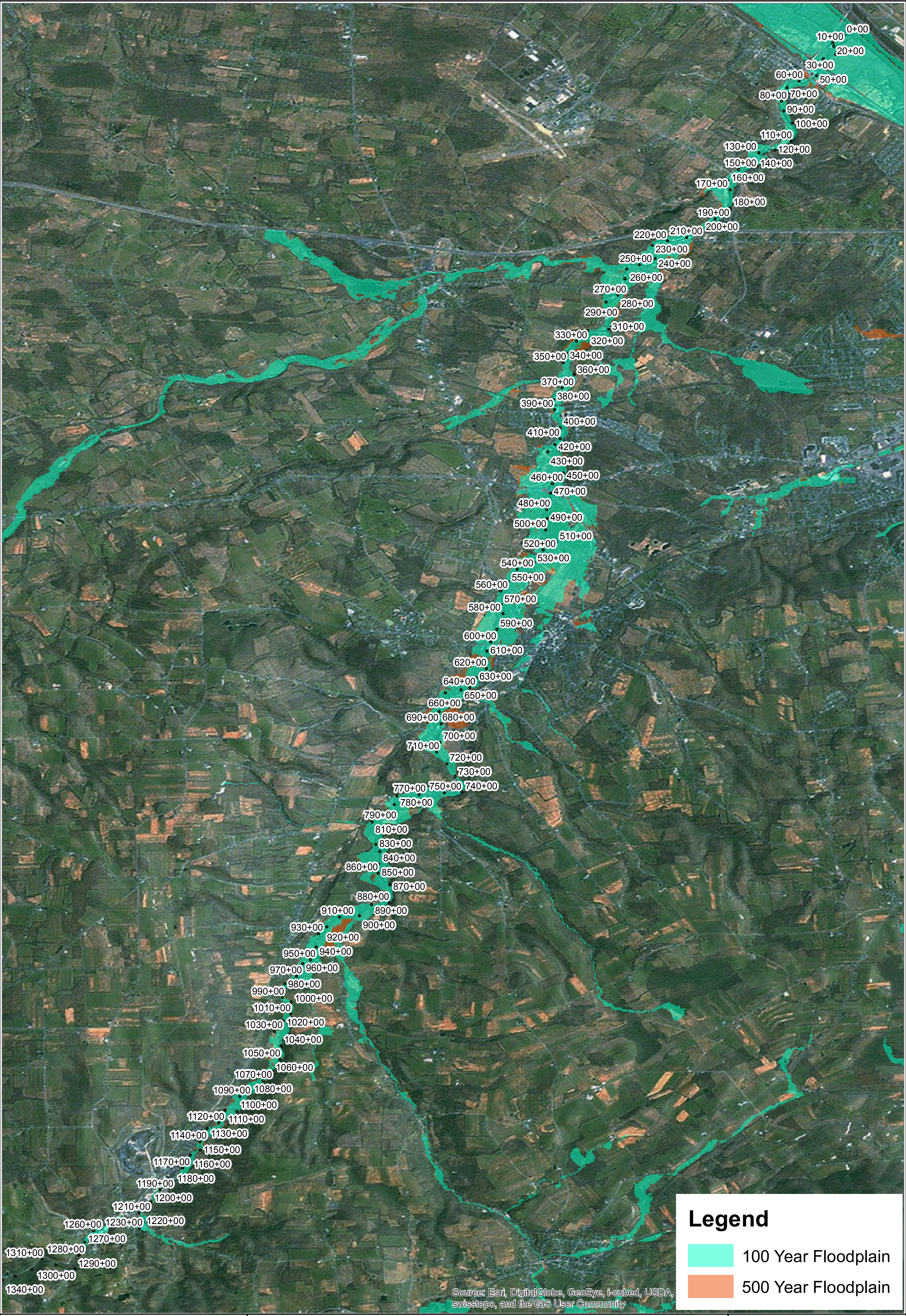
3.1 Flooding History on Oriskany Creek

According to the FEMA FIS, Oriskany Creek floods in the hamlet of Kirkland. FEMA reports that flooding in this area is due to insufficient channel capacity. The greatest known flood on Oriskany Creek occurred in March 1936. FEMA has not established a reoccurrence interval for that flood.

FEMA flood insurance maps showing the 100-year flood zone along Oriskany Creek indicate that the most extensive and widespread flooding occurs in Deansboro in the vicinity of Route 315, and in an extensive area extending from upstream of Route 12B at STA 730+00 to downstream of Route 5 at STA 430+00, including the communities of Franklin Mills, Clinton, and Kirkland. Figures 5, 6, and 7 show the FEMA delineated floodplain.

In mid to late June and early July of 2013, a severe precipitation system caused excessive flow rates and flooding in a number of communities in the greater Utica region, including in the Oriskany Creek basin. Because rainfall across the region was highly varied, it is not possible to determine exact rainfall amounts within the Oriskany Creek Basin.

Historic records on the National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) Advanced Hydrologic Prediction Service website indicate that the village of Mohawk area received between 10 and 15 inches of rainfall in the month of June and an additional 5 to 8 inches in July 2013. Much of this rainfall occurred over several storm events that dropped between 3.5 and 4.5 inches of rain between June 11 and June 14; 5.5 to 8.5 inches between June 24 and June 28; and 1.5 to 2.0 inches on July 2. In between these more severe rain events were a number of smaller rain showers that dropped trace amounts of precipitation, preventing soils from drying out between the larger rain events.



SOURCE(S):	Figure 5: Oriskany Creek FEMA Flood Zones	Location: Oneida County, New York
	N NYDOT: Emergency Transportation Infrastructure Recovery	Map By: CMP MMI#: 5231-01 MXD: Y:\5231-01\GIS\Maps\FEMA FIRM Maps\Oriskany FEMA.mxd 1st Version: 01/06/2014 Revision: 4/11/2014 Scale: 1 in = 6,000 ft
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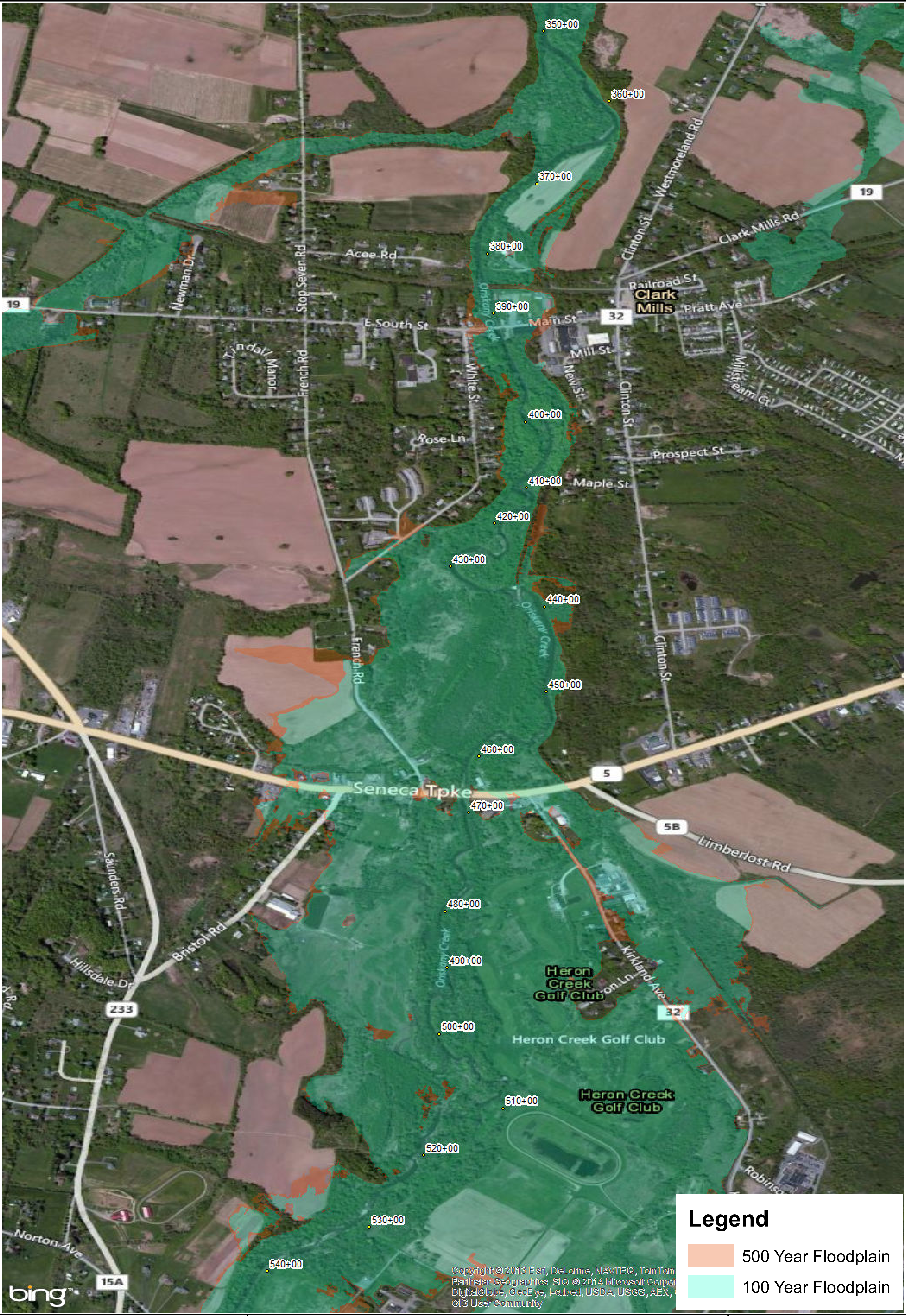

SOURCE(S):

Figure 6: Oriskany Creek FEMA Flood Zones

Location: **Oneida County, New York**

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SOURCE(S):

Figure 7: Oriskany Creek FEMA Flood Zones

Location: **Oneida County, New York**

N

NYDOT: Emergency Transportation Infrastructure Recovery

Map By: CMP
MMI#: 5231-01
MXD: Y:\5231-01\GIS\Maps\FEMA FIRM Maps\Oriskany FEMA X-2.mxd
1st Version: 01/06/2014
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Local officials and residents report flooding problems in the vicinity of Van Hyning Road (STA 1096+50) downstream of Oriskany Falls, where the stream jumps its banks and cuts new channels but does not threaten structures. Floodwaters have overtopped the banks between STA 590+00 and STA 560+00, between College Street (Route 412) and Norton Avenue. Flooding also occurs at the Norton Avenue bridge (STA 553+75) in Kirkland, where homes have been damaged, and at Route 5 (Seneca Turnpike) (STA 466+00), where homes and businesses have been damaged by floods.

On lower Oriskany Creek, flood-related road damage has occurred in the vicinity of the dam at STA 81+50 and in the vicinity of the Little League fields (STA 70+00). Oriskany Creek has flooded the lot at the Department of Public Works facility (STA 62+00) but did not cause damage to the salt storage shed or other buildings. The backyards of two homes along Ridge Road (at STA 58+00) flooded, causing damage to sheds and a pool, but damage to the homes was minimal.

Jams caused by woody debris catching on the piers at the Erie Boulevard (Route 69) bridge at STA 53+50 have contributed to flooding problems in Oriskany. Municipal officials report that trees and logs are removed from the piers on a regular basis by state work crews.

Following meetings with community officials, conversations with neighbors, review of existing reports and studies, and field investigations by MMI, high flood hazard risk areas have been identified. These are described in detail in the following sections, along with an analysis of potential mitigation alternatives.

3.2 Post-Flood Community Response

Following the heavy flooding in June 2013 along Oriskany Creek, towns and villages in the Oriskany basin implemented flood response measures. Private property owners throughout the basin attempted repairs to individual properties and sections of stream bank as well. Erosion in the area of the Van Hyning Road (STA 1096+50) bridge was repaired, and rocks were placed on the banks to act as armor. An existing park located on Little League Lane appears to have been impacted by flooding in June 2013. Existing athletic fields, parking areas, and small structures such as dugouts and concession stands appear to have been rebuilt after the flood. During field investigations, construction of a berm along the riverbank was also being undertaken although the engineering basis or effectiveness of such a berm is not clear.

3.3 High-Risk Area #1 – Undersized Bridges on the Upper Oriskany (STA 500+00 to STA 1100+00)

Figure 8 is a location plan of High Risk Area #1. This area focusses on the bridges along Oriskany Creek that cause the creek to overtop its banks during flood events because they are acting as hydraulic constrictions. In many cases, these bridges fail to span even the bankfull channel width and, according to FEMA profiles, are acting as hydraulic constrictions during flood conditions.

SOURCE(S):

Figure 8: Oriskany Creek High Risk Area #1

Location: **Oneida County, New York**

N

NYDOT: Emergency Transportation Infrastructure Recovery

Map By: CMP
MMI#: 5231-01
MXD: Y:\5231-01\GIS\Maps\High Risk Areas\Oriskany High Risk #1.mxd
1st Version: 2/24/2014
Revision: 2/28/2014
Scale: 1 in = 3,000 ft

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The bridges where some of the most severe flooding to buildings and property has been reported are the Route 315 bridge (STA 936+50) and the Norton Avenue bridge (STA 554+00). The FEMA profiles showing these bridges are included as Figures 9 and 10.

The FEMA profiles identify additional bridges that are acting as hydraulic constrictions but where no flooding of structures has been reported due in part to the low density of development in proximity to many of these crossings. These include Van Hyning Road (STA 1096+00), Lumbard Road (STA 752+00), Route 12B (STA 692+00), and College Street (STA 603+00).

Alternative 1-1: Prioritize the most severely floodprone, undersized bridges for replacement.

Tier 1: Replace undersized bridges at Route 315 (STA 936+50) and Norton Avenue (STA 554+00) with structures that are large enough to span the creek's bankfull width and convey flood flows without causing a hydraulic constriction. The Route 315 bridge is one of the bridges identified for replacement in Governor Cuomo's Scour Critical Bridge Replacement Program. According to the Governor's website, "*This bridge carries NY Route 315 over Oriskany Creek in the Town of Marshall, Oneida County. The highway at this location carries an average of 1,980 vehicles a day. This 51 ft. span steel jack arch bridge on high concrete abutments founded on rock was constructed in 1930, connects Waterville with Deansboro. The bridge connects residential and business districts.*"

Alternative 1-2: Prioritize second-tier undersized bridges for replacement as funding becomes available.

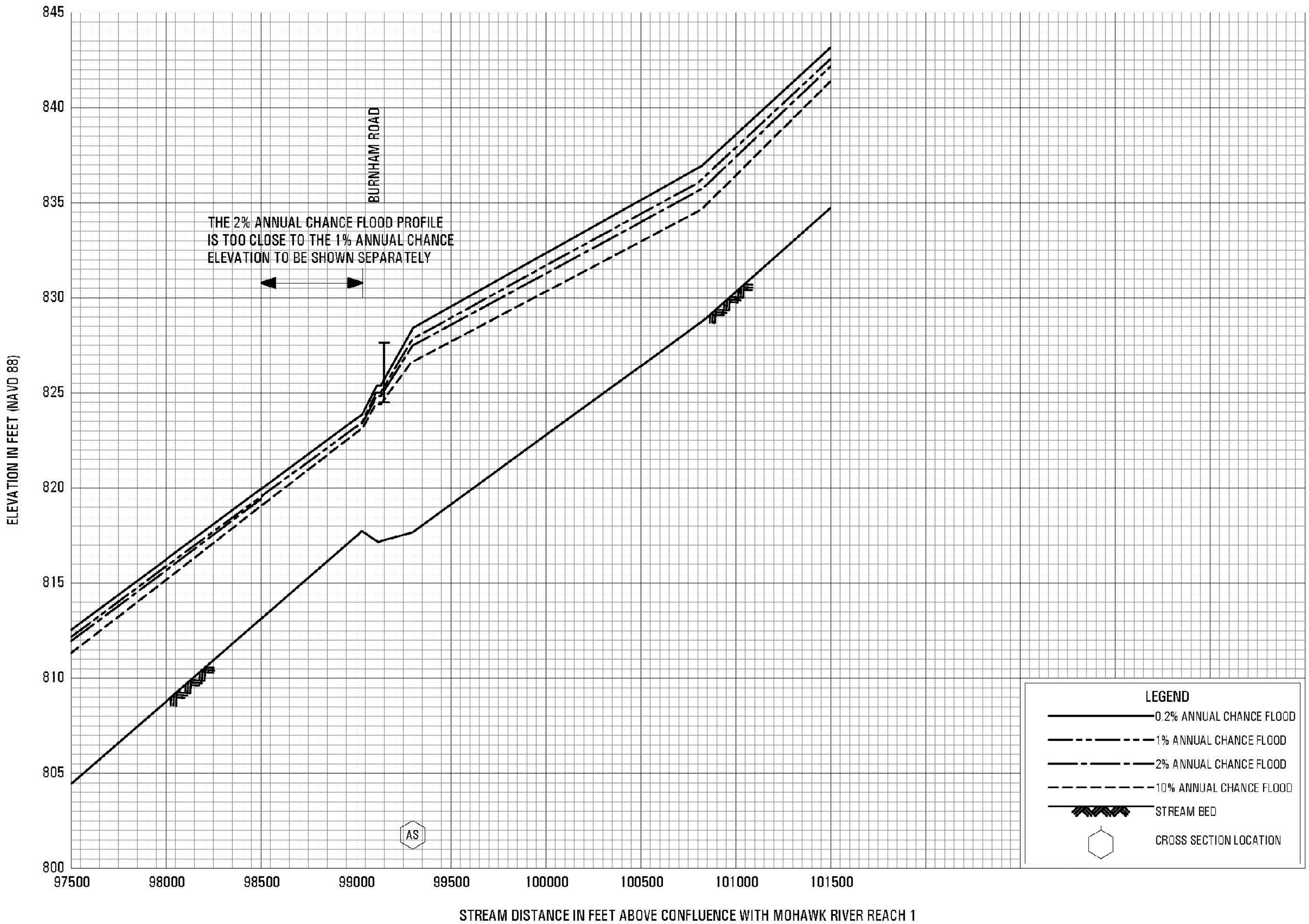
Tier 2: As funding becomes available, replace or remove bridges at Van Hyning Road (STA 1096+00), Lumbard Road (STA 752+00), Route 12B (STA 692+00), and College Street (STA 603+00). Justification for replacing bridges to protect a relatively few number of developed parcels may be difficult. However, as these structures are scheduled for repair or replacement, modifications should be undertaken to increase their hydraulic capacity.

Recommendation

Alternatives 1-1 and 1-2 are recommended as site conditions, property owner participation, and funding allow.

3.4 High-Risk Area #2 – Low-Head Dam at STA 436+00 and Undersized Bridges

Figure 11 is a location plan of High Risk Area #2. Municipal officials have reported that flooding occurs on a regular basis along Oriskany Creek near Route 5 in Kirkland. FEMA maps show extensive flooding through Kirkland during the 100-year frequency storm event although modeling profiles indicate that the Route 5 bridge in Kirkland is adequately sized and does not act as a substantial hydraulic constriction.



FLOOD PROFILES

ORISKANY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ONEIDA COUNTY, NY

(ALL JURISDICTIONS)

156P

Drawing: C:\USERS\DANME\APPDATA\LOCAL\TEMP\ACPUBLISH_2532B\FIS REPORT FIGS.DWG Layout Tab:FIG9

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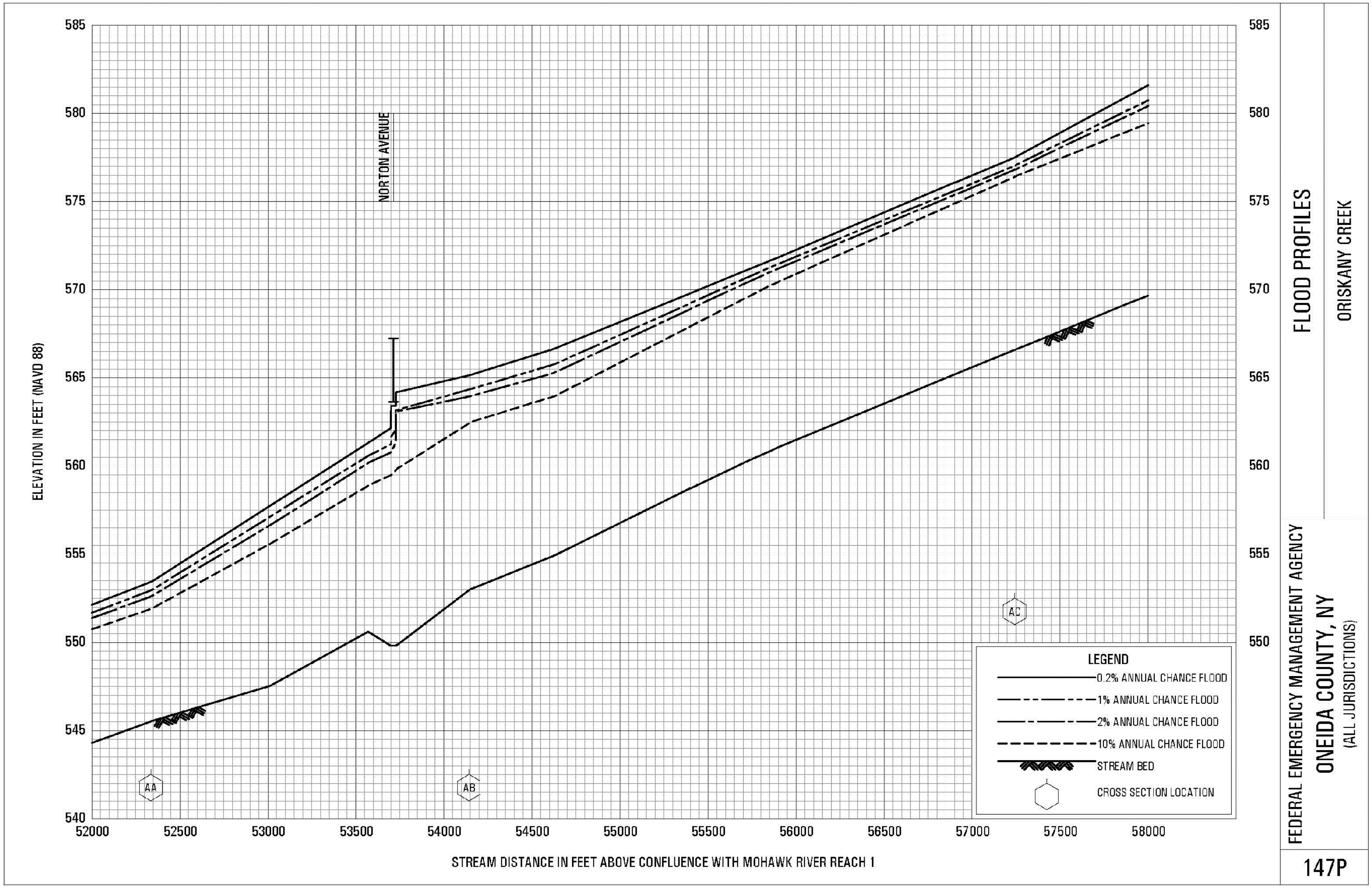
SCALE	As Noted		**FIG. 9**
PROJ. NO.	5231-01	**NYDOT EMERGENCY TRANSPORTATION INFRASTRUCTURE RECOVERY ONEIDA COUNTY, NEW YORK**	



Drawing: C:\USERS\DANME\APPDATA\LOCAL\TEMP\ACPUBLISH_25328\FIS REPORT FIGS.DWG Layout Tab:FIG10 Plotted by: DANME On this date: Fri, 2014 February 28 – 12:57pm

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FEMA PROFILE IN HIGH RISK AREA #1 (2 OF 2)

NYDOT EMERGENCY TRANSPORTATION INFRASTRUCTURE RECOVERY
ONEIDA COUNTY, NEW YORK

DRAWING NAME:

FIG. 10

SOURCE(S):	Figure 11: Oriskany Creek High Risk Area #2		Location: Oneida County, New York
	N NYDOT: Emergency Transportation Infrastructure Recovery	Map By: CMP MMI#: 5231-01 MXD: Y:\5231-01\GIS\Maps\High Risk Areas\Oriskany High Risk #2.mxd 1st Version: 02/24/2014 Revision: 2/28/2014 Scale: 1 in = 1,000 ft	MILONE & MACBROOM 99 Realty Drive Cheshire, CT 06410 (203) 271-1773 Fax: (203) 272-9733 www.miloneandmacbroom.com

A low-head dam located approximately 3,000 feet downstream of Route 5, at STA 436+00, is acting to increase water surface elevations upstream of the dam by between 5.5 and 6.5 feet during peak flood events, depending on the magnitude of the storm. This influence diminishes gradually moving upstream from the dam but results in a significant increase in water surface elevation that extends through Kirkland beyond the Route 5 bridge. The slope of the channel between the Route 5 bridge and the dam is extremely flat, with only an approximately 0.5-foot drop in elevation between the bed of the channel under the bridge and the crest of the dam.

A number of bridges downstream of the dam also contribute to flooding conditions in the area. These include the Main Street bridge (STA 390+00), an abandoned railroad bridge (STA 385+00), the Peckville Road bridge (STA 310+00), and the Stone Road bridge (STA 278+00). The backwater from the series of bridges reaches the dam. The FEMA profiles showing these bridges and the dam are included as Figures 12 through 14.

Alternative 2-1: Remove the Low-Head Dam.

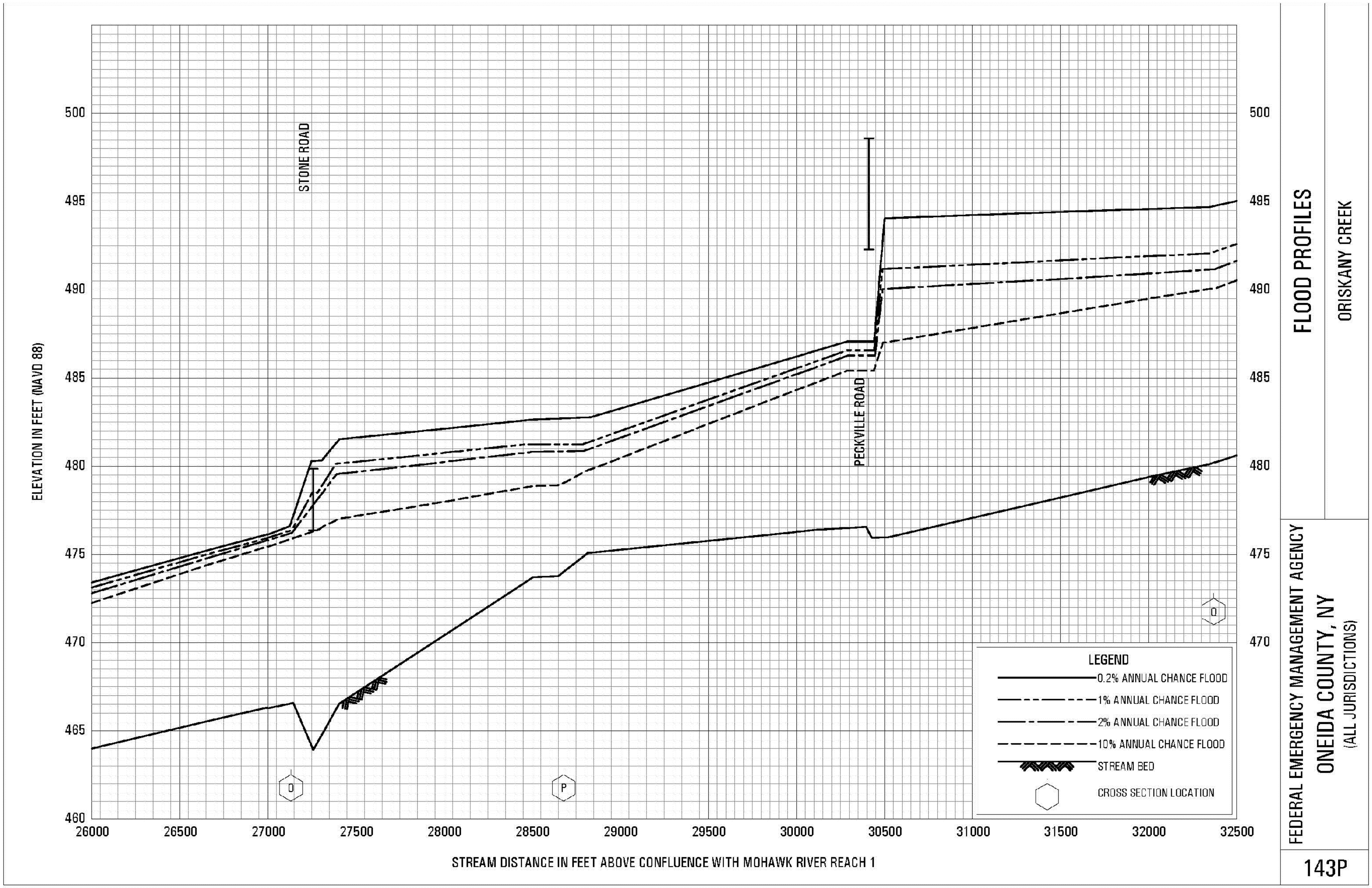
Removal of the dam at STA 436+00 would reduce water surface elevations in the vicinity of Route 5 during flood events and thereby reduce flooding. The likely intent of the original dam was to divert water into a channel that runs approximately 2,500 feet along the east side of the creek from the dam to a mill facility located south of Main Street; however, it does not appear to be serving a useful function at the present time.

Visual observations indicate that there is an extensive accumulation of sediments impounded behind the dam, which would need to be either stabilized or removed prior to dam removal. Dam removal at this site will be costly and can only occur if the owner is willing to participate in such an endeavor. Beyond the hydraulic improvements that would ensue as a result of dam removal, other benefits include improved ecological conditions, reduced long-term maintenance and liability, and restoration of sediment transport to a more natural regime.

The river hydraulics in this reach are complex and include the backwater from the dam as well as numerous undersized downstream bridges. If dam removal is considered, analysis of the hydraulics of the downstream bridges must be taken into consideration when evaluating flood mitigation improvements.

Alternative 2-2: Replace Undersized Bridges.

Replace undersized bridges at Main Street (STA 390+00), the abandoned railroad (STA 385+00), Peckville Road (STA 310+00), and Stone Road (STA 278+00). When evaluating the hydraulics for any one of these structures, the hydraulics of the others should be considered as well as the effects of the upstream dam. This reach of Oriskany Creek is complex in that changes from one structure affect the hydraulics of the others.



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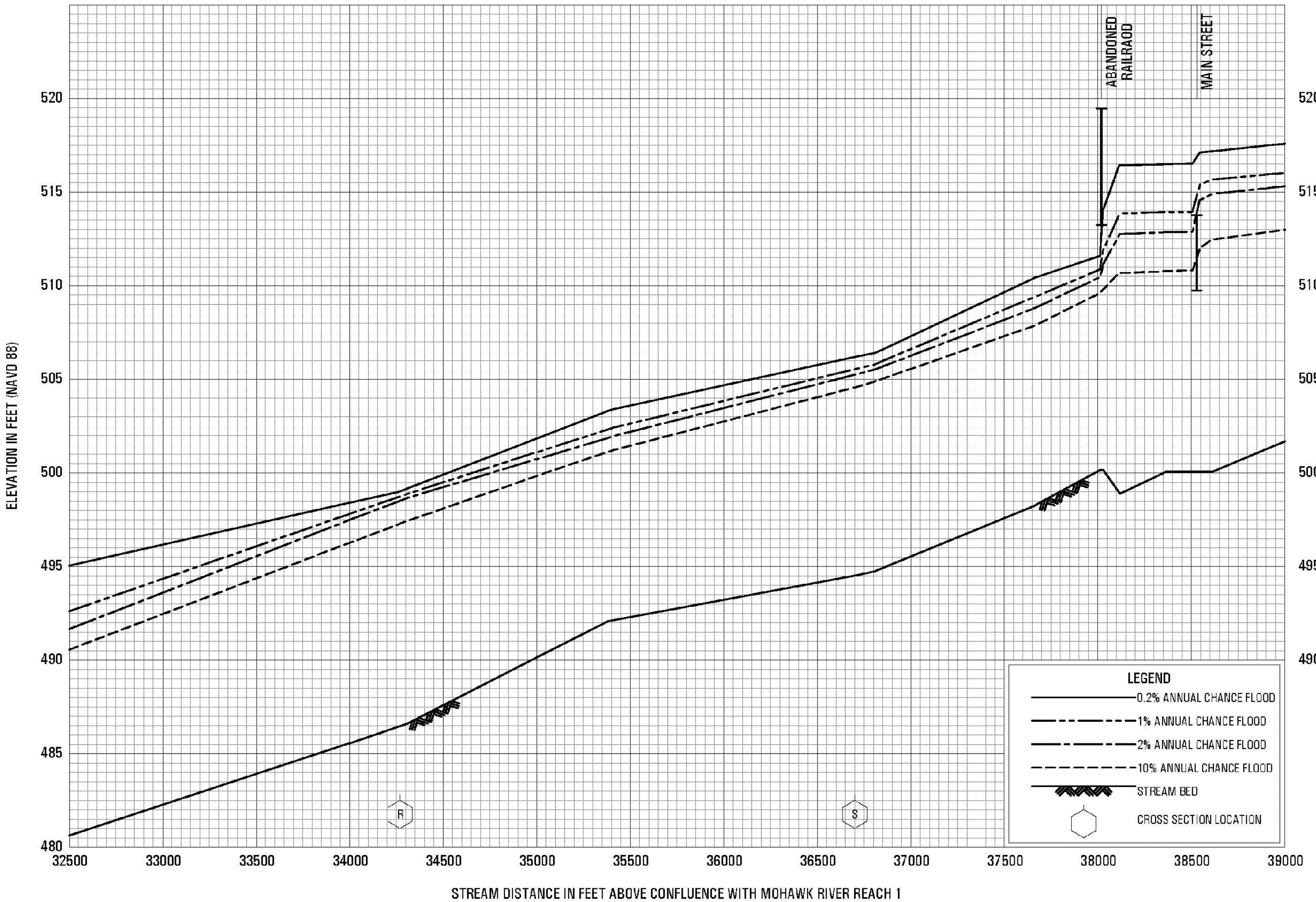
FEMA PROFILE IN HIGH RISK AREA #2 (1 OF 3)

NYDOT EMERGENCY TRANSPORTATION INFRASTRUCTURE RECOVERY
ONEIDA COUNTY, NEW YORK

DRAWING NAME:

FIG. 12



FLOOD PROFILES

ORISKANY CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

ONEIDA COUNTY, NY

(ALL JURISDICTIONS)

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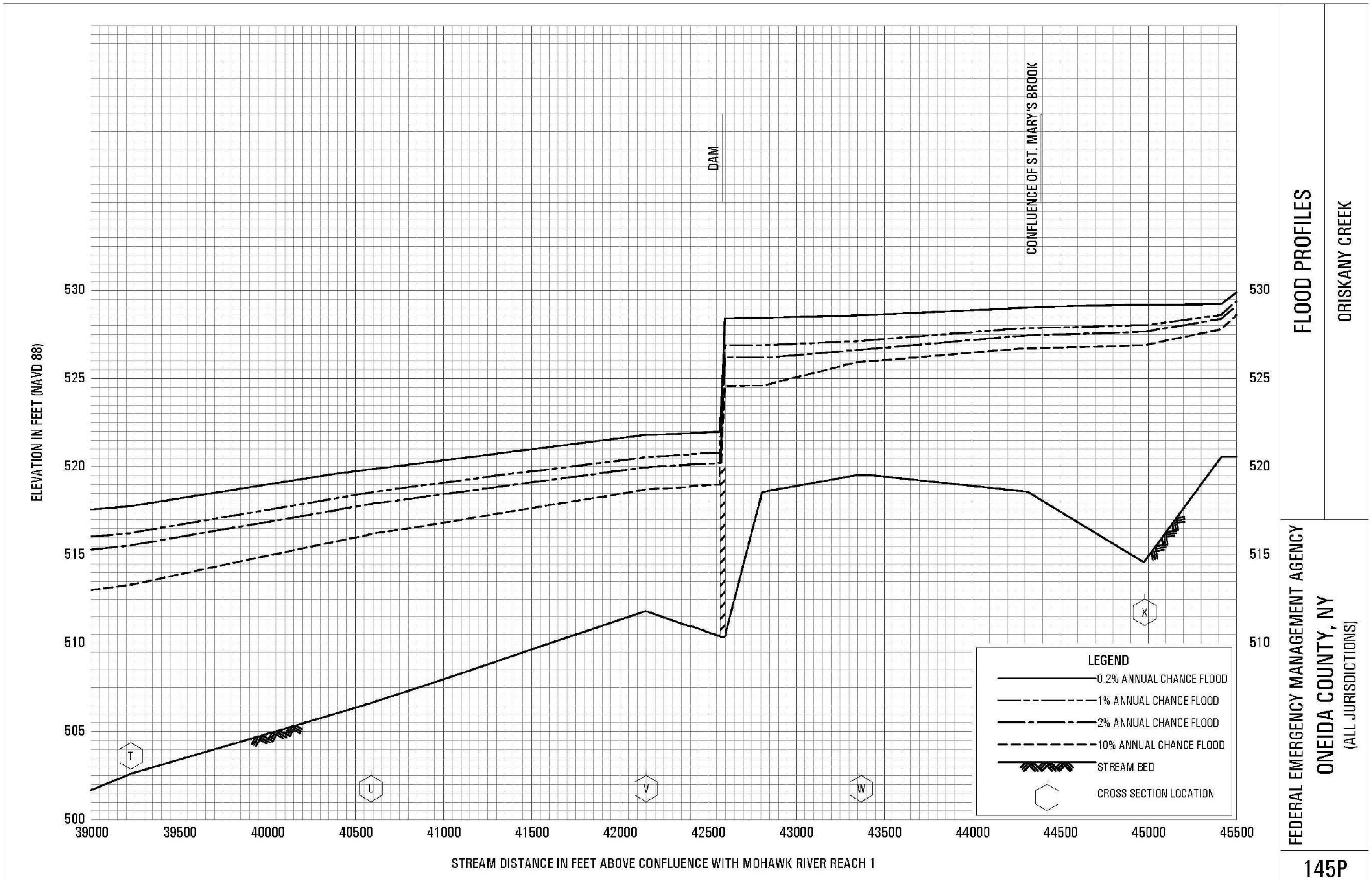
FEMA PROFILE IN HIGH RISK AREA #2 (2 OF 3)

NYDOT EMERGENCY TRANSPORTATION INFRASTRUCTURE RECOVERY
ONEIDA COUNTY, NEW YORK

DRAWING NAME:

FIG. 13



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FEMA PROFILE IN HIGH RISK AREA #2 (3 OF 3)

NYDOT EMERGENCY TRANSPORTATION INFRASTRUCTURE RECOVERY
ONEIDA COUNTY, NEW YORK

DRAWING NAME:

FIG. 14

Recommendation

Alternatives 2-1 and 2-2 are recommended as site conditions, property owner participation, and funding allow.

3.5 High-Risk Area #3 – Floodprone Areas in Lower Oriskany (STA81+50 to STA 99+00)

Figure 15 is a location plan of High Risk Area #3. Flooding and damage to Valley Road (Route 32) has been reported in the vicinity of STA 81+50 upstream to STA 99+00 in the backwater area of the dam located at STA 81+50. According to the FEMA profile, the dam creates an increase in water surface elevation upstream of the dam by more than five feet during the 10-year flood event, which is contributing to flooding and flood-related damages to Valley Road.

In flood events larger than the 10-year frequency, the FEMA profile indicates that the backwater effect caused by hydraulic constrictions at the Utica Street bridge (at STA 56+50, approximately 2,500 feet downstream of the dam) reaches upstream of the dam and combines with the backwater effect of the dam to raise water surface elevations through this reach. The Erie Boulevard and railroad bridges (STA 53+50 and STA 43+50, respectively) also create a backwater effect that extends upstream from these bridges, contributing to increased water surface elevations from STA 43+50 to upstream beyond the dam at STA 81+50, including the Little League fields on the right bank. A recently constructed earthen levee between the Little League fields and the creek was observed during field investigations in October and November 2013. The FEMA profiles showing these bridges and the dam are included as Figures 16 and 17.

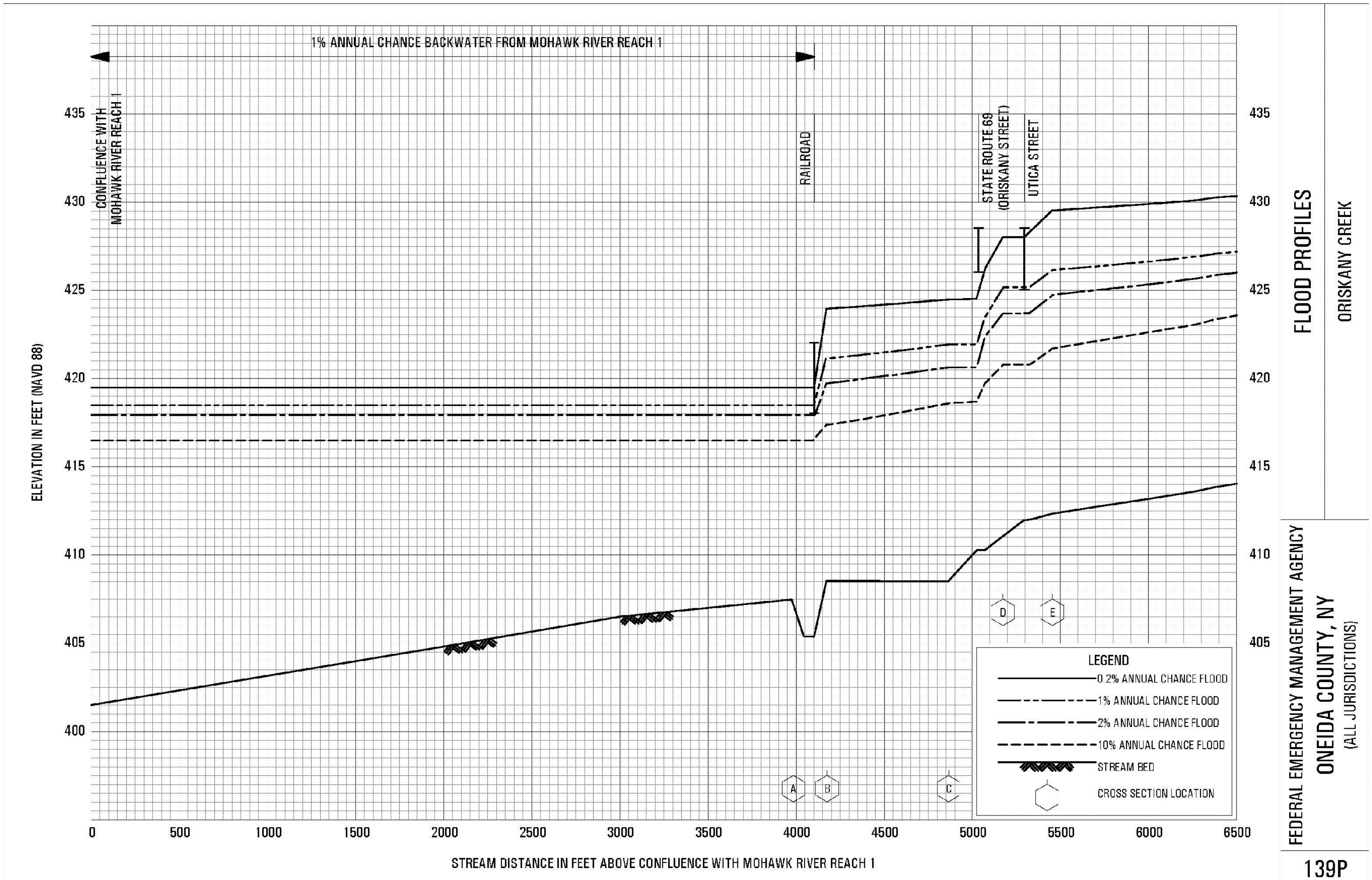
Alternative 3-1: Removal or Modification of the Dam at STA 81+50

The dam at STA 81+50 does not appear to be serving a useful function at the present time. It appears that the original intent of the dam was to store water and direct it through a channel that runs approximately 2,000 feet along the west side of Valley Road from the dam to the Department of Public Works facility, where it returns to the creek. Removal or modification of this dam to reduce or eliminate the backwater effect would decrease water surface elevations upstream of the dam during flood events and would potentially reduce flooding and flood-related damages along Valley Road between STA 81+50 and STA 99+00.

Alternative 3-2: Modification or Removal of Piers at Erie Boulevard (Route 69) Bridge

The Erie Boulevard (Route 69) bridge is the site of frequent jams of woody debris that contribute to flooding problems in Oriskany. Removal or modification of the piers would reduce the frequency of debris jams and improve hydraulic capacity at the bridge.

SOURCE(S):	Figure 15: Oriskany Creek High Risk Area #3		LOCATION: Oneida County, New York
	N NYDOT: Emergency Transportation Infrastructure Recovery MXD: Y:\5231-01\GIS\Maps\High Risk Areas\Oriskany High Risk #3.mxd	Map By: CMP MMI#: 5231-01 Original: 02/04/2014 Revision: 4/11/2014 Scale: 1 inch = 1,000 feet	MILONE & MACBROOM 99 Realty Drive Cheshire, CT 06410 (203) 271-1773 Fax: (203) 272-9733 www.miloneandmacbroom.com



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FEMA PROFILE IN HIGH RISK AREA #3 (1 OF 2)

NYDOT EMERGENCY TRANSPORTATION INFRASTRUCTURE RECOVERY
ONEIDA COUNTY, NEW YORK

DRAWING NAME:

FIG. 16

Drawing: C:\USERS\DANME\APPDATA\LOCAL\TEMP\ACPUBLISH_25328\FIS REPORT FIGS.DWG Layout Tab:FIG17

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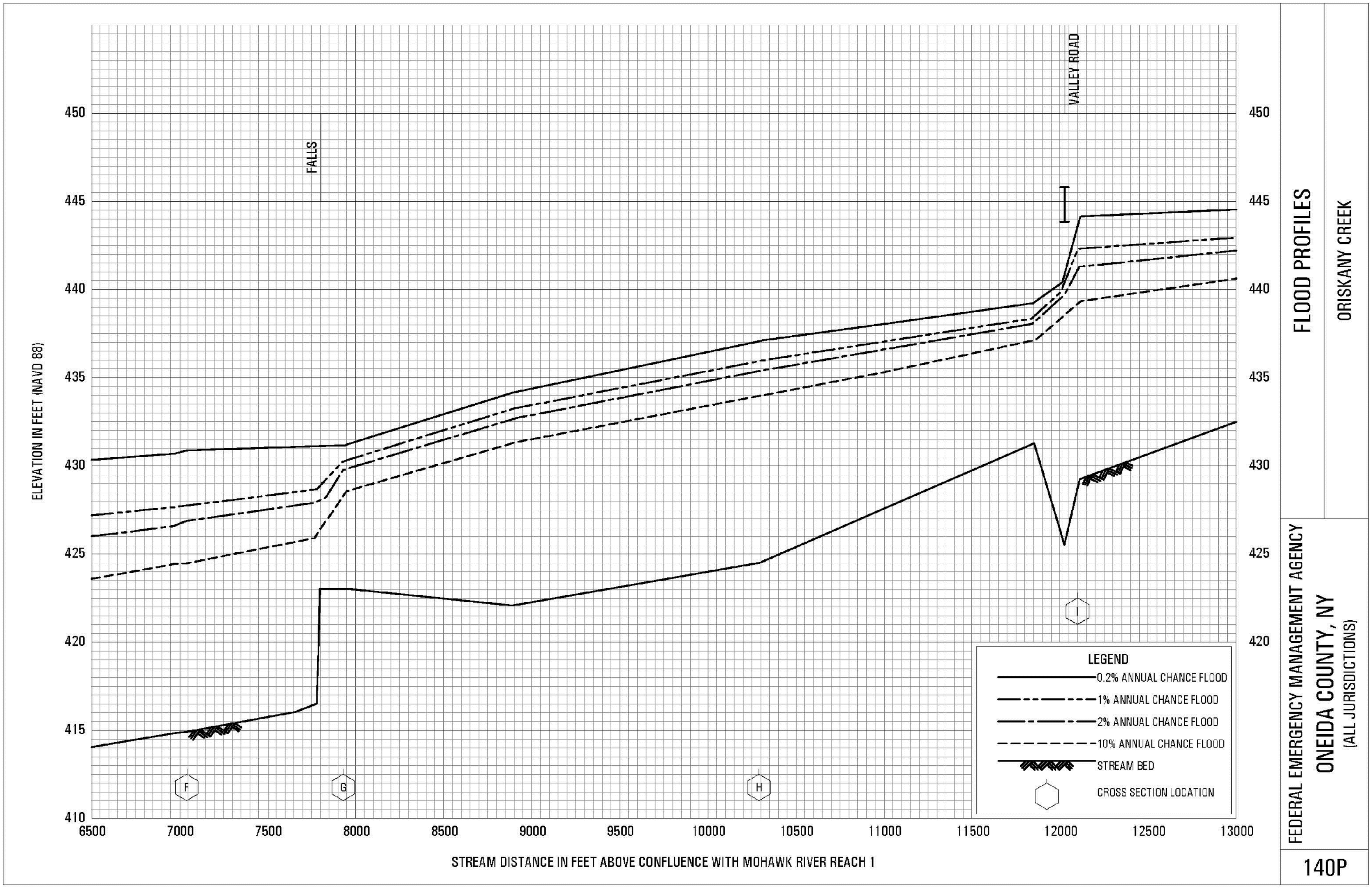

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SCALE	As Noted	NYDOT EMERGENCY TRANSPORTATION INFRASTRUCTURE RECOVERY ONEIDA COUNTY, NEW YORK	**FIG. 17**
PROJ. NO.	5231-01		

Alternative 3-3: Removal of Levee at Little League Fields

During field inspections in late fall 2013, a recently constructed earthen levee was observed between the Little League fields and associated parking area, and Oriskany Creek, approximately between STA 72+00 and STA 69+00. While flood control levees can serve a useful function for protecting high-value properties and infrastructure from flood damage, they require long-term inspection and maintenance. In cases where a levee overtops, or if runoff collects behind it, a pump system is required to remove water from behind the levee. In certain circumstances such as a breach, levees can worsen flood problems. The levee at the Little League field separates Oriskany Creek from its natural floodplain, thus reducing flood storage and potentially exacerbating flooding at points further downstream. The area being protected by the levee (ball fields, dugouts, and concession stand) are of relatively low value. Complete removal of the levee is recommended.

Alternative 3-4: Removal or Replacement of Three Bridges in Oriskany

Bridges at Utica Street (STA 56+50), Erie Boulevard (STA 53+50), and the railroad (STA 43+50) serve as hydraulic constrictions during flood flows. Removal or replacement of one or a combination of these bridges would provide the largest flood mitigation. Due to the close proximity of Utica Street and Erie Boulevard, it may be feasible and cost effective to replace one of these bridges with a larger structure and remove the other, routing traffic over the remaining bridge.

The hydraulic analysis and design at one of these structures will need to take into account the backwater effect of the Mohawk River which, according to the FEMA profile, extends upstream to the railroad bridge during the 100-year frequency flood event and would potentially extend further upstream if the bridge were to be removed or replaced with a larger structure.

Recommendations

Alternatives 3-1, 3-2, and 3-3 are all recommended in parallel as flood hazard mitigation solutions. Alternative 3-4 would be very expensive to implement, with limited resulting flood reduction. Justification for replacing bridges to protect relatively few developed parcels would be difficult. However, as these structures are scheduled for repair or replacement, modifications should be undertaken to increase their hydraulic capacity.

3.6 Maintaining a Healthy Stream Corridor

Oriskany Creek is a low gradient watercourse with few higher-energy reaches. The creek has a rural character, with a heavily forested stream corridor for much of its length. As such, it lacks a high degree of excessive erosion and sediment deposition observed in other nearby streams in the region. There are few signs of channel excavation and bank armoring and, where they occur, they are relatively minor. A number of steps are recommended for maintaining a healthy stream corridor as described below.

Alternative 4-1: Stream Repair and Maintenance Program

A stream repair and maintenance program for Oriskany Creek could be developed and implemented to address bank failures and areas of erosion on a site-by-site basis using a combination of conventional and bioengineering techniques. Such a program could include periodic inspection to identify future areas subject to erosion, periodic removal of woody debris from the channel, and monitoring of restored areas.

Bioengineering approaches could include the following:

- Construction of rock vortex vanes to deflect or redirect flows away from eroding banks
- Use of stone weirs or drop structures to stabilize the channel and dissipate the energy of the flowing water
- Use of coir logs filled with soil to provide interplanting areas in lower-flow velocity zones along the banks
- Use of vegetated natural boulder slopes in higher-flow velocity zones along the bank
- Use of brush mattresses, live fascines, live stakes, tubelings, and/or blueberry/fern sod where bare soils have been exposed [Available plant species for live stakes, fascines, mattresses, and tubelings typically include willow (*Salix* spp.), speckled alder (*Alnus rugosa*), silky dogwood (*Cornus amomum*), red twig dogwood (*Cornus sericia*), nannyberry (*Viburnum lentago*), and northern arrowwood (*Viburnum dentatum*).]
- Transplanting native plantings, such as willow (*Salix* spp.), from nearby sites, combined with seeding to reestablish vegetation on creek banks where bare soils have been exposed
- Erosion control matting to stabilize banks combined with seeding to reestablish vegetation on creek banks where bare soils have been exposed

Access to some areas along Oriskany Creek will be limited due to their remoteness, steep slopes, or occurrence of houses. Use of heavy equipment can be difficult in such areas and could cause more environmental harm than benefit. In these areas, in-stream work would need to be accomplished by crews working with hand tools, using materials that could be carried in or gathered on site.

Alternative 4-2: Sediment Management

While large-scale dredging was not evident during the field investigations conducted in October and November 2013, local representatives report a growing sentiment that dredging will alleviate flooding along Oriskany Creek and should be pursued. The need for sediment excavation can be reduced by reducing the sediment load at its source (i.e., by repairing bank failures and headcuts and reducing erosion, as discussed above) and by improving sediment transport through dam removal and properly sizing bridges. However, sediments will continue to be transported downstream regardless of what actions are taken to control the source in the upper reaches. Mobilized sediment is prone to depositing in the lower reaches, thus reducing channel capacity and contributing to flooding.

Dredging is often the first response to sediment deposition and clogging of the stream channel or bridge openings; however, over-widening or over-deepening through dredging can initiate headcutting, foster poor sediment transport, result in low habitat quality, and not necessarily provide significant flood mitigation. Dredging can further isolate a stream from its natural floodplain, disrupt sediment transport, expose erodible sediments, cause upstream bank/channel scour, and encourage additional downstream sediment deposition. Improperly dredged stream channels often show signs of severe instability, which can cause larger problems after the work is complete. Such a condition is likely to exacerbate flooding on a long-term basis.

A sediment management program should involve the development of standards to delineate how, when, and to what dimensions sediment excavation should be performed. It will also require the proper regulatory approval, as well as budgetary considerations to allow the work to be funded on an ongoing or as-needed basis as prescribed by the standards to be developed.

Conditions in which active sediment management should be considered include:

- situations where the channel is confined, without space in which to laterally migrate
- for the purpose of infrastructure protection
- at bridge openings where hydraulic capacity has been compromised
- in reaches with low habitat value

In cases where sediment management of the stream channel is necessary, a methodology should be developed that would allow for proper channel sizing and slope. The following guidelines are provided:

1. Maintain the original channel slope and do not overly deepen or widen the channel. Excavation should not extend beyond the channel's estimated bankfull width unless it is to match an even wider natural channel. Estimated bankfull widths on Oriskany Creek are provided in Table 1 of this report and range from 57.1 feet in the vicinity of the Route 315 crossing, to 83.2 feet at the Route 5 crossing, to 106 feet in the vicinity of the Little League field in Oriskany.

2. Sediment management should be limited in volume to either a single flood's deposition or to the watershed's annual sediment yield in order to preclude downstream bed degradation from lack of sediment. Annual sediment yields vary, but one approach is to use a regional average of 50 cubic yards per square mile per year unless a detailed study is made. The estimated annual sediment yield of Oriskany is 7,350 cubic yards.

3. Excavation of fine-grain sediment releases turbidity. Best available practices should be followed to control sedimentation and erosion.

4. Sediment excavation requires regulatory permits. Prior to initiation of any in-stream activities, NYSDEC should be contacted, and appropriate local, state, and federal permitting should be obtained.

5. Disposal of excavated sediments should always occur outside of the floodplain. If such materials are placed on the adjacent bank, they will be vulnerable to remobilization and redeposition during the next large storm event.

6. No sediment excavation should be undertaken in areas where rare or endangered species are located.

3.7 Individual Property-Based Risk Areas

Alternative 5-1: Strategic Acquisition of Repetitive Loss Properties

In areas along Oriskany Creek where dwellings have suffered repeated losses due to flooding, property acquisition is a potentially viable mitigation alternative, either through a FEMA buyout program or governmental buyout. Such properties can be converted to passive, non-intensive land uses such as streamside parks, picnic areas, fishing access sites, or wildlife observation areas.

Property acquisitions may be funded by FEMA under three grant programs: the Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM), and Flood Mitigation Assistance (FMA). The PDM Program was authorized by Part 203 of the Robert T. Stafford Disaster Assistance and Emergency Relief Act (Stafford Act) and provides funds for hazard mitigation planning and mitigation projects. The HMGP is authorized under Section 404 of the Stafford Act and provides grants to implement hazard mitigation measures after a major disaster declaration. A key purpose of the HMGP is to ensure that any opportunities to take critical mitigation measures to protect life and property from future disasters are not "lost" during the recovery and reconstruction process following a disaster.

The FMA program was created as part of the National Flood Insurance Reform Act (NFIRA) of 1994 with the goal of reducing or eliminating claims under the National Flood Insurance Program (NFIP). FEMA provides FMA funds to assist states and communities with implementing measures that reduce or eliminate the long-term risk of flood damage to buildings, homes, and other structures insurable under the NFIP. The long-term goal of FMA is to reduce or eliminate claims under the NFIP through mitigation activities.

The NFIP provides the funding for the FMA program. The PDM and FMA programs are subject to the availability of appropriation funding, as well as any program-specific directive or restriction made with respect to such funds. FEMA is the entity that dispenses funds for all three programs.

Historically, acquisitions and elevations of structures have been eligible for funding only when the project is found to be cost effective using FEMA's benefit-cost analysis (BCA) program. The BCA utilizes data from the FIS or previous flood damage claims to calculate the benefit-cost ratio (BCR) associated with the acquisition. The project cost (acquisition fees plus site restoration) must be known to determine the BCR. While this process has proved effective for funding many property acquisitions nationwide, there were many instances where BCRs above 1.0 were not computed due to site-specific challenges or data gaps.

The Biggert-Waters Flood Insurance Reform Act of 2012 made several changes to the mitigation programs, and the new Hazard Mitigation Assistance (HMA) guidance was released in July 2013. One potentially important change to the PDM, HMGP, and FMA programs is that green open space and riparian area benefits can now be included in the project BCR once the project BCR reaches 0.75 or greater. This is one potential method of bridging the gap between a BCR of 0.75 and a BCR of 1.0.

On August 15, 2013, FEMA issued new guidance for acquisitions and elevations of structures within Special Flood Hazard Areas (SFHAs). According to the guidance, acquisitions with a project cost lower than $276,000 and elevations with a project cost lower than $175,000 may be considered *automatically cost-effective for structures in SFHAs*. Although this is a new interpretation of cost effectiveness, it could mean that acquisitions and elevations may be more easily funded without consideration of the BCA.

Once a structure has been acquired and demolished, the property must remain as open space. The intent of the mitigation programs is that structures will not be built in the open space although passive recreation is permitted. To offset the loss of the structure and its occupant, the community should strive to facilitate relocation nearby in areas outside of the floodplain.

Alternative 5-2: Flood Protection Measures of Individual Properties

Potential measures for property protection include the following:

Elevation of the structure. Home elevation involves the removal of the building structure from the basement and elevating it on piers to a height such that the first floor is located above the 1 percent annual chance flood level. The basement area is abandoned and filled to be no higher than the existing grade. All utilities and appliances located within the basement must be relocated to the first-floor level.

Construction of property improvements such as barriers, floodwalls, and earthen berms. Such structural projects can be used to prevent shallow flooding. There may be properties within the town where implementation of such measures will serve to protect structures.

Dry floodproofing of the structure to keep floodwaters from entering. Dry floodproofing refers to the act of making areas below the flood level watertight. Walls may be coated with compound or plastic sheathing. Openings such as windows and vents would be either permanently closed or covered with removable shields. Flood protection should extend only 2 to 3 feet above the top of the concrete foundation because building walls and floors cannot withstand the pressure of deeper water.

Wet floodproofing of the structure to allow floodwaters to pass through the lower area of the structure unimpeded. Wet floodproofing refers to intentionally letting floodwater into a building to equalize interior and exterior water pressures. Wet floodproofing should only be used as a last resort. If considered, furniture and electrical appliances should be moved away or elevated above the 1 percent annual chance flood elevation.

Performing other potential home improvements to mitigate damage from flooding. The following measures can be undertaken to protect home utilities and belongings:

- Relocate valuable belongings above the 1 percent annual chance flood elevation to reduce the amount of damage caused during a flood event.
- Relocate or elevate water heaters, heating systems, washers, and dryers to a higher floor or to at least 12 inches above the high water mark (if the ceiling permits). A wooden platform of pressure-treated wood can serve as the base.
- Anchor the fuel tank to the wall or floor with noncorrosive metal strapping and lag bolts.
- Install a backflow valve to prevent sewer backup into the home.
- Install a floating floor drain plug at the lowest point of the lowest finished floor.
- Elevate the electrical box or relocate it to a higher floor and elevate electric outlets to at least 12 inches above the high water mark.

Encouraging property owners to purchase flood insurance under the NFIP and to make claims when damage occurs. While having flood insurance will not prevent flood damage, it will help a family or business put things back in order following a flood event. Property owners should be encouraged to submit claims under the NFIP whenever flooding damage occurs in order to increase the eligibility of the property for projects under the various mitigation grant programs.

Recommendation

Alternatives 5-1 and 5-2 are recommended as flood hazard mitigation solutions in areas where repeated flooding has occurred.

4.0 RECOMMENDATIONS

The following recommendations are offered:

1. *Bridge Replacement in Upper Oriskany* – Replace undersized bridges at Route 315 (STA 936+50) and Norton Avenue (STA 554+00). As funding becomes available, replace or remove bridges at Van Hyning Road (STA 1096+00), Lumbard Road (STA 752+00), Route 12B (STA 692+00), and College Street (STA 603+00).

2. *Remove or Modify Structures Near STA 436+00* – Remove the low-head dam at STA 436+00 and replace undersized bridges at Main Street (STA 390+00), the abandoned railroad (STA 385+00), Peckville Road (STA 310+00), and Stone Road (STA 278+00). The river hydraulics in this reach are complex and include the backwater from the dam as well as the numerous undersized downstream bridges. When evaluating specific alterations at one location, analysis of the hydraulics of the others must be taken into consideration.

3. *Dam Removal* – Remove the dam at STA 81+50.

4. *Modify Bridge at Route 69* – Remove or modify the piers at the Erie Boulevard (Route 69) bridge (STA 53+50) to reduce the frequency of debris and ice jams and improve hydraulic capacity at the bridge.

5. *Remove Earthen Levee* – Remove the earthen levee at Little League fields near STA 69+00 to 72+00.

6. *Replacement of Undersized Bridges in Lower Oriskany* – Bridges at Utica Street (STA 56+50), Erie Boulevard (STA 53+50), and the railroad (STA 43+50) serve as hydraulic constrictions during flood flows. Remove or replace one or a combination of these bridges to provide flood mitigation. Due to the close proximity of Utica Street and Erie Boulevard, it may be feasible and cost effective to replace one of these bridges with a larger structure and remove the other, routing traffic over the one remaining bridge.

7. *Develop and Implement a Stream Repair and Maintenance Program* – A number of small bank failures and eroding creek banks were observed along Oriskany Creek. While no single one of these failures is the major cause of sediment transport, collectively they contribute sediment loading in the creek. Once mobilized, this sediment can restrict channel and bridge capacity and exacerbate flooding. Arresting local bank failures and erosion is recommended through a combination of conventional and bioengineering techniques. These include planting of native vegetation to stabilize failing slopes, construction of stone weirs or drop structures to stabilize the channel and dissipate the energy of the flowing water, and other measures to improve the condition and stability of the stream channel.

8. *Adopt Sediment Management Standards* – When excavation of depositional areas is necessary, it should be undertaken in a manner that maintains channel stability, avoiding over-widening and/or over-deepening the channel. Development of sediment management standards is recommended to provide guidance to contractors and local municipal and county public works departments on how to maintain proper channel sizing and slope as well as the application of best practices.

9. *Acquisition of Floodprone Properties* – Undertaking flood mitigation alternatives that reduce the extent and severity of flooding is generally preferable to property acquisition. However, it is recognized that flood mitigation initiatives can be costly and may take years or even decades to implement. Where properties are located within the FEMA designated flood zone and are repeatedly subject to flooding damages, strategic acquisition, either through a FEMA buyout or other governmental programs, may be a viable alternative. There are a number of grant programs that make funding available for property acquisition. Such properties could be converted to passive, non-intensive land uses.

10. *Evaluate Floodplain Regulations* – A critical evaluation of existing floodplain law and policies should be undertaken to evaluate the effectiveness of current practices and requirements. Identification of a floodplain coordinator and development of a detailed site plan review process for all proposed development within the floodplain would provide a mechanism to quantify floodplain impacts and ascertain appropriate mitigation measures.

11. *Install and Monitor a Stream Gauge* – There is currently no stream gauge on Oriskany Creek, making statistical analysis difficult. Installation of a gauge would inform future analysis of the brook and is recommended.

12. *Develop Design Standards* – There is currently no requirement to design stream crossings to certain capacity standards. For critical crossings such as major roadways or crossings that provide sole ingress/egress, design to the 50- or 100-year storm event may be appropriate. Less critical crossings in flat areas may be sufficient to pass only the 10-year event. Crossings should always be designed in a manner that does not cause flooding. When a structure that is damaged or destroyed is replaced with a structure of the same size, type, and design, it is reasonable to expect that the new structure will be at risk for future damage as well. Development of design standards is recommended for all new and replacement structures.

13. *Protect Individual Properties* – A variety of measures are available to protect existing public and private properties from flood damage, including elevation of structures, construction of barriers, floodwalls and earthen berms, dry or wet floodproofing, and utility modifications within the structure. While broader mitigation efforts are most desirable, they often take time and money to implement. On a case-by-case basis, where structures are at risk, individual floodproofing

should be explored. Property owners within FEMA delineated floodplains should also be encouraged to purchase flood insurance under the NFIP and to make claims when damage occurs.

The above recommendations are graphically depicted on the following pages. Table 4 provides an estimated cost range for key recommendations.

TABLE 4
Cost Range of Recommended Actions

	Approximate Cost Range				
Oriskany Creek Recommendations	< $100k	$100k-$500k	$500k-$1M	$1M-$5M	>$5M
Bridge Replacement in Upper Oriskany					X
Remove or Modify Structures Near STA 436+00					X
Dam Removal at STA 81+50		X			
Modify Bridge at Route 69		X			
Remove Earthen Levee	X				
Replacement of Undersized Bridges in Lower Oriskany					X
Develop and Implement a Stream Repair and Maintenance Program	X				
Install and Monitor a Stream Gauge	X				

WATER BASIN ASSESSMENT AND FLOOD HAZARD MITIGATION ALTERNATIVES ORISKANY CREEK, ONEIDA COUNTY, NEW YORK

High-Risk Area #1: Undersized Bridges on Upper Oriskany Creek

Site Description: Along upper Oriskany Creek, several bridges cause the creek to overtop its banks during flood events because they are acting as hydraulic constrictions. In many cases, these bridges fail to span even the bankfull channel width, and according to FEMA profiles, are acting as hydraulic constrictions during flood conditions.

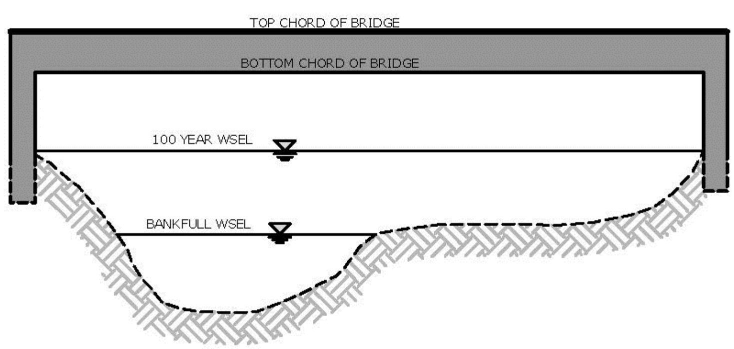
The bridges where some of the most severe flooding to buildings and property has been reported are the Route 315 Bridge (STA 936+50) and the Norton Avenue Bridge (STA 554+00). The FEMA profiles identify additional bridges that are acting as hydraulic constrictions, but where no flooding of structures has been reported, due in part to the low density of development in proximity to many of these crossings. These include Van Hyning Road (STA 1096+00), Lumbard Road (STA 752+00), Route 12B (STA 692+00), and College Street (STA 603+00).



Recommendations:

- Prioritize the most severely flood prone, undersized bridges for replacement. These include Route 315 (STA 936+50) and Norton Avenue (STA 554+00).
- Prioritize second tier undersized bridges for replacement, as funding becomes available. These include Van Hyning Road (STA 1096+00), Lumbard Road (STA 752+00), Route 12B (STA 692+00), and College Street (STA 603+00).
- Replace bridges with structures that are large enough to span the creek's bankfull width and convey flood flows without causing hydraulic constriction.

	BENEFITS
✓	Improved safety
✓	Reduction in debris jams
✓	Improved hydraulic capacity
✓	Reduced flood hazard
✓	Improved ecological connectivity



TYPICAL UNCONSTRAINED BRIDGE CROSSING

MILONE & MACBROOM®

WATER BASIN ASSESSMENT AND FLOOD HAZARD MITIGATION ALTERNATIVES
ORISKANY CREEK, ONEIDA COUNTY, NEW YORK

High-Risk Area #2: Low Head Dam at STA 436+00

Site Description: This dam is located approximately 3,000 feet downstream of Route 5 in Kirkland. The dam is acting to significantly increase water surface elevations through Kirkland extending upstream of the Route 5 Bridge. A sediment bar has formed upstream of the dam. The hydraulics in this reach are complex and include the backwater from the dam as well as numerous under-sized downstream bridges.

Location of dam (STA 436+00)

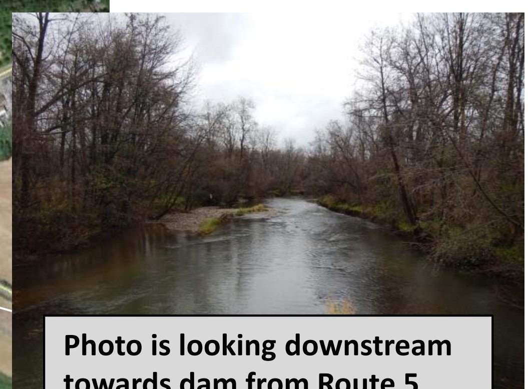


Photo is looking downstream towards dam from Route 5

Recommendations:

- Remove the dam, thus reducing water surface elevations in the vicinity of Route 5 during flood events. Removal of the dam would have additional benefit of improving aquatic connectivity. Accumulated sediments behind the dam would need to be either stabilized or removed.
- If dam removal is considered, analysis of the hydraulics of the downstream bridges must be taken into consideration when evaluating flood mitigation improvements.

	BENEFITS
✓	Improved safety
✓	Reduced water surface elevations
✓	Reduced flood hazard
✓	Improved ecological connectivity

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WATER BASIN ASSESSMENT AND FLOOD HAZARD MITIGATION ALTERNATIVES ORISKANY CREEK, ONEIDA COUNTY, NEW YORK

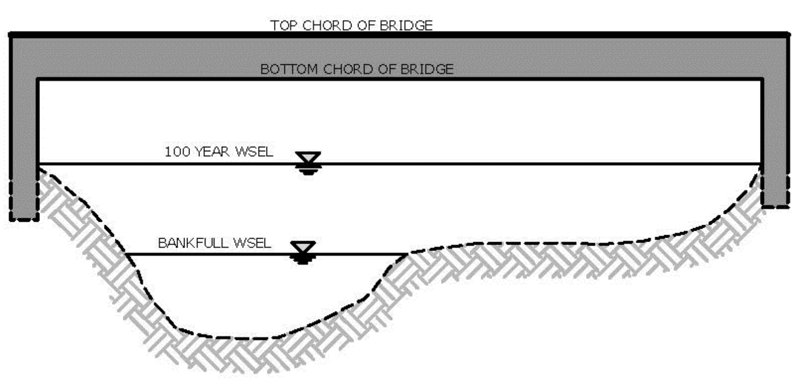
High-Risk Area #2: Undersized Bridges Downstream of Kirkland

Site Description: Undersized bridges downstream of Kirkland contribute to flooding conditions in the area. These include the Main Street Bridge (STA 390+00), an abandoned railroad bridge (STA 385+00), the Peckville Road Bridge (STA 310+00), and the Stone Road Bridge (STA 278+00). The backwater from these bridges reaches the dam at STA 436+00.

Recommendations:

- Replace undersized bridges at Main Street (STA 390+00), the abandoned railroad (STA 385+00), Peckville Road (STA 310+00), and Stone Road (STA 278+00).
- When evaluating the hydraulics for any one of these structures, the hydraulics of the others should be considered as well as the effects of the upstream dam. This reach of Oriskany Creek is complex and changes from one structure affect the hydraulics of the others and vice versa.

BENEFITS
Improved safety
Reduction in debris jams
Improved hydraulic capacity
Reduced flood hazard
Improved ecological connectivity



TYPICAL UNCONSTRAINED BRIDGE CROSSING

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WATER BASIN ASSESSMENT AND FLOOD HAZARD MITIGATION ALTERNATIVES
ORISKANY CREEK, ONEIDA COUNTY, NEW YORK

High-Risk Area #3: Dam at STA 81+50

Site Description: According to the FEMA profile, the dam at STA 81+50 creates an increase in water surface elevation upstream of the dam by more than 5 feet during the 10-year flood event, which is contributing to flooding and flood-related damages along Valley Road. In flood events larger than the 10-year frequency flood, the backwater effect caused by hydraulic constrictions at the Utica Street Bridge (at STA 56+50, approximately 2,500 feet downstream of the dam) reaches upstream of the dam and combines with the backwater effect of the dam to raise water surface elevations through this reach.

Recommendations:

- Remove the dam to reduce water surface elevations along Valley Road during moderate flood events.
- Stabilize or remove accumulated sediments behind the dam.

	BENEFITS
✓	Improved safety
✓	Reduced water surface elevations
✓	Reduced flood hazard
✓	Improved ecological connectivity

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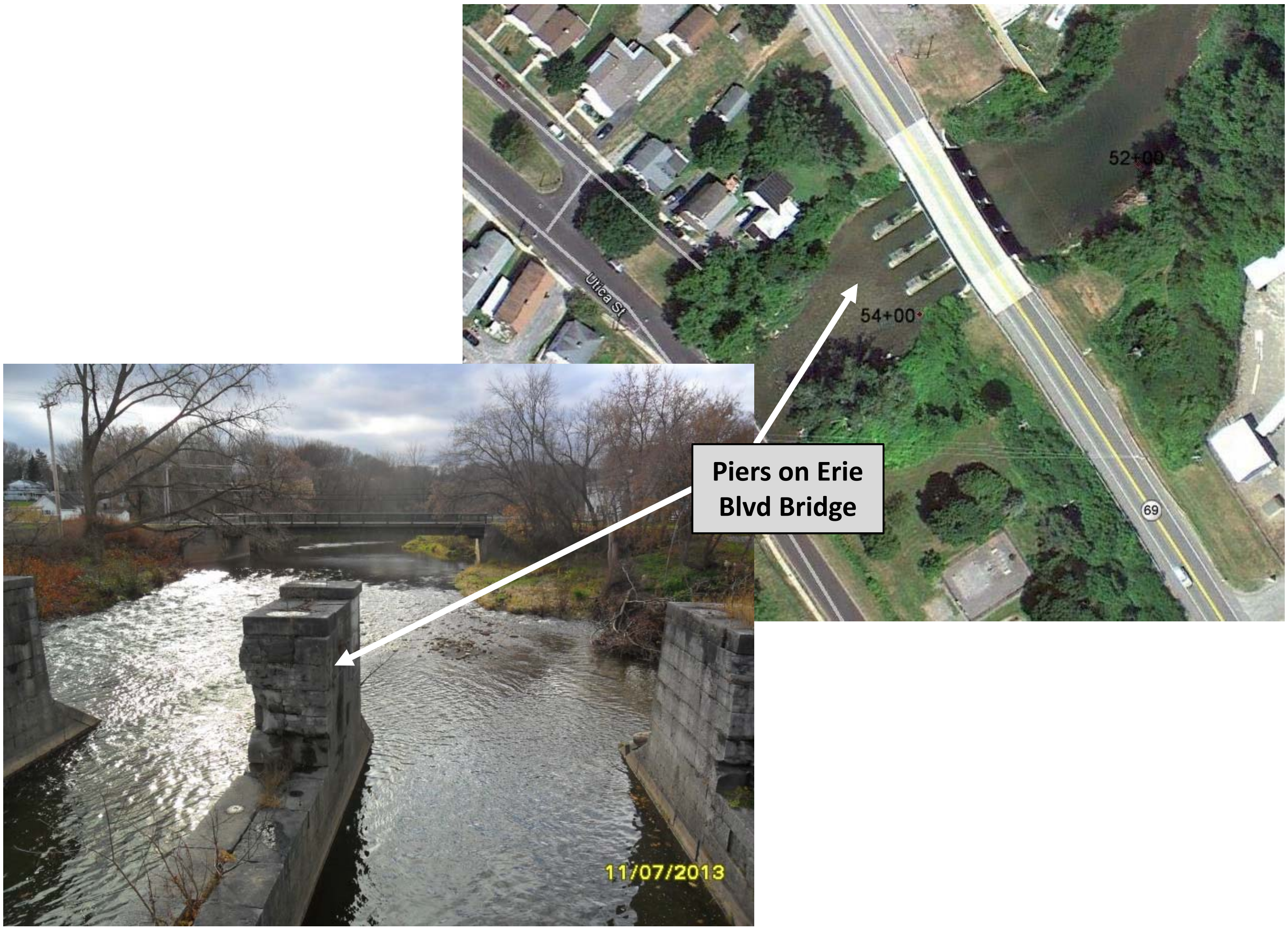
WATER BASIN ASSESSMENT AND FLOOD HAZARD MITIGATION ALTERNATIVES
ORISKANY CREEK, ONEIDA COUNTY, NEW YORK

High-Risk Area #3: Modification/Removal of Piers at Erie Boulevard Bridge

Site Description: The Erie Boulevard (Route 69) Bridge at STA 53+50 is the site of frequent jams of woody debris that contribute to flooding problems in Oriskany.



Recommendations:

- Modify the Erie Boulevard Bridge to reduce the geometry and number of piers to reduce the frequency of debris jams and improve hydraulic capacity at the bridge.

	BENEFITS
✓	Improved safety
✓	Reduction in debris jams
✓	Improved hydraulic capacity
✓	Reduced flood hazard

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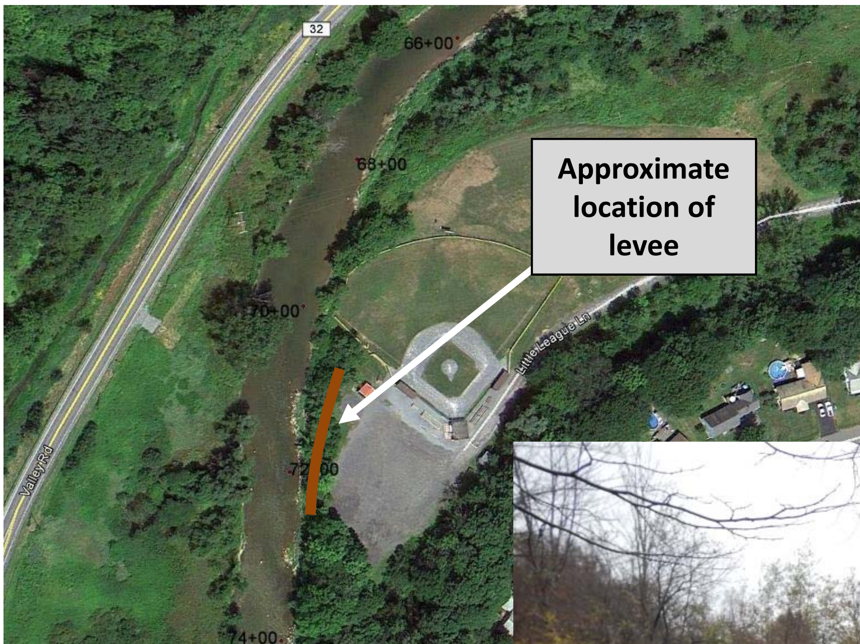
WATER BASIN ASSESSMENT AND FLOOD HAZARD MITIGATION ALTERNATIVES
ORISKANY CREEK, ONEIDA COUNTY, NEW YORK

High-Risk Area #3: Removal of Levee at Little League Field

Site Description: During field inspections, a recently constructed earthen levee was observed between the Little League fields and Oriskany Creek, approximately between STA 72+00 and STA 69+00. The levee separates Oriskany Creek from its natural floodplain, thus reducing flood storage and potentially exacerbating flooding at points further downstream.



Recommendations:

- Completely remove the levee.

	BENEFITS
✓	Reconnect creek with floodplain
✓	Reduced flood hazard

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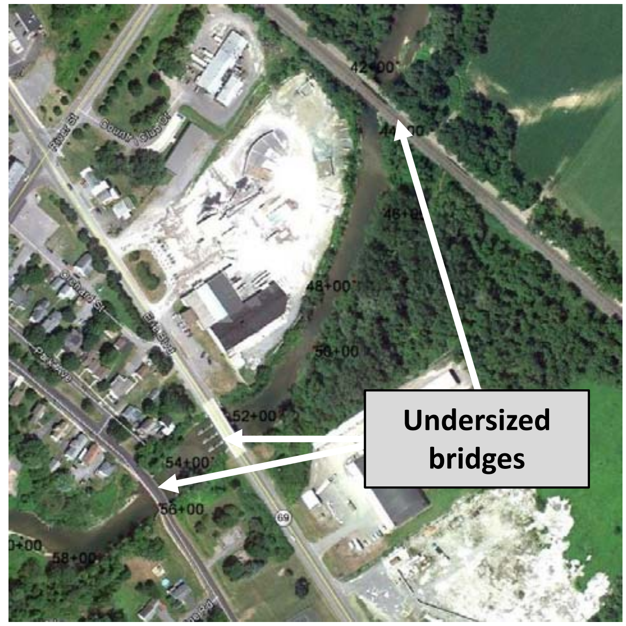
WATER BASIN ASSESSMENT AND FLOOD HAZARD MITIGATION ALTERNATIVES
ORISKANY CREEK, ONEIDA COUNTY, NEW YORK

High-Risk Area #3: Undersized Bridges in Oriskany

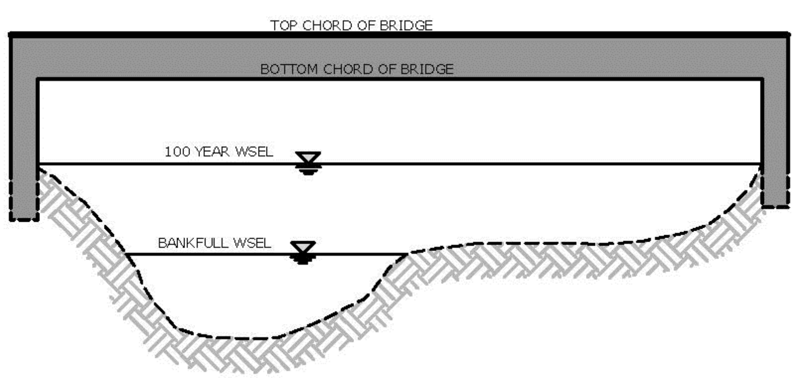
Site Description: Bridges at Utica Street (STA 56+50), Erie Boulevard (STA 53+50), and the railroad (STA 43+50) serve as hydraulic constrictions during flood flows.



Recommendations:

- Remove or replace one or a combination of these three bridges to provide the largest flood mitigation. Due to the close proximity of Utica Street and Erie Boulevard, it may be feasible and cost effective to replace one of these bridges with a larger structure and remove the other, routing traffic over the one remaining bridge.
- The hydraulic analysis and design will need to take into account the backwater effect of the Mohawk River.

	BENEFITS
✓	Improved safety
✓	Reduction in debris jams
✓	Improved hydraulic capacity
✓	Reduced flood hazard
✓	Improved ecological connectivity



TYPICAL UNCONSTRAINED BRIDGE CROSSING

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APPENDIX A

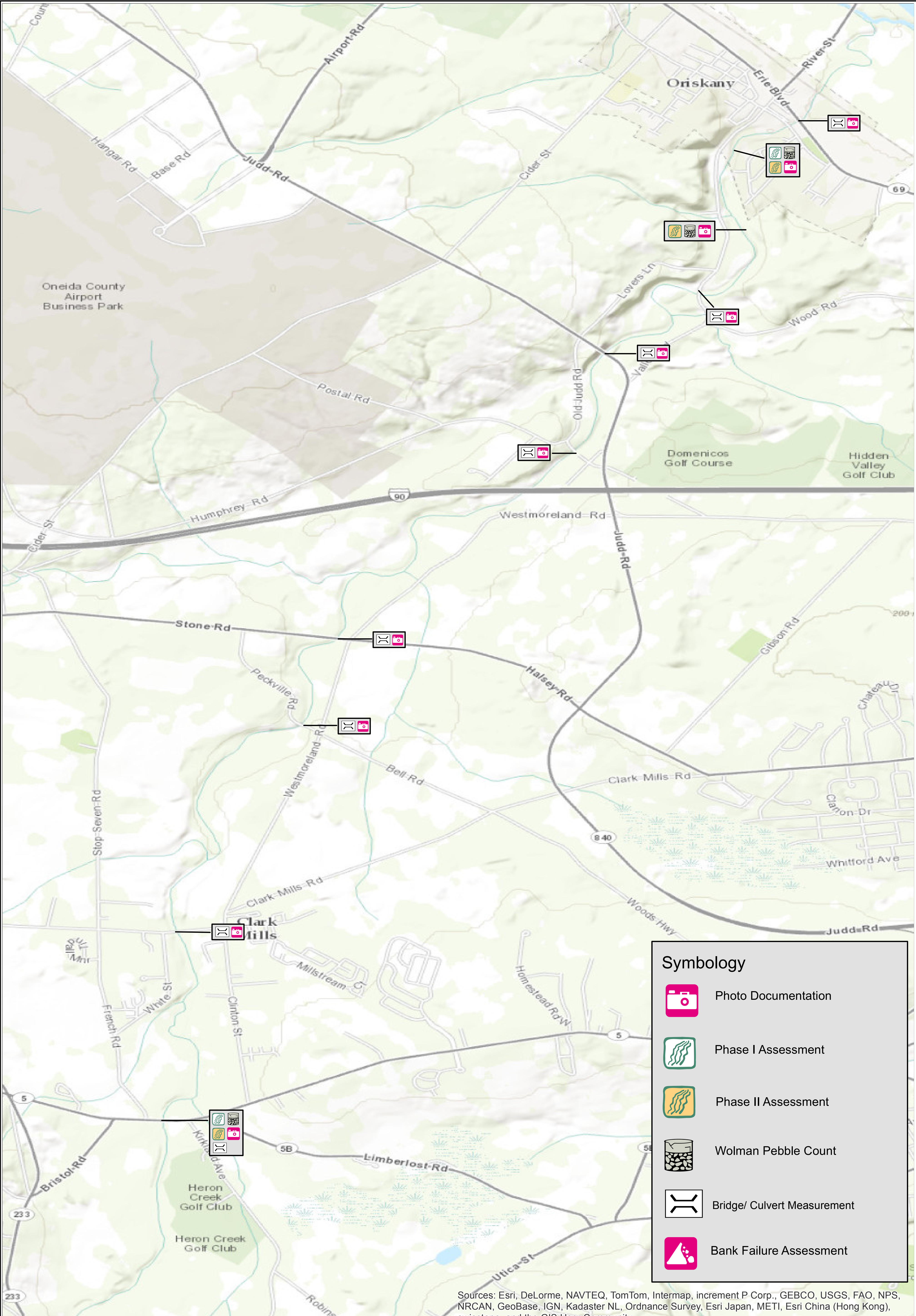
Summary of Data and Reports Collected

ATTACHMENT A: DATA INVENTORY

Year	Data Type	Document Title	Author
2013	Presentation	Flood Control Study for Fulmer Creek	Schnabel Engineering
2012	Map	Sauquoit Creek Watershed/Floodplain Map	Herkimer-Oneida Counties Comprehensive Planning Program
2011	Report	Oriskany Creek Conceptual Plan and Feasibility Study for Watershed Project	Oneida County SWCD
2009	Presentation	Ice Jam History and Mitigation Efforts	National Weather Service, Albay NY
2007	Report	Cultural Resources Investigations of Fulmer, Moyer, and Steele Flood Control Projects	United States Army Corps of Engineers (USACE)
2006	Report	Riverine High Water Mark Collection, Unnamed Storm	Federal Emergency Management Agency (FEMA)
2005	Report	Fulmer Creek Flood Damage Control Feasibility Study	United States Army Corps of Engineers (USACE)
2005	Report	Steele Creek Flood Damage Control Feasibility Study	United States Army Corps of Engineers (USACE)
2004	Report	Fulmer Creek Basin Flood Hazard Mitigation Plan	Herkimer-Oneida Counties Comprehensive Planning Program
2004	Report	Moyer Creek Basin Flood Hazard Mitigation Plan	Herkimer-Oneida Counties Comprehensive Planning Program
2004	Report	Steele Creek Basin Flood Hazard Mitigation Plan	Herkimer-Oneida Counties Comprehensive Planning Program
2003	Report	Fulmer, Moyer, Steele Creek - Stream Bank Erosion Inventory	Herkimer-Oneida Counties Comprehensive Planning Program
1997	Report	Sauquoit Creek Watershed Management Strategy	Herkimer-Oneida Counties Comprehensive Planning Program
2011	Report	Flood Insurance Study (FIS), Herkimer County	Federal Emergency Management Agency (FEMA)
2011	Report	Flood Insurance Study (FIS), Montgomery County	Federal Emergency Management Agency (FEMA)
2013	Report	Flood Insurance Study (FIS), Oneida County	Federal Emergency Management Agency (FEMA)
2010	Report	Bridge Inspection Summaries, Multiple Bridges	National Bridge Inventory (NBI)
2002	Hydraulic Models	Flood Study Data Description and Assembly - Rain CDROM	New York Department of Enviromental Conservation (NYDEC)
2013	Data	June/July 2013 - Post-Flood Stream Assessment	New York State Department of Transportation (NYSDOT)
2013	GIS Data	LiDAR Topography, Street Mapping, Parcel Data, Utility Info, Watersheds	Herkimer-Oneida Counties Comprehensive Planning Program
2013	GIS Data	Aerial Orthographic Imagery, Basemaps	Microsoft Bing, Google Maps, ESRI
2011	GIS Data	FEMA DFIRM Layers	Federal Emergency Management Agency (FEMA)
2013	Data	Watershed Delineation and Regression Calculation	US Geological Survey (USGS) - Streamstats Program

APPENDIX B

Field Data Collection Forms



SOURCE(S):

Appendix B-1: Oriskany Creek Data Collection Points

Location:
Oneida County, New York

N

NYDOT: Emergency Transportation Infrastructure Recovery

Map By: CMP
MMI#: 5231-01
MXD: Y:\5231-01\GIS\Maps\Phase II Icon Maps\Oriskany 11-1.mxd
1st Version: 12/12/2013
Revision: 12/12/2013
Scale: 1 in = 2,500 ft

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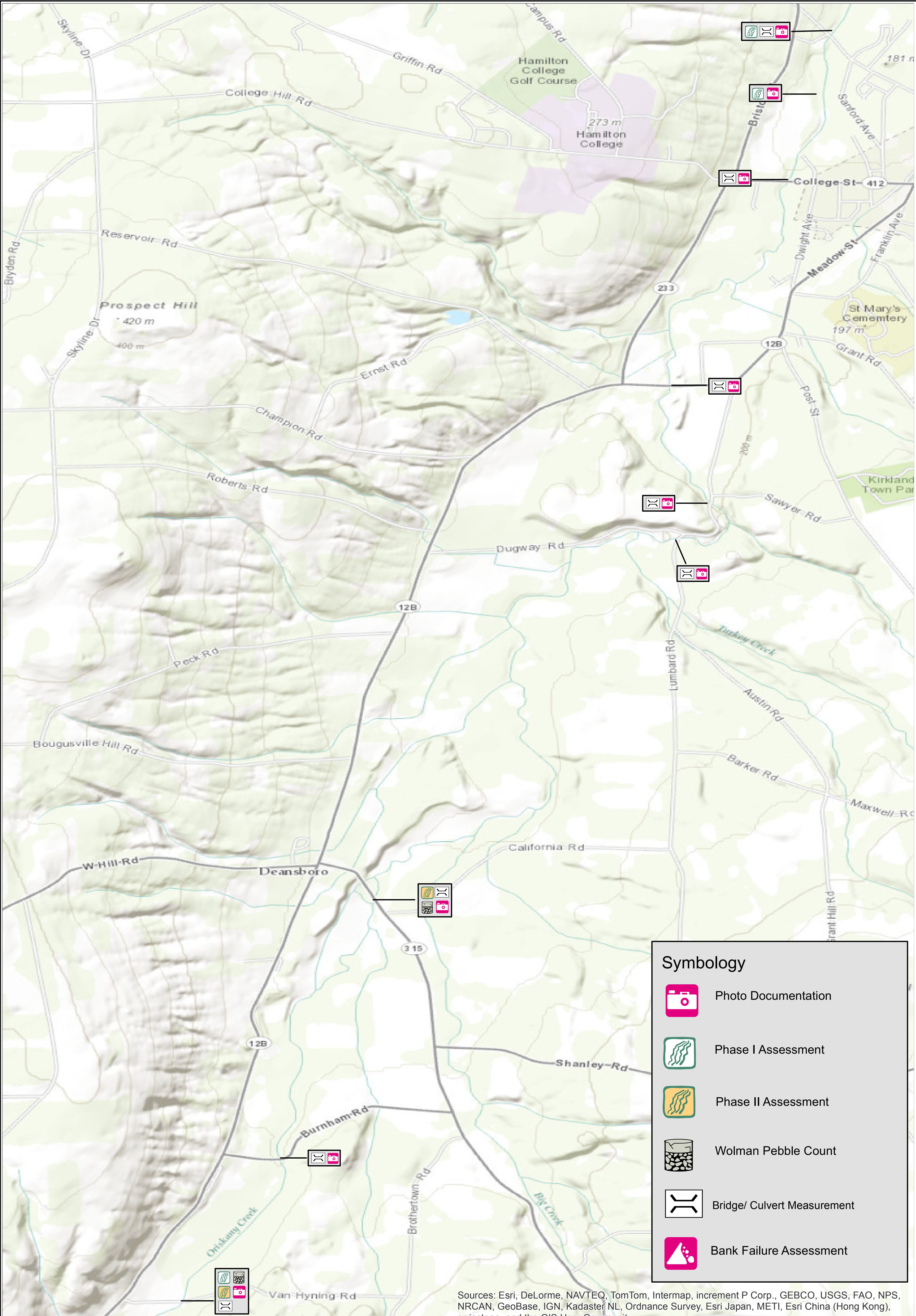

SOURCE(S):	Appendix B-2: Oriskany Creek Data Collection Points	Location: Oneida County, New York

N

NYDOT: Emergency Transportation Infrastructure Recovery

Map By: CMP
MMI#: 5231-01
MXD: Y:\5231-01\GIS\Maps\Phase II Icon Maps\Oriskany 11-2.mxd
1st Version: 12/12/2013
Revision: 12/12/2013
Scale: 1 in = 2,500 ft

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MMI Project #5231-01 Phase I River Assessment Reach Data

River ________________ Reach _____________ U/S Station _______________ D/S Station ___________

Inspectors __________________ Date ______________ Weather ___________________________________

Photo Log ____

A) Channel Dimensions: Bankfull
Width (ft) __________
Depth (ft) __________

Watershed area at D/S end of reach (mi^2) ___________

B) Bed Material:

Bedrock	Boulders	Cobble
Gravel	Sand	Clay
Concrete	Debris	Riprap

Notes: ____

C) Bed Stability: Aggradation Degradation Stable Note: ___________________

D) Gradient: Flat Medium Steep Note: ___________________

E) Banks: Natural Channelized Note: _________________

F) Channel Type: Incised Colluvial Alluvial Bedrock Note: __________

G) Structures: Dam Levee Retaining Wall Note: ________________

H) Sediment Sources: ____

I) Storm Damage Observations: ____

____

J) Vulnerabilities: Riverbank Development Floodplain Development Road Trail Railroad

Utility Bridge Culvert Retaining Wall Ball field Notes: _________________

K) Bridges: Structure # _____________ Inspection Report? Y N Date _________________

Notes: ____

Record span measurements if not in inspection report: _____________________________________

Damage, scour, debris: ____

L) Culverts: complete culvert inspection where necessary. Size: ____________________________________

Type: _________________ Notes: ____

____

Phase II River Assessment
Reach Data

River ____________________ Reach ____________ Road _____________ Station ______________

Inspector _________________ Date _____________ Town ____________ County _____________

Identification Number _____________________ GPS # ________________ Photo # ________________

A) River Reach ID _________________________ Drainage Area, sm ________________________
D/S Boundary ______________________________, U/S Boundary ____________________________
D/S STA __________________________________, U/S STA _________________________________
D/S Coordinates ____________________________, U/S Coordinates _________________________

B) Valley Bottom Data:

Valley Type (Circle one)	Confined >80% L	Semiconfined 20-80%	Unconfined <20%
Valley Relief	<20'	20-100'	>100
Floodplain Width	<2 W_b	2-10 W_b	>10 W_b

	Left Side	Right Side
Natural floodplain	_______%	_______%
Developed floodplain	_______%	_______%
Terrace	_______%	_______%
Floodplain Land Use	____________	____________

C) Pattern: Straight S=1-1.05 Sinuous S=1.05 – 1.25 Meanders S=1.25 – 2.0 Highly Meandering S>2.0 Braided Wandering Irregular

D) Channel Profile Form: (Percent by Class in Reach)

Cascades	__________	Alluvial	__________	Channel Transport
Steep Step/Pool	__________	Semi Alluvial	__________	Sed. Source Area
Fast Rapids	__________	Non Alluvial	__________	Eroding
Tranquil Run	__________	Channelized	__________	Neutral
Pool & Riffle	__________	Incised	__________	Depositional
Slow Run	__________	Headcuts	__________	

E) Channel Dimensions (FT):

	Bankfull	Actual Top of Bank	Regional HGR
Width	__________	__________	__________
Depth	__________	__________	__________
Inner Channel Base Width	__________		
W/D Ratio	__________		

F) Hydraulic Regime:
Mean Bed Profile Slope _______________ Ft/Ft
Observed Mean Velocity ______________________ FPS

G) Bed Controls:

Bedrock	Weathered Bedrock	Dam
Static Armor	Cohesive Substrate	Bridge
Boulders	Dynamic Armor	Culvert
Debris	Riprap	Utility Pipe/Casing

Overall Stability ______________________

H) Bed Material:

D50 __________

Bedrock	__________	Sand	__________	Riprap	__________
Boulders	__________	Silt and Clay	__________	Concrete	__________
Cobble and Boulder	__________	Glacial Till	__________		
Gravel and Cobble	__________	Organic	__________		
Sand and Gravel	__________				

I) Flood Hazards:

Developed Floodplains	Bank Erosion
Buildings	Aggradation
Utilities	Sediment Sources
Hyd. Structures	Widening

Bridge Waterway Inspection Summary

River ____________________ Reach ____________ Road _____________ Station ______________

Inspector _________________ Date _____________ NBIS Bridge Number ____________________

NBIS Structure Rating _____________________ Year Built __________________________________

Bridge Size & Type _______________________ Skew Angle ________________________________

Waterway Width (ft) ______________________ Waterway Height (ft) _________________________

Abutment Type (circle) Vertical Spill through Wingwalls

Abutment Location (circle) In channel At bank Set back

Bridge Piers _____________________________ Pier Shape __________________________________

Abutment Material ________________________ Pier Material ________________________________

Spans % Bankfull Width ____________________ Allowance Head (ft) __________________________

Approach Floodplain Width _________________ Approach Channel Bankfull Width _______________

Tailwater Flood Depth or Elevation ___________ Flood Headloss, ft ____________________________

	Left Abutment	Piers	Right Abutment
Bed Materials, D_{50}			
Footing Exposure			
Pile Exposure			
Local Scour Depth			
Skew Angle			
Bank Erosion			
Countermeasures			
Condition			
High Water Marks			
Debris			

Bed Slope	Low	Medium	Steep
Vertical Channel Stability	Stable	Aggrading	Degrading
Observed Flow Condition	Ponded	Flow Rapid	Turbulent

Lateral Channel Stability ____

Fish Passage ____

Upstream Headwater Control ____

Project Information	
Project Name	
Project Number	
Stream / Station	
Town, State	
Sample Date	
Sampled By	
Sample Method	Wolman Pebble Count

Particle Distribution (%)	
silt/clay	
sand	
gravel	
cobble	
boulder	
bedrock	

Sample Site Descriptions by Observations	
Channel type	
Misc. Notes	

Particle Sizes (mm)	
D16	
D35	
D50	
D84	
D95	

(Bunte and Abt, 2001)

Particle Name	Size Limits (mm) lower	upper	Tally	Count	Percent Passing	Cumulative % Finer
silt/clay	0	**0.063**			0.0	0.0
very fine sand	0.063	**0.125**			0.0	0.0
fine sand	0.125	**0.250**			0.0	0.0
medium sand	0.250	**0.500**			0.0	0.0
coarse sand	0.500	**1**			0.0	0.0
very coarse sand	1	**2**			0.0	0.0
very fine gravel	2	**4**			0.0	0.0
fine gravel	4	**5.7**			0.0	0.0
fine gravel	5.7	**8**			0.0	0.0
medium gravel	8	**11.3**			0.0	0.0
medium gravel	11.3	**16**			0.0	0.0
coarse gravel	16	**22.6**			0.0	0.0
coarse gravel	22.6	**32**			0.0	0.0
very coarse gravel	32	**45**			0.0	0.0
very coarse gravel	45	**60**			0.0	0.0
small cobble	60	**90**			0.0	0.0
medium cobble	90	**128**			0.0	0.0
large cobble	128	**180**			0.0	0.0
very large cobble	180	**256**			0.0	0.0
small boulder	256	**362**			0.0	0.0
small boulder	362	**512**			0.0	0.0
medium boulder	512	**1024**			0.0	0.0
large boulder	1024	**2048**			0.0	0.0
very large boulder	2048	**4096**			0.0	0.0
bedrock	4096	**-**			0.0	0.0
			Total	0	0.0	-

(Wenthworth, 1922)

F-T Particle Sizes (mm)	
F-T n-value	0.5
D16	
D5	

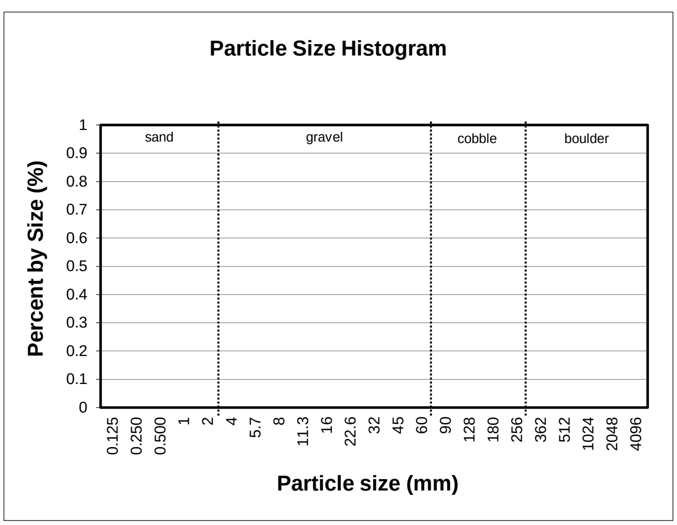
(Fuller and Thompson, 1907)

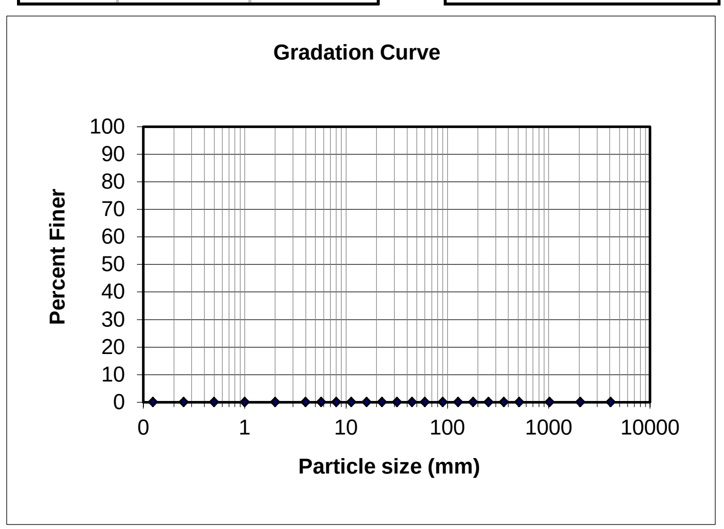
D (mm) of the largest mobile particles on bar	
Mean	

Riffle Stability Index (%)

(Kappesser, 2002)

Notes





APPENDIX C

Oriskany Creek Photo Log

99 Realty Drive
Cheshire, Connecticut 06410
(203 271-1773

Oriskany Creek
Photo Log

PROJECT PHOTOS

PHOTO NO.:

1

DESCRIPTION:

Looking downstream from bridge at Van Hyning Road at STA 1096+00. Oriskany Creek has overtopped its banks as a result of this undersized bridge.

PHOTO NO.:

2

DESCRIPTION:

Oriskany Creek at STA 575+00, approximately 2,000 feet upstream of the Norton Avenue Bridge, looking in a downstream direction. The creek has overtopped its banks in this area due to a backwater condition created by the bridge.

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(203 271-1773

PHOTO NO.: **3** DESCRIPTION: Norton Avenue Bridge (STA 554+00) viewed from downstream. This bridge is undersized and creates a hydraulic constriction.	
PHOTO NO.: **4** DESCRIPTION: At Route 5 Bridge in Kirkland (STA 466+00) looking downstream towards low head dam. The dam causes an increase in water surface elevations through this area.	

99 Realty Drive
Cheshire, Connecticut 06410
(203 271-1773

PHOTO NO.:

5

DESCRIPTION:
Low head dam on Oriskany Creek at STA 81+00. The dam causes an increase in water surface elevations along Valley Road.

PHOTO NO.:

6

DESCRIPTION:
View from Erie Blvd (STA 53+50) looking upstream towards Utica Street Bridge (STA 56+50). Piers on the Erie Blvd bridge are visible in the foreground. The piers and the undersized bridges contribute to ice jams and flooding in this area.

PHOTO NO.: **7** DESCRIPTION: Earthen levee at ball field in Oriskany. The levee separates Oriskany Creek from its floodplain and could potentially exacerbate flooding problems. It should be removed.	
PHOTO NO.: **8** DESCRIPTION: View looking downstream towards the Mohawk River from the Erie Blvd Bridge (STA 53+50). Oriskany Creek downstream of this area is influenced by water levels on the Mohawk River during flood events.